2006 AIR Research Grant Proposal

Correlates of Decision Making: Factors Associated with Degree Completion and Employment

Data sets of interest:

Baccalaureate and Beyond
Beginning Postsecondary Student Longitudinal Survey
Scientist and Engineer Statistics Data System

Grant Amount Requested: $29,856.61

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Project Summary

Grounded in Prospect Theory, the primary goal of the proposed study is to investigate correlates of student decision making related to baccalaureate degree completion and choices of employment among students attending and graduating from U.S. colleges and universities. The specific aims of the proposed research are:

1. To investigate factors associated with (a) baccalaureate degree completion, (b) choices of employment, and (c) entry into graduate school among students attending U.S. colleges and universities.
2. To examine predictors of (a) baccalaureate degree completion, (b) choices of employment, and (c) entry into graduate school among subpopulations of students attending U.S. colleges and universities.
3. To investigate the extent to which Prospect Theory will be a fruitful mechanism for examining students' decisions related to postsecondary education.
4. To compare factors associated with (a) baccalaureate degree completion, (b) choices of employment, and (c) entry into graduate school among science and engineering students and non-science and engineering students attending U.S. colleges and universities.

Findings will be discussed in relation to Prospect Theory and recommendations will be made for future investigation of areas important to student decision making that may not currently be included in NCES and NSF surveys.

The independent variables in this study are six categories of factors including *family background, academic performance, career and academic goals, personal and financial responsibilities, academic self-efficacy,* and *perceived family or social support.* These variables will serve as predictors of students' decisions relative to *degree completion, choice of employment,* and *entry into graduate schools*. Each of the predictors will be constructed using different indicators to represent different points of time in higher education (during pursuit of the baccalaureate degree and post-graduation).

The first step in a multistage analysis process will be data cleaning which involves examination of anomalous data pattern values, missing data and distributions of the variables of interest, followed by variable reduction (i.e., construction of composite and derived variables), where applicable. The next step will be the application of sample weights and computing weight adjustments, followed by analyses of the data. Univariate

procedures will be used to examine variable frequencies, means, standard deviations, variances, skewness and kurtosis. Bivariate and multivariate analyses will be used to address the objectives of the study. Examples of bivariate and multivariate procedures to be employed include bivariate correlations, logistic regression, principal component analysis, and confirmatory factor analysis.

Three data bases maintained by the National Center of Educational Statistics (NCES) and/or the National Science Foundation (NSF) are of primary interest in this study: 1) Baccalaureate and Beyond (1992), 2) Beginning Postsecondary Student Longitudinal Survey (1990); 3) Scientist and Engineer Statistics Data System (1993, 1995, 1997, and 1999). The third database of interest includes data from three NSF surveys-- the National Survey of Recent College Graduates, the National Survey of College Graduates, and the Survey of Doctorate Recipients.

This research will directly inform policy-makers and administrators at post-secondary institutions on factors that influence critical decisions made by their students. The dynamic nature of Prospect Theory permits an examination of the extent to which factors are more influential in decision-making at different times of progression through a student's post-secondary academic experiences. As such, the findings will permit policy and decision-making, such as efficient use of limited resources, to be based on evidence related to both student characteristics and critical periods in students' academic careers.

Although frequently used in other domains of research (e.g., business, economics, and cognitive psychology), Prospect Theory rarely has been applied in the field of education. The utilization of Prospect Theory in the proposed research allows for the propensity of factors that influence undergraduate and graduate student decisions to change as their situation changes. Further, the application of Prospect Theory to data available in the NCES and NSF databases may yield new research tools and procedures that can be applied to the analysis of the dynamic variables that are common in the field of education. Thus, this project will not only serve to inform the applied audience (post-secondary policy-makers, administrators and scholars) of the research findings but also has implications for the methods used in conducting research. As such, this project has the potential to provide information and techniques that will enhance social science research methods in general.

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Project Description

a. Statement of Problem and Variables: Postsecondary education is a critical component for maximizing opportunities in the labor market. It is anticipated that the need for a highly educated work force will continue for years to come. Clark, Jeserich, and Toft (2004) suggest that U.S. jobs requiring a bachelor's degree are expected to increase by 24% through the year 2010. Estimates reveal that in today's market, 75% of workers need a postsecondary education for gainful employment, yet, many students who embark on the postsecondary education journey do not make it through their first college year (National Center on Education and the Economy, 1990 as cited in Long, n.d.). Although profiles are available for students who do and do not obtain a postsecondary education, little is known about the decisions made pertaining to postsecondary education. To better prepare tomorrow's work force by increasing the number of students who receive a postsecondary education, it is imperative to understand decisions about postsecondary education.

Within the context of Prospect Theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992), factors associated with students' decisions regarding their pursuit of postsecondary education (namely, the baccalaureate degree) and decisions made after attainment of the bachelor's degree (post-graduation) will be investigated. The six categories of factors of interest are *family background, academic performance and persistence, career and academic goals, personal and financial responsibilities, academic self-efficacy,* and *perceived family or social support* (Breen & Yaish, 2003; Osbourne, Marks & Turner, 2004; Robbins, Lauver, Le, Davis, Langley, & Carlstrom, 2004; Leech & Zepke, 2005). Specifically, for each of these factors the magnitude of association and capability to predict degree attainment, choices of employment, and pursuit of further studies (e.g., pursuit of a graduate degree) will be explored. The examination of the association and predictability of these factors will be conducted at two stages: during pursuit of the baccalaureate degree (postsecondary education level) and at the post baccalaureate graduation level (e.g., during employment or pursuit of graduate studies).

Although the categories of factors are broad, they can be defined by identifying specific variables of interest. A sample of these variables and the stage at which they will be examined are summarized in Table 1.

Table 1
A sample of variables defining each factor of interest

Factor	Post Secondary	Post Graduation
Family Background	whether the student's home had i) 50 or more books and ii) a personal computer; the student's dependency status; whether the	marital status, number of dependents, spouse's highest educational level.

	student had first child before during, or after postsecondary education;	

Table 1 (continued)

A sample of variables defining each factor of interest

Factor	Post Secondary	Post Graduation
Academic Performance and Persistence	undergraduate GPA, number of types of remedial instruction courses received; number of institutions attended; number of months elapsed to first degree attainment	high school GPA, undergraduate major GPA, time between high school graduation and starting degree; graduate degree start date, stop date and earned date
Career and Academic Goals	employment plans, and background goals such as finding steady work, giving own children better opportunity, and being well off financially	applied to graduate school, immediate and long term degree expectations; reasons for choosing current career; employment expectations in 2 years; expected occupation long term; reasons for not working; educational field of study; reasons for working outside degree field; and reasons for changing employers
Personal and Financial Responsibility	Total aid received (state, Federal, grant, loan, other	vehicles/house/condo ownership, total amount borrowed, total of monthly payments for education debt, total monthly debt burden.
Academic Self-Efficacy	social self confidence, highest level of education ever expected to complete, academic ability, mathematical ability, intellectual confidence, writing ability	highest level of education ever expected, considered attending graduate school
Perceived Family or Social Support	parents' highest level of education	spouse currently enrolled in school; parents' highest level of education

b. Proposal of Work and Databases of Interest: Grounded in Prospect Theory, the primary goal of the proposed study is to investigate correlates of student decision-making related to baccalaureate degree completion and choices of employment among students attending and graduating from U.S. colleges and universities. Using the Baccalaureate and Beyond, Beginning Postsecondary Student Longitudinal Survey, and Scientist and Engineer Statistics Data System databases, specific aims of the proposed research are:

1. To investigate factors associated with (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among students attending U.S. colleges and universities.

2. To examine predictors of (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among subpopulations of students attending U.S. colleges and universities.

3. To investigate the extent to which Prospect Theory will be a fruitful mechanism for examining students' decisions related to postsecondary education.

4. To compare factors associated with (a) baccalaureate degree completion, (b) choices of employment, and (c) entry into graduate school among science and engineering students and non-science and engineering students attending U.S. colleges and universities.

Findings will be discussed in relation to Prospect Theory and recommendations will be made for future investigation of areas important to decision making that may not currently be included in NCES and NSF surveys.

