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A mixed methods approach to examining factors related to time to attainment of the doctorate in education

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A Mixed Methods Approach to Examining Factors Related to Time to Attainment of the Doctorate in Education

by

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DEDICATION

This dissertation is dedicated to three special individuals. First, I dedicate this dissertation to the memory of the founder of Kanga High School in Kenya, the late Hon. Hezekiah Oyugi, whose generosity made my dream of graduate studies come true. How I wish he lived to celebrate this accomplishment. Second, this dissertation is lovingly dedicated to my mother, Mama Dorsila Aoko, for her steadfast love, prayers, and assurance that the sacrifice was worthwhile. Finally, it is my desire that this work inspire my beloved daughter, Melvin Awuor, and others to come, to love and excel in school.

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A MIXED METHODS APPROACH TO EXAMINING FACTORS RELATED TO TIME TO ATTAINMENT OF THE DOCTORATE IN EDUCATION

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ABSTRACT

Over the years, the time that students take to attain the doctorate, particularly in Education, has been increasing. Given the cost incurred in preparing students, the decrease in years of productivity in the chosen professions, and other opportunity costs, this trend is of great concern to students, the university, and society at large. This dissertation examined the timing of doctorate attainment and the factors related to this timing. Using secondary data (*N*=1,028 students), discrete-time multilevel hazard analysis was employed to determine the relationship between various factors and the timing of doctorate attainment in a College of Education. Complementary to the quantitative analyses, four student and two faculty focus groups and four follow-up student interviews were conducted to identify factors perceived to influence time to attainment of the doctorate (TTD) in one College of Education at a state university.

Discrete-time multilevel hazard analysis revealed that the median TTD in Education was 5.8 years; students were most likely to attain the doctorate in the seventh year. In each year during the observation period, students' master's grade point average (GPA) score at admission, percentage of female students in the program, and mean graduate record examination (GRE) quantitative score in the program were each positively associated with the odds of doctorate attainment; whereas the size of the department

housing the program was negatively associated with the odds of doctorate attainment. Female students were more likely than males to attain the doctorate in each year during the observation period, however, the difference disappeared when clustering of students into programs was considered.

According to students, the way program expectations and requirements are communicated, the nature of the dissertation committee formed, and dissertation topic chosen each had a strong association with TTD. Faculty perceived that whether a student enrolls part-time or full-time, the amount and quality of academic preparation received, and the nature of academic guidance, mentoring and supervision received, each had a strong association with TTD. Both students and faculty concurred that the nature and arrangement of program tasks and resources and the desire to work and attain goals despite obstacles encountered had strong associations with TTD. Implications for policy and practice and suggestions for future research are discussed.

CHAPTER I: INTRODUCTION

Statement of Problem

Time-to-the-doctorate or *time-to-degree* (TTD), as it is referred to in the literature, is a measure of the length of time that students take to attain the doctorate. Examining 30 years of statistical records, Bowen and Rudenstine (1992) reported that less than one-half of all students admitted into doctoral programs attain the doctorate even after pursuing it from 6 to 12 years. They noted also that over the years, a more pronounced increase in total TTD has been witnessed in Education than in any other fields. A similar trend was reported in the *Survey of Earned Doctorates 2006 Report* that examined TTD differences among doctorate recipients from U.S. universities (Hoffer, Hess, Welch, & Williams, 2007). In the report, it was established that between 1980 and 2006, the median duration between starting and completing graduate school increased from 10.7 to 12.7 years in Education compared to 7.7 to 7.9 years in all fields.

Time to degree is related to graduation rate, which is defined as the proportion of students admitted in a doctoral program in an institution who attain the doctorate within a given time period: the longer the TTD, the lower the graduation rates (Bowen & Rudenstine, 1992; Ferrer de Valero, 2001; Nerad & Cerny, 1993). Prolonged TTD is associated with increased institutional cost incurred in preparing students, delay in entry into workforce, and reduction in the years of productive work-life in the chosen professions (Tuckman, Coyle, & Bae, 1990). Students, faculty, and administrators of

degree-granting institutions, public agencies and private organizations that support doctoral study, and society at large, are thus affected when the doctorate is not attained in a timely manner.

In response to the concerns of these constituencies about the lengthening trend in TTD, many studies have been conducted that examine factors related to TTD. In most of these studies, quantitative approaches have been employed (e.g., Crayton, 2005; McLaughlin, 2006; Stolzenberg, 2006). A few studies have utilized qualitative approaches (e.g., Kerlin, 1997; Nerad & Cerny, 1993; Schwarz, 1997), and a few have employed mixed methods approaches including meta-synthesis and meta-analysis (e.g., Bair, 1999; Bauer, 2004; Bowen & Rudenstine, 1992; Ferrer de Valero, 2001; Maher, Ford, & Thompson, 2004).

The practical implications of results obtained from most studies employing quantitative approaches have been questionable owing to the tendency in these studies to emphasize *whether* students attain the doctorate (i.e., occurrence of the event) but ignoring *when* the degree is attained (i.e., timing of the event). In computing median TTD in these studies, no consideration is made of the information about students who either withdraw or are still pursuing the degree by the end of observation period (i.e., censored cases). Also, because of the focus on doctorate attainment at a particular point in time, the periodicity of varying completion time is missed. According to Tinto (1988), such studies do "very little to explore the temporal dimension of that process [doctorate attainment]" (p. 438). Willet and Singer (1991) attributed this tendency of the de-emphasis on the *when* question to the analytic and logistic constraints most researchers encounter in attempting to address questions related to the timing of longitudinal events.

In recent years, studies employing quantitative approaches have been expanded to include questions of when the doctorate is attained in addition to whether the doctorate is attained. For instance, Civian (1990) employed proportional hazards models to examine the duration of doctoral study at the Harvard University Graduate School of Education (HGSE). Closely related to the present study is Stiles's (2003) study, which used hazard analysis to estimate the conditional probability of graduating in each year and student-level factors related to this probability. Among Stiles's findings were: other factors held constant, men were more likely than women to graduate during the first five years but the advantage dissipated with time; age at entry was weakly associated with the probability of graduating during the first seven years; younger minority and White students had similar graduation probabilities whereas older minority students were less likely to graduate than were older White students; admission score was not related to graduation when the effect of prior degrees was considered; and part-time status had a negative effect. By employing hazard analysis, Stiles was able to determine, not only *whether* the degree was attained but also, *when* it was attained, the periods of high and low probability of graduation, what factors had significant effects on graduation, and whether the effects of these factors varied over time. Besides Civian (1990) and Stiles (2003), most of the previous researchers were not able to address the *whether* and *when* questions of doctorate attainment because they did not employ hazard analysis. This technique allows for inclusion of information of censored cases (i.e., students who do not graduate by the end of the observation period), thereby providing an unbiased estimate of the probability of graduation and the effects of time-varying covariates as well as accurate computation of median TTD. Details of hazard analysis are covered in Chapter 3.

Previous studies have shown that there are factors at the student level (e.g., sex, race/ethnicity, and admission scores) and at the program level (e.g., program size, type of financial support, nature of faculty advising, and presence of a supportive cohort) that may be related to the timing of doctorate attainment. Following previous findings that smaller doctoral programs had shorter TTD compared to larger programs (Bowen & Rudenstine, 1992; Henderson, Clarke & Woods, 1998), Stiles (2003), in addition to his finding related to student-level variables, attempted to investigate the rival hypothesis that the conditional probability of graduation might have been associated with the differences in the three academic areas[1]. Whereas this attempt may be viewed as Stiles's acknowledgement of the possible contextual or institutional effects on TTD, he did not undertake the hazard analysis in a multilevel context. Students (level-1 unit of analysis) may be conceived as being nested within doctoral programs (level-2 unit of analysis). Whereas the difference in the probability of graduation may be due to student-level characteristic (e.g., a sex difference in favor of men during the first five years as Stiles found), it may also be due to the characteristic of the doctoral program being pursued (e.g., significantly more women than men reported delays in obtaining feedback from their supervisors as was established by Seagram, Gould, & Pyke [1998]). Failing to consider the nesting of students into programs is tantamount to assuming that independence of observations holds for students in various programs and may lead to incorrect conclusions being drawn from the inferential statistics obtained (Raudenbush & Bryk, 2002). Whereas Stiles (2003) considered academic area as a level-2 variable, it is