Background and Conceptual Framework

Commencing a baccalaureate degree program is a major event that impacts students' lives. For many students this decision frames the rest of their academic decisions until graduation. For most students each term the decision to continue their studies must be reaffirmed. In fact, the U.S. Department of Education, National Center for Education Statistics (2005c) reported only 50% percent of all students who take some college courses complete their baccalaureate degrees.

Students typically withdraw from college for three reasons: (1) they are required to leave for academic difficulties; (2) they transfer to another institution; or (3) they voluntarily choose to end their post-secondary education (Tinto, 1975). Broad categories of factors that potentially affect students' decisions to continue or drop out of college include family background factors; academic performance; career and academic goals; personal and financial responsibilities; academic self-efficacy; and perceived family or social support (Breen & Yaish, 2003; Osbourne, et al., 2004; Robbins, et al., 2004; Leech & Zepke, 2005). Further, evidence suggests that factors involved in students' decision-making for remaining in college have differential importance depending on their stage of educational attainment (Graunke & Woosley, 2005; Osbourne et al., 2004).

Several theoretical models have been proposed as organizational frameworks for understanding and investigating these sets of factors. Tinto's (1975) Student Integration Model proposes a dynamic longitudinal model that explains the continued persistence of students or their withdrawal from college (see Figure 1). Educational perseverance requires successful integration of the student into both the social and academic domains of the institution. Each student's individual characteristics, such as gender, socio-economic status, and ethnicity; prior educational experiences; as well as psychological factors, such as goal commitment and educational expectations impact this integration. The students' on-going social and academic experiences within the institution along with their current perceptions about the value of continuing their education influence their commitment to continue in college and thus their decision to persevere or drop out.

Bean's (1985) Student Attrition Model adds to Tinto's Student Integration Model by explaining the importance of external factors as well as the initial selection process of the institution, and the differentiation of the socialization process over time (see Figure 2). Cabrera, Castaneda, Nora, & Hengstler (1992) confirmed the importance of external factors in the ongoing decision-making process to persevere or dropout of college in a study they conducted to confirm and integrate Tinto's and Bean's models. Although Cabrera, et al. (1992) found support through their research for 70% of the hypotheses posited for Tinto's Student Integration Model and 40% of the hypotheses for Bean's Student Attrition Model, they also found that Tinto's Student Integration Model explained only 38% of students' persistence and 36% of students' intent to persist, while Bean's Student Attrition Model accounted for 44% of students' persistence and 60.3% of students' intent to persist. They attributed the improvement of the Student Attrition Model to the external factors of parental encouragement and support from friends and finances. Bean also proposed that the influence of the misfit of the students' integration into the institution has the greatest influence on the dropout syndrome or the intention to drop out for freshmen; this declines with students' increased time enrolled and attainment of higher academic class status. Another important concept in Bean's model is the active and intentional impact that students have on their academic and social integration.

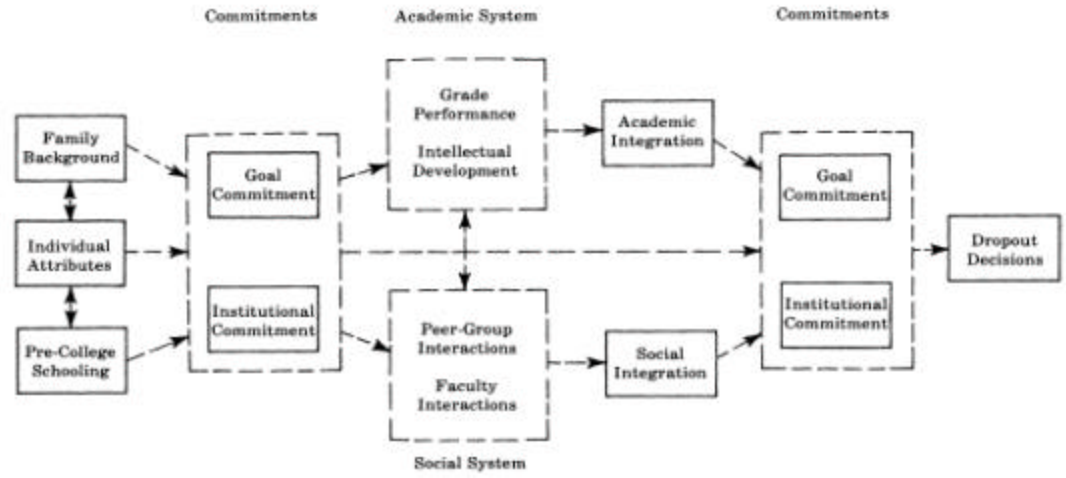

Figure 1. Conceptual Schema for Drop Out from College (Tinto, 1975, p. 95)

If individuals have a conscious impact on their integration process, additional theoretical frameworks, which include motivation, help to explain the components of an Integrated Student Integration/ Attrition Model of college persistence. Alexander's (2003) Model of Domain Learning explains the dynamic process involved during the academic integration within an academic institution as students progress from novice to expert. Students are socialized in their domain of interest as they learn the tacit and overt knowledge and skills and develop deep

processing strategies required by the discipline. Students with high self-efficacy maintain the motivation and focus that is necessary for obtaining expertise by setting appropriate types of goals that they believe are attainable (Bandura, 2001; Covington, 2000; Eccles & Wigfield, 2002; Pintrich, 2000).

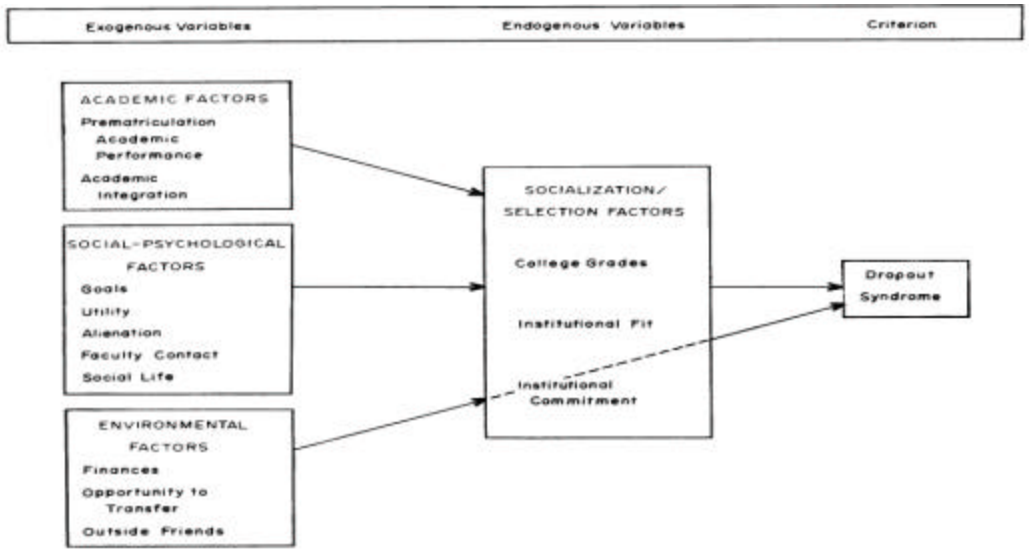

Figure 2. Conceptual Model for Drop Out Syndrome (Bean, 1985, p. 37)

Eccles and Wigfield (2002) explain that Expectancy-Value Theory places the choices of goals and actions in an elaborate system of values, probabilities of attainment, and costs (see Figure 3). Students' perceptions about the difficulty of the task, their perceptions about their competence, their goals, and their self-concept directly affect these values. Choices have positive intrinsic value or utility value as well as cost or negative aspects such as effort or the loss of opportunity for other options. Therefore, the choice to remain in college has value, a probability of attainment of the goal of graduation, and costs in the form of effort and the opportunity for participating in other activities. Eccles and Wigfield recommend further research to study how context affects these goals, values, and choices. Robbins, et al. (2004, p. 264) propose studying the effects of the following constructs: achievement motivation, academic goals, institutional commitment, perceived social support, social involvement, academic self-efficacy, general self-concept, academic-related skills, and contextual influences (including financial support, size of institutions, and institutional selectivity) on students' decisions to persist or dropout of college.

Pintrich (2000) raises the question about the stability of students' goals and suggests that goals are dynamic states that are adapted according to the context. Thus, the levels and types of goals adopted are responsive to situational factors in the environment and fluctuate. Inconsistencies in predicting educational choices or the

persistence of students in college may be due to the dynamic nature of goal choices and their attributed values (Eccles & Wigfield, 2002; Pintrich, 2000). If this is the case, then the variables that affect student intentions for persistence must be measured with methods that take into account their dynamic nature. Several theoretical models have been proposed as organizational frameworks to explain the dynamic aspect of the influence of these sets of factors. For example, Expected Utility Theory (Keeney & Raiffa, 1976) models decision making as a function of final states rather than gains and losses. Conversely, Brennan and Marriott (1996) suggested a generic model of decision making that included social and psychological factors as well as economic influences. However, James (1999) criticized the applicability of such choice models to real-world decision making with limited information.

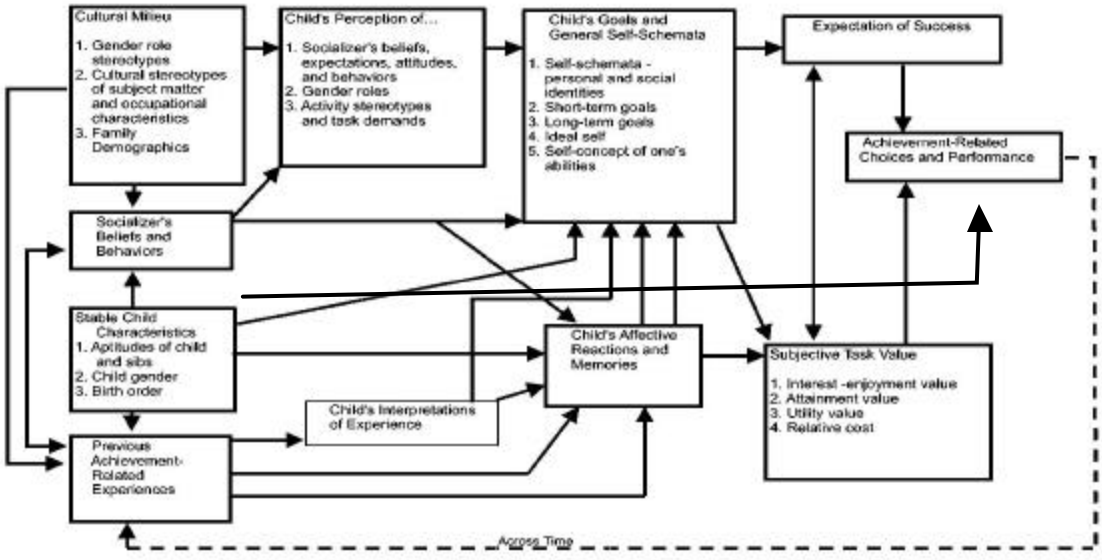

Figure 3. Conceptual Model of Expectancy-Value Theory (Eccles & Wigfield, 2002, p. 119)

A particularly fruitful structure for explaining the influence of the variety of factors is the theoretical framework provided by Prospect Theory (Kahneman & Tversky, 1979; Tversky & Kahneman, 1992). Prospect Theory was developed in the context of economic choices (e.g., purchasing product A vs. product B, investing in stock X vs. stock Y) and has been able to account for individual choice decisions that other models could not. The theory proposes that value of a particular prospect (V), among a set of prospects, is a function of the prospect's payoff or loss if it occurs (x) and the probability of its occurrence (p):

$$V(x, p) ? v(x)w(p)$$

In this equation, *v(x)* represents the subjective value of the consequence of *x*, and *w(p)* is the impact of the probability of the prospect's occurrence on the prospect's attractiveness. Both of these are curvilinear relationships (see Figures 4a and 4b). Kahneman and Tversky (1979) expressed the subject value function as

$$v(x) = x^{\alpha} \quad if \quad x \geq 0, \; and \; = -\lambda(-x)^{\beta} \quad if \quad x < 0$$

Similarly, Lattimore, Baker & Witte (1992) represented the weighting function in a log-odds metric:

$$w(p) = \frac{\delta p^{\gamma}}{\delta p^{\gamma} + (1 - p)^{\gamma}}$$

where δ characterizes the overall elevation of the function and γ determines its curvature.

The decision maker views losses as having more weight than gains; that is, the curve is concave for gains and convex for losses (Kahneman & Tversky, 1979). This can be seen in Figure 4a where movement to the right of neutrality (representing increasing gains) leads to only modest changes in *v(x)*. In contrast, movement to left of neutrality (greater perceived losses) results in large changes in *v(x)*. Thus, students would be more prone to avoiding losses as opposed to committing efforts to attaining their educational goals.

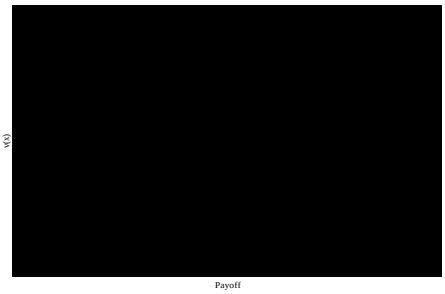

Figure 4a. Perceived value as a function of payoff or loss.

Figure 4b. Attractiveness as a function of probability of occurrence.

In addition, Prospect Theory takes into account the influence of framing effects or the students' current perception of the value of influential factors (Trepela, Fox, & Poldrack, 2005). These broad categories of factors that affect students' decisions to drop out of college or persevere to baccalaureate completion have been the focus of many studies (see, for example, Robbins et al., 2004). Prospect Theory proposes that the students' perceptions of these factors or framing effects are not fixed but are altered by their environment (Trepela, et al., 2005). Decisions to continue or to drop out of college is based on the sum of the weighted values for each of the major variables at the

time the decision is made (Kahneman & Tversky, 1979; Trepela, et al., 2005). Since the students' perceptions of the importance of these variables can be ameliorated, it may be possible to improve student retention in college with specially designed programs. Therefore, it is important to examine how these factors relate to students' decisions to persevere as they progress in attaining their baccalaureate degree (Robbins et al., 2004).

Databases

Three databases maintained by the National Center of Educational Statistics (NCES) and/or the National Science Foundation (NSF) are of primary interest in this study: (1) Baccalaureate and Beyond (B&B), (2) Beginning Postsecondary Student Longitudinal Survey (BPS), and (3) Scientist and Engineer Statistics Data System (SESTAT). The third database, SESTAT includes data from three NSF surveys, the National Survey of Recent College Graduates, the National Survey of College Graduates, and the Survey of Doctorate Recipients. Information from these databases addresses issues such as persistence and completion and has a longitudinal in structure, thus permitting investigation of relationships between characteristics of the students and their subsequent employment and educational activities upon completion of their undergraduate work.

The B&B database contains data collected in three waves from a cohort of students pursuing teaching degrees over a time period of ten years (U.S. Department of Education, National Center for Education Statistics, 2005a). The sample consists of 11,000 students who received the baccalaureate degree in 1992/1993. Follow-up data were then collected in 1997 and 2003. Data from the baseline year are available and include not only demographic and academic information but also expectations (e.g., for employment, advanced studies) of the graduates. Follow-up information in 1997 and 2003 provides information on the individual's employment history, including training, certification status, and income as well as personal and family information. Another cohort of students has been identified from the 2000-2001 school year and are not projected to be part of this study.

The BPS follows students who begin their postsecondary education and have initially completed the National Post Secondary Aid Survey (NPSAS) (U.S. Department of Education, National Center for Education Statistics, 2005b). Approximately 2-5 years after completing the NPSAS, these students are asked questions about their experiences during, and transitions through postsecondary education and into the labor force, as well as family formation through the period under study. Transfers, persisters, stopouts/dropouts, and vocational completers are among those included in the studies. In the first BPS study, about 10,600 students were identified in NPSAS:90 as first-time beginning postsecondary students during the academic year 1989-90. These students were followed in

1992 (BPS:90/92) and again in 1994 (BPS:90/94). A second cohort of first time, beginning students was identified in NPSAS:96; follow-up surveys were conducted in 1998 (BPS:96/98), and in 2001 (BPS:96/2001). The third cohort, identified in NPSAS:04, will be followed in 2006 and 2009 and are not included in the proposed analyses.