[1] The three academic areas included Administration Planning and Social Policy, Human Development and Psychology, and Learning and Teaching.

possible to consider program-level variables or derive other variables such as percentage of female students in the program, percentage in the modal race/ethnic category in the program, and so on, as potential level-2 factors, and examine if these variables are associated with the probability of graduation after controlling for the effects of level-1 variables. Institution-related factors such as strong student-faculty mentoring or advising, strong peer relationships, opportunities for professional identification, sufficient financial support, and presence of orientation are related to shorter TTD (Bauer, 2004; Crayton, 2005; Schwarz, 1997; Stolzenberg, 2006). These program-level factors should thus be considered alongside student-level factors when examining factors related to TTD.

Whereas previous studies including Bair's (1999) meta-synthesis have emphasized the need to conduct qualitative studies that capture students' thoughts, feelings, and behaviors regarding TTD, there have been only a few studies in which factors related to TTD have been examined using qualitative approaches (e.g., Kerlin, 1997; Nerad & Cerny, 1993; Schwarz, 1997). Most studies examining TTD using qualitative approaches have been included as part of quantitative studies, for instance, as a means to facilitate instrument development (e.g., preceding a survey with a focus groups; Maher et al., 2004), as a complement to the quantitative component (e.g., Ferrer de Valero, 2001), or in the form of open-ended items included in surveys (e.g., Green, 1995; Stolzenberg, 2006). Some qualitative studies, although focused on doctoral attrition, have yielded factors that conceptually may be considered to influence TTD as well (e.g., Lawley, 1999; Malone, Nelson, & Nelson, 2001). Qualitative studies have yielded a variety of factors that may be related to TTD including advising, mentoring, and supervision (Dinham & Scott, 1999); motivation (Maher et al., 2004); emotional

stress (Powell & Dean, 1986); sex (Kerlin, 1997); procrastination (Green, 1995); health (Maher et al., 2004); and dissertation topic (Lenz, 1995). Although findings from these studies have informed department- and program-level policies, their generalizability has been limited due to the small number of participants involved. In addition, most of these studies lack a quantitative data to corroborate the qualitative findings.

Factors related to TTD are complex and intertwined (Bair, 1999). A better understanding of these factors, according to Tinto (1993), requires both quantitative and qualitative methods of inquiry. Quantitative methods allow for the longitudinal tracking of students by linking their experiences to doctorate attainment, whereas qualitative methods facilitate investigation of the "meaning different students attach to their [TTD] experiences" (Tinto, 1993, p. 243). Attempts have been made to employ mixed methods (i.e., quantitative and qualitative approaches in a single study; Johnson & Onwuegbuzie, 2004) to examine factors related to TTD, however, in none of the studies reviewed was hazard analysis employed in conjunction with multilevel modeling.

Purpose of the Study

The purpose of this dissertation was to understand the timing of doctorate (either Ed. D. or Ph. D.) attainment in Education and the factors related to this timing. To do so, a mixed methods approach is employed. In the quantitative component, multilevel discrete-time hazard analysis—that is, a combination of hazard analysis (i.e., an analytic technique that allows for inclusion of information of censored cases) and multilevel modeling (i.e., an analytic technique that takes into account the clustering of students into programs) was employed to examine how selected student-level factors and selected program-level factors were related to the timing of doctorate attainment in Education. In

the qualitative component, student focus groups (followed by individual interviews) and faculty focus groups were employed to investigate students' and faculty members' opinions and experiences regarding factors they perceive influence time to attainment of the doctorate. Because the quantitative component of the study was based on previously collected (secondary) data, this restricted the variables available for analysis. Given that "TTD varies more systematically with discipline of study [field] than any other variable" (Bowen & Rudenstine, 1992, p. 123), to control for the effect of the field, the study focuses on the field of Education at one College of Education at a state university.

Quantitative Research Questions

The following quantitative research questions were addressed:

1. What is the median time to the doctorate of students in one College of Education at a state university?
2. When (or, after how many years) are students likely to attain the doctorate in one College of Education at a state university?
3. To what extent is the timing of doctorate attainment in Education related to the following student-level characteristics: (a) sex, (b) race/ethnicity, (c) age at admission, (d) master's grade point average (GPA), score at admission, (e) Graduate Record Examination - Verbal Score at admission, and (f) GRE-Quantitative Score at admission?
4. After controlling for student-level characteristics, to what extent is the timing of doctorate attainment in Education related to the following program-level factors: (a) size of the program, (b) size of the department housing the program, (c) racial/ethnic diversity in the program, (d) percentage of females in the program,

(e) mean age at admission in the program, (f) mean master's GPA score at admission in the program, (g) mean GRE verbal score at admission in the program, and (h) mean GRE quantitative score at admission in the program?

Qualitative Research Questions

The following qualitative research questions were addressed:

1. What factors do students (i.e., all-but-dissertation [ABDs] and graduates) perceive influence time to attainment of the doctorate in Education?
2. What factors do faculty members perceive influence students' time to attainment of the doctorate in Education?
3. What are the similarities and differences in students' and faculty members' perceptions of factors that influence time to attainment of the doctorate in Education?

Significance of the Study

Costs accrue to the student, the institution, and the society when the doctorate is not attained in a timely manner (National Science Foundation [NSF], 1998). Longer TTD reduces the productive work-life and the expected benefits accruing to the graduates. For instance, an additional year spent pursuing the doctorate has an opportunity cost exceeding $50,610[2] for a student pursuing a doctorate in vocational education (U. S. Department of Labor, 2006). Having a better understanding of factors that are associated with the timing of doctorate attainment could enable Colleges of Education to develop, implement or enhance strategies that encourage students to attain the doctorate in a

[2] This is the annual mean wage of vocational education teachers in Florida by May 2006. It was obtained by manipulating the "create customized table" function found on the U.S. Department of Labor website.

timely manner. This, in turn, can lead to cost-effective utilization of the institution's resources in preparing doctoral students.

Accountability requires the assessment of the quality and success of the institution's academic programs. Both TTD and graduation rates are increasingly being used as measures of an institution's performance (Burke, Minnasian, & Yang, 2002; Layzell, 1999). As state funding for higher education continues to decrease (Selingo, 2003), understanding these measures may help administrators of colleges of education to manage effectively doctoral student enrollments relative to their fiscal viability.

As noted by Evangelauf (1989), longer TTD can discourage undergraduate students considering entering graduate school or demoralize students who are already enrolled in doctoral programs from working toward completion. Undergraduate students intending to enter graduate school or currently enrolled doctoral students may use the results of this study in making informed decisions regarding doctoral education.

It was expected that this study, employing a mixed methods approach, would represent a unique contribution to the burgeoning body of literature on mixed methods research in general and to the timing of doctorate attainment in Education in particular. Secondarily, the quantitative component serves to illustrate the utility of combining two statistical techniques, discrete-time hazard analysis and multilevel modeling, in understanding the timing of doctorate attainment in Education.

The Association of American Universities (1998) strongly encouraged individual institutions to monitor TTD and graduation rates and to use such information for inter-institutional comparisons. In addition, Malone et al. (2001) noted that persistence trends

vary by department and by program; thus, an institutional-based study such as the present study was needed to facilitate inter-institution comparisons.