The SESTAT database includes data from three different NSF sponsored surveys administered in 1993, 1995, 1997, and 1999 and integrates this information into one resource (National Science Foundation, 2005). Created by NSF, this database provides data for policy analysis and general research. The 1993 surveys include responses from about 200,000 individuals representing a population of 11.6 million scientists and engineers (S&E). The 1995 surveys include responses from about 105,000 individuals, representing 12.0 million S &Es; the 1997 surveys include responses from about 100,000 individuals representing 12.6 million S&Es; and the 1999 surveys include responses from about 87,000 individuals representing 13.1 million scientists and engineers. The 1993 National Survey of College Graduates was a once-a-decade baseline survey in that it also covered the non-S&E population with a bachelor's degree or higher -- about 29 million people.

Data Analysis Variables

The dependent variables in this study are students' decisions regarding (a) degree completion, (b) choice of employment, and (c) graduate school entry. The three dependent variables are dichotomous, coded 0 and 1. For the *degree completion*, 0 = decision not to complete degree, 1 = decision to complete degree. Similarly, for *choice of employment*, 0= decision to not take employment, 1 = decision to take employment. Likewise, for *entry into graduate school*, 0= decision to not enter graduate school, and 1 = decision to enter graduate school.

The independent variables in this study are six categories of factors including *family background, academic performance, career and academic goals, personal and financial responsibilities, academic self-efficacy,* and *perceived family or social support.* These variables will serve as predictors of students' decisions regarding *degree completion, choice of employment,* and *entry into graduate school*. Each of the predictors will be constructed using different indicators to represent the two stages of interest in this study: during postsecondary education, and post-graduation). For instance, during the postsecondary education stage, the predictor *family background* will be measured by four indicators (1) whether the home had 50 or more books, (2) whether the home had a personal computer, (3) the student's dependency status, (4) whether the student had first child before, during, or after completion of the baccalaureate degree. At the post-graduation stage, *family background* will be measured by three indicators: (1) marital status, (2) number of dependents, and (3) spouse's highest educational level.

Similarly, at the postsecondary stage, indicators that measure the predictor *academic performance* are: (1) undergraduate GPA, (2) number of institutions attended, (3) number of months elapsed to first degree attainment, and (4) number of types of remedial instruction received. At post-graduation, the indicators include (1) high school GPA, (2) undergraduate major GPA, (3) time between high school graduation and start of baccalaureate degree, and (4) graduate degree start date. Likewise, during the postsecondary stage, the indicators of the predictor *career and academic goals* include (1) employment plans, (2) finding steady work, (3) giving own children better opportunity, and (4) being well off financially. At post-graduation, there are 13 indicators of *career and academic goals*: (1) applied to graduate school, (2) immediate and long term degree expectations, (3) reasons for choosing current career, (4) employment expectations in 2 years, (5) expected occupation long term, (6) reasons for not working, (7) attendance at professional society or association meetings/conferences, (8) attendance at work related workshops, seminars, or other training, (9) reasons for attending training, (10) educational field of study, (11) reasons for taking classes, (12) reasons for working outside degree field, and (13) reasons for changing employers.

For the predictor *personal and financial responsibilities*, the indicators during the postsecondary stage include: (1) total federal aid received, (2) total state aid, (3) total grant, (4) total loan, and (5) total aid from other sources. At post-graduation, there are five indicators: (1) number of vehicles owned, (2) number of houses/condos owned, (3) total amount borrowed, (4) total of monthly payments for education debt, and (5) total monthly debt burden. In terms of the predictor *academic self-efficacy*, there are six indicators during the postsecondary stage: (1) social self-confidence, (2) highest level of education ever expected to complete, (3) academic ability, (4) mathematical ability, (5) intellectual confidence, and (6) writing ability. At post-graduation, there are two indicators: (1) highest level of education ever expected, and (2) whether student considered attending graduate school. The last predictor, *perceived family or social support* will be measured by two indicators at post-graduation: (1) spouse currently enrolled in school, and (2) parents highest educational level attained.

Analysis Plan

Because all the surveys of interest were conducted using complex survey designs, involving stratification, clustering, and unequal probabilities of case selection (NCES, 2005; NSF, 2005), analyses will take into account the complex sampling designs in order to estimate variances accurately. The first step in a multistage analysis process will be data cleaning, including examination of anomalous data patterns as well as missing data and distributions of the variables of interest. The statistical software, SAS version 9.1.3 (SAS Institute Inc., 2005), will be used.

The second step will be variable reduction (i.e., construction of composite and derived variables), where applicable. This step is necessary because most of NCES and NSF surveys have a large number of variables, many of which appear to measure the same construct. In addition, variable reduction tends to simplify the analyses which, as a result, will increase the power of the study because fewer hypotheses will be tested. Variable reduction will be conducted by employing principal component analysis in SAS or by creating derived variables using existing variables and appropriate mathematical equations.

The third step will be application of sample weights and computing weight adjustment. Because the data were obtained from complex survey designs, estimates based on the samples will be computed using statistical analysis weights. These analysis weights primarily account for the unequal probabilities of selection in the sample. The sampling weight assigned to a case indicates the number of cases in the population represented by the respondent. The sampling weight is the inverse of the selection probability. However, sampling weights also contain adjustments to account for the potential bias due to non-response, and are post-stratified to known population totals to improve overall efficiency (Technical Issues in Using NCES Data, 2005). This step is essential in that it allows variances in the study to be more accurately estimated. The statistical software SAS version 9.1.3 (SAS Institute Inc., 2005), will be employed to compute variance estimates that are adjusted for the design effects resulting from complex sampling designs.

The fourth step will be analyses of the data which include univariate, bivariate, and multivariate statistics. Univariate procedures will be used to examine descriptive statistics including frequencies, means, standard deviations, variances, skewness and kurtosis for individual variables; whereas bivariate analyses will be used to examine descriptive and inferential statistics for pairs of variables such as bivariate normality (skewness and kurtosis) and bivariate correlations, respectively.. Multivariate procedures will be employed when multiple variables are examined simultaneously. Examples of multivariate procedures include principal component analysis, logistic regressions, and confirmatory factor analysis.

In order to address each of the four specific aims of the study, the following analyses will be conducted.

Specific Aim #1: To investigate factors associated with (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among students attending U.S. colleges and universities. The hypotheses to be tested for are that there is statistically significant association between:

(1) family background and (a) baccalaureate degree completion, (b) choices of employment, and (c) entry into graduate school among students attending U.S. colleges and universities.

(2) academic performance and (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among students attending U.S. colleges and universities.

(3) career and academic goals and (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among students attending U.S. colleges and universities.

(4) personal and financial responsibilities and (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among students attending U.S. colleges and universities.

(5) academic self-efficacy and (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among students attending U.S. colleges and universities.

(6) perceived family or social support and (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among students attending U.S. colleges and universities.

Polychoric correlation will be employed to assess the degree of association between baccalaureate degree completion and the aforementioned factors.

Specific Aim #2: To examine predictors of (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among subpopulations of students attending U.S. colleges and universities. The hypotheses to be tested for are that there is a statistically significant relationship between:

1) baccalaureate degree completion among subpopulations of students attending U.S. colleges and universities and (1) family background, (2) academic performance, (3) career and academic goals, (4) personal and financial responsibilities, (5) academic self-efficacy, and (6) perceived family or social support.

2) choice of employment among subpopulations of students attending U.S. colleges and universities and (1) family background, (2) academic performance, (3) career and academic goals, (4) personal and financial responsibilities, (5) academic self-efficacy, and (6) perceived family or social support.

3) graduate school enrollment among subpopulations of students attending U.S. colleges and universities and (1) family background, (2) academic performance, (3) career and academic goals, (4) personal and financial responsibilities, (5) academic self-efficacy, and (6) perceived family or social support.

Logistic regression will be used to assess the degree that the aforementioned factors predict the three outcome variables. First, baseline logistic regression models will be created using the single best predictor of each outcome.

Next, each of the remaining five predictors will be added to the respective baseline models to create reduced models. Finally, full models (all predictors are included in the model with interaction terms) are constructed, and the differences in Chi-square values will be compared across logistic regression models to determine whether the changes in Chi-square values are statistically significant. The statistically significant changes in Chi-square values suggest that some logistic regression models predict the outcome (dependent) variables better than the others.