Definitions

For the purpose of the present investigation, the following definitions were used:

1. All but dissertation (ABD)—a stage in the doctoral program when a student has accomplished all degree requirements except the dissertation.
2. Centering—the process of linearly transforming a variable by subtracting a meaningful constant to render the intercept term interpretable.
3. Doctorate attainment (or graduation)—The awarding either a Doctor of Philosophy (Ph. D.) or Doctor of Education (Ed. D.) degree anytime within the observation period upon completion of the degree requirements.
4. Graduation rate—percentage of an entering cohort who attain the doctorate in the same institution after a given number of years.
5. Hazard function—a plot of the hazard probabilities over time, whereby hazard probability refers to the proportion of students enrolled at the start of the year that attains the doctorate during the year.
6. Hazard rate—conditional probability that a student attains a doctorate during the current year given that the student had not accomplished this in a prior year.
7. Median lifetime—length of time it takes for one-half of the sample, adjusting for censored cases, to attain the doctorate.
8. Mixed methods—a research design whereby quantitative and qualitative approaches are employed in the various stages of research (viz., research

questions, research methods, data collection, and data analysis) as a single study (Tashakkori & Teddlie, 1998).

9. Multilevel analysis—an analytic approach that allows the simultaneous examination of the effects of group (program) level and student-level variables while accounting for the non-independence of observations within groups (Roux, 2002).
10. Right-censoring—a student's observed time is deemed to be right censored if the student does not attain the doctorate either during or by the end of the observation period.
11. Risk set—a group of students who have not attained the doctorate in a given year and are thus "at risk" of attaining the doctorate at the end of that year.
12. Survivor function—a plot of survival probabilities over time, whereby survival probability represents the proportion of the original sample that has not graduated.

Delimitations and Assumptions

The study is delimited to College of Education doctoral students who were admitted into either a Ph. D. or an Ed. D. program between Spring of 1990 and Spring 2006. The decision to focus on Education was made after reviewing the information presented in the Survey of Earned Degrees [SED] 2006 Report (Hoffer et al., 2007). Compared to six other broad fields, Education (a) has consistently had the longest median TTD, 10.7 years in 1980 compared to 7.7 years in all fields and 12.7 years in 2005 compared to 7.9 in all fields; (b) recorded the highest drop in number of graduates between 2005 and 2006 (2%); (c) had the highest proportions of female graduates (65%);

(d) had the highest representation of U.S. minority groups (23%), particularly Blacks (55%); (e) had the oldest graduates, a median age of 41.7 years compared to 37.2 years in all fields; (f) had the highest proportion of doctoral recipients indicating earning a master's degree (97%) compared to 80% in all other fields; and (g) had the highest proportion of doctoral recipients indicating "own resources" as the primary source of financial support (59%). In sum, "the breadth and depth of Education are such that any research related to doctoral degrees in this field has broad applications for a significant proportion of all doctoral degree recipients and a majority of degree-granting institutions" (McLaughlin, 2006, p. 3).

In this study, it is assumed that the institution maintained accurate records; the participants in focus groups and interviews responded honestly to questions asked; the goal of students admitted into doctoral program is to attain the doctoral degree (either a Ph. D. or Ed. D.); and attainment of the doctorate in a timely manner is neither synonymous with high quality graduate education nor antithetical to it. It is the researcher's position that timely progress is achievable without necessarily sacrificing quality of education received or being insensitive to individual student's circumstances as they pursue the doctorate.

Limitations

Quantitative Component Limitations

The quantitative component of this study may have been limited by threats to both internal and external validity, threats that may have occurred at any of the three stages of the research process (i.e., research design/data collection, data analysis, and data interpretation). Internal validity refers to the degree to which causal inferences are made

about the relationships among variables as a result of controlling for extraneous variables and ruling out alternative explanations, whereas external validity refers to the degree to which the inferences are generalizable from a particular sample to other groups.

Threats to Internal Validity

Specificity of variables. The quantitative component of the study was limited only to variables that were available from the secondary source. Studying only a subset of the variables limits the conclusions about factors related to the timing of doctorate attainment. In addition, the results obtained may partly be a function of the design employed, which is, partially mixing quantitative and qualitative components with equal emphasis in both components in answering the research questions.

Threats to External Validity

Because the study relied on secondary data and was limited to a single institution, *population generalizability* (i.e., the extent to which findings from the samples are generalizable to doctoral students in the College of Education) and *ecological generalizability* (i.e., extent to which say, median TTD obtained, is generalizable to other Colleges of Education) are to be undertaken with caution. To the extent that characteristics of the various doctoral programs in other colleges match those examined in this study, the results of this study might be used to identify factors associated with the timing of doctorate attainment in similar colleges.