Specific Aim #3: To investigate the extent to which Prospect Theory will be a fruitful mechanism for examining students' decisions related to postsecondary education. The hypotheses to be tested are that the model derived from Prospect Theory that explains the relationship between students' decisions regarding:

1) baccalaureate degree completion and (1) family background, (2) academic performance, (3) career and academic goals, (4) personal and financial responsibilities, (5) academic self-efficacy, and (6) perceived family or social support will likely fit the data.

2) choices of employment and (1) family background, (2) academic performance, (3) career and academic goals, (4) personal and financial responsibilities, (5) academic self-efficacy, and (6) perceived family or social support will likely fit the data.

3) entry into graduate school among students attending U.S. colleges and universities and (1) family background, (2) academic performance, (3) career and academic goals, (4) personal and financial responsibilities, (5) academic self-efficacy, and (6) perceived family or social support will likely fit the data.

Confirmatory Factor Analysis (CFA) will be employed to examine the fit of the hypothesized models to the data. The CFA's weighted least squares method (WLS) will be appropriate because this method does not require meeting the normality assumption, but rather having a sufficiently large sample (larger than 5,000, ideally) (Raykob & Marcouilides, 2003) which is met in this study. The analysis will be conducted with the specialized statistical software Pre-lis2 and Lisrel8 (Scientific Software International, Inc., 2002).

Specific Aim #4: To compare factors associated with (a) baccalaureate degree completion, (b) choices of employment and (c) entry into graduate school among science and engineering students and non-science and engineering students attending U.S. colleges and universities. The hypotheses to be tested are that there are statistically significant differences in factors associated with:

1) baccalaureate degree completion among science and engineering students and non-science and engineering students attending U.S. colleges and universities.

2) choices of employment among science and engineering students and non-science and engineering students attending U.S. colleges and universities.

3) entry into graduate school among science and engineering students and non-science and engineering students attending U.S. colleges and universities.

Logistic regression models established for the sub-sample of science and engineering students (as described in Specific Aim #2) will be repeated with the sub-sample of non-science and engineering students. Next, the results obtained from the two sub-samples (factors associated with choices of employment among science and engineering students and non-science and engineering students) will be compared and discussed.

c. Dissemination Plan: Research findings will primarily be shared with post-secondary policy-makers, administrators and other scholars interested in issues pertaining to post-secondary education among U.S. students through papers delivered at professional conferences and other professional groups who seek information exchange and peer-reviewed publications. Specifically, papers will be submitted for presentation at both the 2007 AIR Forum and the 2007 American Educational Research Association's annual meeting. Additional conferences that will also be considered include the Florida Educational Research Association and the Eastern Educational Association. Manuscripts will be prepared and submitted to journals that have an audience that will be interested in this research, both practically and methodologically. A non-exhaustive list of targeted journals includes: *American Educational Research Journal, College Student Journal, Education Evaluation and Policy Analysis, Educational and Psychological Measurement, Educational Researcher, Higher Education, and Journal of Higher Education.* Key findings will also be shared with policy-makers and administrators through news briefs which will be disseminated through the University's Office of Public Affairs. Lastly, information generated from this project will also be available on the Center for Research, Evaluation, Assessment and Measurement website.

d. Description of Policy Relevance: This research will directly inform post-secondary institution policy-makers and administrators on factors that influence student decisions. The dynamic nature of Prospect Theory permits examination of the extent to which factors are more influential in decision-making at different times of progression through a student's post-secondary academic experiences. As such, the findings will permit policy and decision-making to be based on evidence related to student characteristics and critical periods in students' academic careers.

The examination of relationships based on timeframe of the impact of certain factors associated with decisions to continue or terminate education will support focused and targeted policies related to recruitment and

retention. As a result, not only will students benefit from having the most relevant and necessary supports available at critical times during their academic progression, the institution will benefit by developing more efficient means to guide decisions regarding the use of limited resources. The ability to target the use of resources more efficiently will maximize benefits to both institutions and students.

e. Innovative Aspects of Project: Although frequently used in other domains of research (e.g., business, economics, and cognitive psychology), Prospect Theory rarely has been applied in the field of education. Page (2004) found that Prospect Theory explained the choices of students from different socio-economic classes in three situations: (1) choosing to drop out early, (2) selecting from the different vocational tracts, and (3) electing to pursue higher education. However, some of the framing variables in the databases Page used were restricted and could not be tracked at the individual student level. The utilization of Prospect Theory in the proposed research allows for the propensity of factors that influence undergraduate and graduate student decisions to change as their situation changes. As such, it is more dynamic than other theories that have guided similar research in the past. Further, the application of Prospect Theory to data available in the NCES and NSF databases may yield new research tools and procedures that can be applied to the analysis of the dynamic variables that are common in the field of education. Thus, this project will not only serve to inform the applied audience of the research findings but also has implications for the methods used in conducting research. As such, this project has the potential to provide information and techniques that will enhance social science research methods in general.

f. Audience: The findings of this research will serve to inform post-secondary policy-makers, administrators and other scholars interested in issues pertaining to post-secondary education among U.S. students. This project supplements and extends research already done in these areas and will provide further evidence of relationships between student characteristics and their propensity to finish post-secondary degrees as well as whether or not they tend to pursue graduate opportunities. Relationships between student characteristics will also be examined relative to employment choices. A better understanding of influential factors in these areas will permit post-secondary institutions to examine their current policies, procedures and support structure relative to the potential success of their students, both academically and professionally.

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James, R. (1999). Non-traditional students and their university participation: An Australian perspective on persistent inequities and the new ideology of student choice. Paper presented at the 21st European Association of Institutional Research, Lund University, Sweden.

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Trepela, C., Fox, R. F., & Poldrack, R. A. (2005). Prospect theory on the brain? Toward a cognitive neuroscience of decision under risk. *Cognitive Brain Research, 23* 34 – 50.

Tversky, A. & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, *5*, 297-323.

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EDUCATION

B.A., Psychology, University of South Florida, 1977

M.A., Exceptional Child Education, University of South Florida, 1982

Ph.D., Educational Measurement and Evaluation, University of South Florida, 1989

Dissertation: *Toward practical advise on the treatment of missing data.* Advisor: Joseph Mazur

RESEARCH INTERESTS

Applied statistics and data analysis, computer intensive statistical methods, psychometrics, meta-analysis.

ACADEMIC EXPERIENCE

2004-present	University of South Florida. Department of Educational Measurement and Research. Professor and Chair.
1999-2004	University of South Florida. Department of Educational Measurement and Research. Professor.
1994-1999	University of South Florida. Department of Educational Measurement and Research. Associate Professor.
1991-1994	University of South Florida. Department of Educational Measurement and Research. Assistant Professor.
1990-1991	University of South Florida. Department of Educational Measurement and Research. Visiting Assistant Professor.

1986-1990 University of South Florida. Institute for Instructional Research and Practice. Visiting Assistant Professor.

RECENT GRANTS

2004 – 2006 Emerging Med Clinical Trials Evaluation, American Cancer Society, Evaluator

2003 – 2005 Innovations in Technology and Teaching (Project Evaluation and Research), Fund for the Improvement of Postsecondary Education, P.I.

2000 – 2002 Analyzing Student Achievement in Statewide, Urban and Rural Systemic Initiatives, National Science Foundation, P.I.

SELECTED PROFESSIONAL SERVICE

2004 – present Executive Editor, *Journal of Experimental Education.*

2000 – present Editor, *Florida Journal of Educational Research.*

2003 - present Editorial Board Member, *Review of Educational Research.*

1995 - present Editorial Board Member, *Educational and Psychological Measurement.*

1998 - 2002 Associate Editor, *Review of Educational Research.*

1996 – 2004 Editorial Board Member, *Journal of Experimental Education.*

AWARDS

Educational Researcher of the Year, Florida Educational Research Association, 1977

Distinguished Paper Award, Florida Educational Research Association, 1999, 2000, 2001, 2003

President's Award for Faculty Excellence, University of South Florida, 2003.

Distinguished Paper Award, College Teaching and Learning Conference, 2005.

Best Paper Award, World Multi-conference on Systemics, Cybernetics and Informatics, 2005

SELECTED PUBLICATIONS

Cavanaugh, C., Gillan, K. J., Kromrey, J. D., Hess, M., & Blomeyer, R. (in press). The effect of distance education on K-12 student outcomes: A meta-analysis. American Journal of Distance Education.

Mallard, V., Lengacher, C., Daley, E., & Kromrey, J. (in press). Protecting yourself and your unborn child from STIs: An APN educational intervention. The Nurse Practitioner.

Kromrey, J. D. & Rendina-Gobioff, G. (in press). On knowing what we don't know: An empirical comparison of methods to detect publication bias in meta-analysis. Educational and Psychological Measurement.

Hess, M. R., Hogarty, K. Y., Ferron, J. M. & Kromrey, J. D. (in press). Interval Estimates of Multivariate Effect Sizes: Accuracy and Precision Under Non-normality and Variance Heterogeneity. Educational and Psychological Measurement.

Ferron, J.M., Hogarty, K. Y., Dedrick, R. F., Hess, M. R., Niles, J., Kromrey, J. D. (in press). Reporting results from multilevel analyses. In A. O'Connell & B. McCoach (Eds.) Multilevel Analysis of Educational Data. Information Age Publishing.

Kromrey, J. D., Hogarty, K. Y. & Onwuegbuzie, A. (in press). The continua of disciplined inquiry: Quantitative, qualitative, and mixed methods. In R. Mawdsley & S. Permuth (Eds.). Research Methods for Studying Legal Issues in Education. Dayton, OH: Education Law Association.

Kromrey, J. D., Hogarty, K. Y., Hess, M. R., Rendina-Gobioff, G., Hilbelink, A., Lang, T. (2005). A comprehensive system for the evaluation of innovative online instruction at a research university: Foundations, components and effectiveness. Journal of College Teaching and Learning, 2, 1 - 9.

Kromrey, J. D. & Hess, M. R. (2005). Interval estimates of R^2: An empirical investigation of the influence of fallible regressors. Multiple Linear Regression Viewpoints, 31, 19 – 37.

Hogarty, K. Y., Hines, C. V., Kromrey, J. D., Ferron, J. M. & Mumford, K. R. (2005). The quality of factor solutions in exploratory factor analysis: The influence of sample size, communality and overdetermination. Educational and Psychological Measurement, 65, 202 - 226.

Borman, K. M., Kersaint, G., Cotner, B., Lee, R., Boydston, T., Uekawa, K., Kromrey, J. D., Katzenmeyer, W., Baber, M. Y. & Barber, J. (2005). Meaningful educational reform: Confronting the learning crisis in mathematics and science. Albany, NY: State University of New York Press.

Hogarty, K. Y., Kromrey, J. D., Ferron, J. M. & Hines, C. V. (2004). Selection of variables in exploratory factor analysis: An empirical comparison of stepwise and traditional approaches. Psychometrika, 69, 593 – 611.

Borman, K. M., Cotner, B., Baber, M. Y., Boydston, T., Katzenmeyer, W., Kersaint, G., Kromrey, J., Lee, R. & Uekawa, K. (2004). Rhetoric versus reality in educational reform: The case of the National Science Foundation's Urban System Initiative. Journal of Educational Change, 5, 249 – 266.

Kromrey, J. D. & Rendina-Gobioff, G. (2003). An empirical comparison of regression analysis strategies with discrete ordinal variables. Multiple Linear Regression Viewpoints, 29, 30 - 43.

Ferron, J. M., Foster-Johnson, V. L. & Kromrey, J. D. (2003). The functioning of single-case randomization tests with and without random assignment. Journal of Experimental Education, 71, 267 - 288.

Luther, S., Studnicki, J., Kromrey, J., Lomando-Frakes, K., Grant, P. & Finley, G. C. (2003). A method to measure the impact of primary care programs targeted to impact racial and ethnic disparities in health outcomes. Journal of Public Health Management and Practice, 9, 243 - 248.

Hogarty, K. Y., Lang, T. R. & Kromrey, J. D. (2003). Another look at technology use in classrooms: The development and validation of an instrument to measure teachers' perceptions. Educational and Psychological Measurement, 63, 137-160.

McKinney-Burney, D. & Kromrey, J. D. (2001). Initial development and score validation of the Adolescent Anger Rating Scale. Educational and Psychological Measurement, 61, 446 - 460.

Reed, J. H. & Kromrey, J. D. (2001). Teaching critical thinking in a community college history course: Empirical evidence from infusing Paul's model. College Student Journal, 35, 201 - 215.

Studnicki, J., Luther, S. L., Kromrey, J. D. & Myers, B. (2001). A minimum data set and empirical model for population health status assessment. American Journal of Preventive Medicine, 20, 40 – 49.

Kromrey, J. D. & Hogarty, K. Y (2000). Retrospective statistical power analysis: An empirical investigation of point and interval estimation techniques. Multiple Linear Regression Viewpoints, 26 (2), 7 - 14.

Parshall, C., Harmes, J. C. & Kromrey, J. D. (2000). Item exposure control in computer-adaptive testing: The use of freezing to augment stratification. Florida Journal of Educational Research, 40, 28 - 52.

RECENT PRESENTATIONS

Kromrey, J. D., Barron, A., Hilbelink, A., Hogarty, K. Y., Loggie, K., Schullo, S. & Sweeney, P. (2005, June). Intellectual Property and Online Courses: Policies at Major Research Universities. National Education Computing Conference, Philadelphia.

Kromrey, J. D., Hogarty, K. Y., Ferron, J. M., Hines, C. V. & Hess, M. R. (2005, August). Robustness in Meta-Analysis: An Empirical Comparison of Point and Interval Estimates of Standardized Mean Differences and Cliff's Delta. Joint Statistical Meetings, Minneapolis.

Tyson, W., Lee, R., Tolentino, A., Hanson, M.A., Kromrey, J. D., Micceri, T., & Borman, K. (2005, July). A Multiphasic Approach to Discovering How Scientists Develop Career-Related Interests and Careers. World Multi-conference on Systemics, Cybernetics and Informatics (WMSCI 2005), Orlando.

Motika, R. & Kromrey, J. D. (2005, April). Effects of Anchor Item Content Representation on the Accuracy and Precision of Linear Test Equating. Annual meeting of the American Educational Research Association, Montreal.

Hess, M., Kromrey, J. D., Schullo, S., Hogarty, K. & Barron, A. (2005, April). Evaluation of Online Instruction in a Research University: Establishing an Evaluation Framework and Delineating Lessons Learned. Annual meeting of the American Educational Research Association, Montreal.

Hogarty, K. Y., Kromrey, J. D., Hess, M. R., & Ferron, J. F. (2005, April). A Macro for Computing Point Estimates and Confidence Intervals for Mahalanobis Distance. SAS Users Group International, Philadelphia.

Ferron, J., Onwuegbuzie, A., Kromrey, J., Hines, C., Hogarty, K., Dickinson, W., Hess, M., Scott, H., Hollon, G. L., Dedrick, R., Schneider, W. R., Kwon, N., Ataya, R. & Frank, I. (2005, March). Structural Equation Modeling Across Disciplines: Consistency In Methodology? Annual meeting of the Eastern Educational Research Assocation, Sarasota, Florida.

Kromrey, J. D., Hogarty, K. Y., Barron, A. E., Schullo, S., Hilbelink, A., Singh, O. & Venable, M. (2004, November). Innovative Online Instruction at a Research University: Development and Implementation of a Comprehensive Evaluation System. Association for the Advancement of Computing in Education: eLearn 2004, Washington, D. C.

Hess, M. & Kromrey, J. D. (2004, April). Robust Confidence Intervals for Effect Sizes: A Comparative Study of Cohen's d and Cliff's Delta Under Nonnormality and Heterogeneous Variances. Annual meeting of the American Educational Research Association, San Diego.

Hogarty, K. Y. & Kromrey, J. D. (2004, April). Risky Predictions, Damn Strange Coincidences and Theory Appraisal: A Multivariate Corroboration Index for Path Analysis. Annual meeting of the American Educational Research Association, San Diego.

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PROFESSIONAL PREPARATION

University of South Florida	Educational Measurement and Research	Ph.D.	2003
Webster University	Management	M.A.	1990
University of South Florida	Electrical Engineering	B.S.	1986

Dissertation: *Effect Sizes, significance tests, and confidence intervals: Assessing the influence and impact of research reporting protocol and practice* Advisor: Jeffrey D. Kromrey

APPOINTMENTS

Academic

Apr 03–Present: Director, Center for Research, Evaluation, Assessment and Measurement, University of South Florida

Non-academic

Jul 97 – Apr 03: Educational Researcher and Instructor, Pasco County Schools, Fl.

Oct 95-May 97: Technical Training Flight Commander, Sheppard AFB, TX, USAF

Oct 93-Oct 95: Aircraft and Weapons Supervisor, Kleine Brogel AFB, Belgium, USAF

Oct 91-Oct 93: Flight Systems Engineer, Eglin AFB, FL, USAF

Oct 90-Oct 91: Weapons Officer, Araxos AB, Greece, USAF

Oct 86-Oct 90: (Various) Weapons & Aircraft Systems, McConnell AFB, KS, USAF

Selected Publications:

Cavanaugh, C., Gillan, K. J., Kromrey, J. D., Hess, M., & Blomeyer, R. (in press). The effect of distance education on K-12 student outcomes: A meta-analysis. *American Journal of Distance Education.*

Ferron, J.M. & Hess, M.R. (2005). Estimation in Structural Equation Modeling: A Concrete Example. Accepted for publication in *Journal of Educational and Behavioral Statistics.*

Ferron, J.M., Hogarty, K. Y., Dedrick, R. F., Hess, M. R., Niles, J., Kromrey, J. D. (in press). Reporting results from multilevel analyses. In A. O'Connell & B. McCoach (Eds.) *Multilevel Analysis of Educational Data.* Information Age Publishing.

Hess, M.H., Hogarty, K.Y., Ferron J.M., & Kromrey, J.D. (2006). Interval Estimates of Multivariate Effect Sizes: Coverage and Interval width Estimates Under Variance Heterogeneity and Non-normality. Accepted for publication in *Educational and Psychological Measurement.*

Kromrey, J. D., Hogarty, K. Y., Hess, M. R., Rendina-Gobioff, G., Hilbelink, A., Lang, T. (2005). A comprehensive system for the evaluation of innovative online instruction at a research university: Foundations, components and effectiveness. *Journal of College Teaching and Le*arning, 2, 1 - 9.

Kromrey, J. D. & Hess, M. R. (2005). Interval estimates of R^2: An empirical investigation of the influence of fallible regressors. Multiple Linear Regression Viewpoints, 31, 19 – 37.

Selected Papers and Presentations:

Hess, M.R. (2005, November). The effects of sample size on fixed effect inferences in hierarchical linear models. Paper delivered at the annual meeting of the Florida Educational Research Association, Miami, FL.

Scott, H.M., Hess, M.R., Phan, H., Bane, A., Beel Ellison, B., Hohlfeld, T. (2005, November). *The impact of a new science instructional method on the attitudes and perceptions of students and teachers.* Paper presented at the Florida Educational Research Association's Annual Meeting, Miami, Fl.

Kromrey, J. D., Hogarty, K. Y., Ferron, J. M., Hines, C. V. & Hess, M. R. (2005, August). *Robustness in Meta-Analysis: An Empirical Comparison of Point and Interval Estimates of Standardized Mean Differences and Cliff's Delta.* Joint Statistical Meetings, Minneapolis.

Hess, M.R., Barron, A.E., Carey, L., Hilbelink, A., Hogarty, K., Kromrey, J.D., Phan, H., and Schullo, S.

(2005, June) *From the Learners' Eyes: Student Evaluation of Online Instruction.* Paper presented at National Educational Computing Conference, Philadelphia, PA.

Hess, M., Kromrey, J. D., Schullo, S., Hogarty, K. & Barron, A. (2005, April). *Evaluation of Online Instruction in a Research University: Establishing an Evaluation Framework and Delineating Lessons Learned.* Annual meeting of the American Educational Research Association, Montreal.

Roberts, C. & Hess, M.R. (2005, April). Teacher practice and student writing: Professional development influences student achievement. Paper presented at the annual meeting of the American Educational Research Association, Montreal, Canada.

Ferron, J., Onwuegbuzie, A., Kromrey, J., Hines, C., Hogarty, K., Dickinson, W., Hess, M., Scott, H., Hollon, G. L., Dedrick, R., Schneider, W. R., Kwon, N., Ataya, R. & Frank, I. (2005, March). *Structural Equation Modeling Across Disciplines: Consistency In Methodology?* Annual meeting of the Eastern Educational Research Assocation, Sarasota, Florida.

Hess, M.R., Phan, H., Scott, H. Kromrey, J., Hogarty, K., Schullo, S. & Barron, A. (2004 November). *Using evaluation to facilitate project development: The transition from judging to informaing.* Paper presented at the annual meeting of the American Evaluation Association, Atlanta. GA.

Hess, M.R., Phan, H., Scott, H. Kromrey, J., Hogarty, K., Schullo, S. & Barron, A. (2004). *Graduate degree programs delivered via distance: Development of a comprehensive evaluation process and protocol.* Paper presented at the annual meeting of the American Evaluation Association, Atlanta, GA.

Hess, M.R. & Kromrey, J.D. (2003, November). *Effect Sizes, significance tests, and confidence intervals: Assessing the influence and impact of research reporting protocol and practice.* Distinguished paper at Florida Educational "Research Association, Orlando, FL.

Hess, M. & Kromrey, J. D. (2004, April). *Robust Confidence Intervals for Effect Sizes: A Comparative Study of Cohen's d and Cliff's Delta Under Nonnormality and Heterogeneous Variances*. Annual meeting of the American Educational Research Association, San Diego.

Hess, M.R. & Kromrey, J.D. (2003, April*) The message in the numbers: The impact of reporting research results as significance test, effect sizes, point estimates and interval estimates.* (lead author) Paper presented at the American Educational Research Association's Annual Meeting.

Hess, M.R., Donoghue, J.D., McClellan (2003, April) I*nvestigating constructed response scoring over time: The*

effects of study design on trend rescore statistics. (lead author) Paper presented at the American Educational Research Association's Annual Meeting, Chicago IL.

Hess, M.R. (2002, November). *State Mathematics Standards How do they differ and are they related to student performance?*. (lead author) Paper presented at the Florida Educational Research Association's Annual Meeting, Gainesville, FL. (nominated for Distinguished Paper)

SYNERGESTIC ACTIVITIES

Exploration of robustness of interval methods used for Mahlanobis Distance (2004-2006)

Non-parametric indices of Effect Sizes (2004-2005)

Use of Hierarchical Linear Modeling in published educational research (2003-2006)

Examination of sample size in Hierarchical Linear Modeling using Monte Carlo methods (2005)

Conduct and investigation of statistical and research workshops in the College of Education (2005)

Review of College of Education's research grant program (2005-2006)

COLLABORATORS AND OTHER AFFILIATIONS

Recent Collaborators: American Cancer Society (Florida Division), Cathy Cavenaugh (Univ. of North Fl), Pat Daniel (Univ. of So. Fl), John Ferron (Univ. of So. Fl), Elizabeth Gulitz (Univ. of So. Fl.), Jeffrey Kromrey (Univ. So. Fl.), Miguel Labrador (Univ. So. Fl), Brenda LeTendre (University of Pittsburg)Carlos Smith (Univ. So. Fl.),

Graduate Students Supervised: A. Bane (Univ. So. Fl.), B. Bell (Univ. So. Fl.), T. Chavez (Univ. So. Fl.), T. Hohlfeld (Univ. So. Fl), T. Lang (Univ. So. Fl), H. Phan (Univ. So. Fl.), Gianna Rendina-Gobioff (Univ of So. Fl.), H. Scott (Univ. So. Fl.), G. Smith (Inst. Tch. Practices), F. Watson (Hillsborough School District)

RECENT GRANTS AND CONTRACTS

Research Consultant for "Holistic Numerical Methods: Evaluation of Four Delivery Modalities", National Science Foundation, $7,000, June 2005 – October 2005

Evaluator and Researcher for USF College of Engineering's "Research Experiences for Undergraduates Initiative", National Science Foundation, $15,000, June 2005 to October 2007

PI for evaluation and research on " Evaluation of Effectiveness of Comprehensive School Reform in Three Schools", Pasco County School District, $15,000, June 2005 to September 2005

Evaluator and Researcher for USF College of Engineering's "Research Experiences for Teachers Initiative", National Science Foundation, $45,000, June 2004 to October 2006

PI for "Hierarchical Analysis of Writing Project Students", $45,000, National Writing Project, January 2004 to May 2005.

PI for "Assessment of Drop Out Prevention Programs", Pinellas County Schools, $36,000

PI for evaluation of USF College of Education's "Evaluation of the Teaching SMART Elementary Science Curriculum", National Science Foundation, $24,000, June 2004 to October 2006

Researcher and Project Manager for "Innovations in Technology and Teaching", Fund for Improvement of Postsecondary Education, $210,000, May 2003 to August 2005

Researcher for "EncStat: A web-based program for the identification and management of statistics anxiety", USF Innovative Teaching Grants Program, June 2003-May 2004.

AWARDS AND HONORS

American Educational Research Association Invited Statistics Institute, 2003

Florida Educational Research Distinguished Paper Award, 2003

Educational Testing Services Researcher, 2002

Florida Educational Research Distinguished Paper Award, 2002

SERVICE

Co-Editor, Florida Journal of Educational Research, 2001- current

Reviewer for FERA, AERA, Journal of Mentoring

Advisory Board Member: Evaluation of Science Education Curriculum Research in Pasco County, 2005-2008

Scorer for Advanced Placement Statistics Examination, 2005-current

Presentation to Polk County Library Association on Evaluation Methods 2004

, **RECENT COURSES TAUGHT**

Foundations of Measurement

Statistics I

Statistics II

Budget

The budget is based primarily on the personnel time required to conduct this research and travel for dissemination. Table 1 contains a breakdown of the costs associated with this project.

The Principal Investigator (Dr. Jeffrey Kromrey) and Co-PI (Dr. Melinda Hess) will devote 5% of their time to this project. They will be responsible for ensuring all elements of this analysis are conducted as reflected in this proposal and will supervise the work of the advanced graduate students working on this project. This will include appropriate screening of the data, examination of the assumptions associated with each analysis, conducting appropriate power analyses, and interpretation of the findings and results. The PI and Co-PI will also ensure that papers will be proposed and submitted to the 2007 AIR Forum in Kansas City, MO and the American Educational Research Association's 2007 Annual Meeting in Chicago, IL as well as other conferences the team members are planning to attend (e.g., the Florida Educational Research Association's Annual Meeting, annual meeting of the American Statistical Association). Note that the latter dissemination activities will be provided at no cost to the grant because the PI and Co-PI will be attending these conferences to present additional research. As the project matures, they will identify and prepare manuscripts to be submitted to appropriate professional journals. In addition, they will maintain ongoing lines of communication with AIR grant administrators and report findings in compliance with the expectations of the grant program, including recommendations for further exploration.

The graduate assistants that will be participating in this project are advanced Ph.D. students in Educational Measurement and Research. Three students will devote 10 hours a week in support of this project (equivalent to 1.5 full time graduate assistants) and will conduct data screening, analysis, and report writing under the guidance and supervision of the PI and co-PI. These students will also work with the PI and Co-PI preparing and delivering findings, contingent upon proposal acceptance, at the AIR Forum and the American Educational Research Association's annual meeting. In addition, they will partner on identifying other appropriate means of dissemination (e.g., other professional meetings, professional journals) and will prepare proposals and manuscripts suitable for submission to journals reaching the appropriate audiences (e.g., policy-makers, post-secondary administrators, and researchers).

Travel costs are estimated for two team members (one faculty and one student) to attend the AIR Forum in Kansas City, MO in June 2007 and the American Educational Research Association's Annual Meeting in Chicago, IL in April 2007, pending acceptance of proposals submitted. These costs are estimates based on current costs for four nights at a hotel and flight arrangements. An additional $21.00 per day is allowed in accordance with institutional guideline for per diem to help defray costs associated with meals.

Table 1
Projected Costs

a. Salaries and Wages

	Salary	Fringe	Percent Time	Total
Dr. Jeff Kromrey (PI)	$75,935.51	27%	5%	$4,821.90
Dr. Melinda Hess (Co-PI)	$57,830.00	27%	5%	$3,498.71
Graduate Assistants (1.5)	$16,000			$16,000
				0
b. Travel	Hotel	Flight	Daily Per Diem (4 Days)	0
2@AERA	$800 x 2	$500 x 2	$84 x 2	$2,768
2 @ AIR Forum	$800 x 2	$500 x 2	$84 x 2	$2,768
Total				$29,856.61

There are no other anticipated direct costs associated with this project. As noted in the *Facilities, Equipment and Other Resources* section of the proposal, all faculty and student computers already are installed with the necessary software to conduct the analyses associated with this project as well as the tools to write-up and report the findings. Costs associated with supplies and communications will be assumed by the institution.

Current and Pending Support

PI: Jeffrey Kromrey

Project	Current / Pending	Total Award	Person Months Per Year	Dates
American Cancer Society: Emerging Med Clinical Trials Evaluation	Current	$500,000	0.50	08/05-7/06
Development of Instruments to Assess High School Geometry and Second-Year Algebra Knowledge	Pending	$1,015,000	1.00	06/06-09/09
Southeast Regional Education Lab	Pending	$40,000,000	1.50	07/06-06/12

Co-PI: Melinda R. Hess

Project	Current / Pending	Total Award	Person Months Per Year	Dates
Research Experiences for Undergraduates in Computer Engineering	Current	$299.369	0.50	01/05-12/07
Holistic Numerical Methods	Current	$363,280	0.50	03/04-02/07
Research Experiences for Teachers in Engineering	Current	$446,593	1.00	09/03-08/06
Experience of Transfer Students in Chemical Engineering using a Multi-Dimensional Spiral Curriculum	Current	$1,000,000	2.00	09/05-08/08
Research Experiences for Undergraduates in Electrical Engineering	Pending	$393,865	0.50	06/06-10/08
Development of Instruments to Assess High School Geometry and Second-Year Algebra Knowledge	Pending	$1,015,000	1.00	06/06-09/09
Holistic Numerical Methods: Unabridged	Pending	$425,047	1.00	01/07-12/09

Facilities, Equipment and Other Resources

The University of South Florida (USF), established in 1956 as a public university, is a comprehensive research university serving more than 42,357 students. With four campuses, USF is home to medical clinics and hospitals, a major mental health research institute, and two public broadcasting stations. The University employs over 1,611 full-time instructional faculty and 12,446 employees and generates over $290 million annually in sponsored research. In FY2003/2004 there were 1,610 active sponsored projects. Its endowment exceeds $244 million and includes 55 endowed chairs. USF is classified as a Doctoral/Research University-Extensive, the highest classification by the Carnegie Foundation. According to the latest (2002) annual NSF benchmarks survey that looks at R&D expenditures in the fields of science and engineering, USF ranked 51st at public universities and 29th in the medical sciences. In the Annual Report, *TheCenter*, from the Lombardi Program on Measuring University Performance, USF ranks 43rd in top public research universities. USF faculty members are making national and international contributions in their fields, and their commitment to quality education is central to the University's teaching, research, and service mission. The largest metropolitan research university and the second largest in total enrollment in the State University System of Florida, USF offers a wide variety of degree programs with both basic and applied orientations, including 86 baccalaureate, 86 master's, and 32 doctoral degrees, including the M.D.

The Center for Research, Evaluation, Assessment, and Measurement (CREAM) is located within the Department of Educational Measurement and Research, in the College of Education. The center provides evaluation and research support for school districts, colleges within the university and other organizations conducting educational research. Students pursuing advanced degrees in Educational Research conduct much of the work undertaken by CREAM, thus providing them with valuable, real-world experience while pursuing their studies. Resources within CREAM and the Department include a full-time office manager, a Department Chairperson, the full-time Director of CREAM, seven tenured faculty members, two visiting instructors, and 10 graduate assistants. There are 21 networked Intel Pentium processor personal computers and six laptop computers located in CREAM and the Department for staff use. Additional office equipment includes one copier, a fax machine, five laser printers, a scanner, AT&T digital telephone service, teleconferencing capabilities, and meeting facilities for up to 15 staff members. Sufficient statistical software is available to all faculty, staff, and graduate assistants to complete the proposed project. In addition to the major statistical packages (SAS and SPSS), available software for research includes HLM, LISREL, MPlus, AM, Bilog, Multilog, and Latent Gold.