Qualitative Component Limitations

The qualitative component of this study is limited by some potential threats to both internal and external credibility, threats that may have occurred at data collection, data analysis, and/or data interpretation stages. Internal credibility refers to the

consistency or dependability of interpretations and conclusions from the cases observed, whereas external credibility refers to the degree to which the findings are generalizable across different settings, contexts, or time.

Threats to Internal Credibility

The degree to which theoretical explanations developed from qualitative research findings fit the data (i.e., *theoretical validity*) and the generalizability of conclusions within the groups/cases studied (i.e., *internal generalizability*) may have been limited (Maxwell, 1992). Familiarity with the literature on TTD might have unconsciously predisposed the researcher to a *confirmation bias* (i.e., the tendency for interpretations and conclusions based on new data to be overly congruent with prior findings) especially where rival themes were absent (Onwuegbuzie & Leech, 2007a). However, to counteract this, not only were emerging themes determined, to facilitate in-depth understanding of the themes, both the frequency and intensity effect sizes also were determined (Onwuegbuzie & Leech, 2007b).

Threats to External Credibility

External generalizability, that is, generalizability of conclusions beyond the focus groups, setting, and time, may have been limited due to the particularities of the institution under study (Maxwell, 1992). Although the qualitative component involved single-case analysis and cross-case analysis, due to the limited number of participants, generalizability beyond the institution under study is limited. However, "naturalistic generalizations" may be undertaken in which we "learn much that is general from single cases" (Stake, 1995, p. 85). This is possible because "we are familiar with other cases and

[we] add this one in, thus making a slightly new group from which to generalize, a new opportunity to modify old generalizations" (Stake, 1995, p. 85).

Organization of the Remaining Chapters

Chapter II provides a review of related literature on doctoral persistence and TTD. The chapter begins with a discussion of the reasons for the dearth of studies on doctoral persistence followed by a historical overview of the models and theories of persistence, both for undergraduate and graduate students. Next, an integrated conceptual framework of doctoral persistence is presented followed by a discussion of the measurement of TTD. As a central part of the literature review, research on factors related to TTD is reviewed focusing on the variables that frequently are featured in the literature, especially in the meta-syntheses and meta-analyses literature, as being related to the doctoral TTD. Broadly, these include demographics; academic achievement variables; psychological factors such as motivation, self-efficacy, and perfectionism; and institutional characteristics such advisement and financial support. The foci of studies on TTD are presented next followed by a discussion of the utility of hazard analysis, multilevel modeling, focus groups, and mixed methods approaches in studying TTD.

Chapter III presents the methodological considerations and is composed of two sections: quantitative and qualitative components. Described in each section are the design and paradigm, description of participants/case selection, data source or methods of data collection/instruments, methods of analysis, and data interpretation. A description of mixed data analysis concludes the section.

Chapter IV presents the results and findings of the study and is composed of quantitative and qualitative results sections. In each section, the research questions guide

the presentation of the findings. Tables and figures are employed to facilitate the presentation of the quantitative findings whereas extensive use of quotes is employed in presenting qualitative findings.

Chapter V is composed of three sections. First, the purpose of the study and the theoretical framework used are reviewed. Next, study findings are presented including a report of conclusions drawn from the findings. Finally, based on implications from the findings, recommendations for practice, theory, and future research are presented.

CHAPTER II: REVIEW OF THE LITERATURE

Overview

The objective of this chapter is to summarize, synthesize, and interpret findings from selected studies addressing the topic of time to degree. Electronic databases such as ProQuest Dissertation and Thesis, ERIC, PsychINFO, and search engines such as Google Scholar were utilized to identify several sources of published and unpublished documents including articles, books, monographs, dissertations, and conference papers.

Because the purpose of this dissertation is to understand the timing of doctorate attainment in Education and the factors related to this timing, efforts were made to ensure the literature selected for review was related as closely as possible to the topic. To be included, the study: (a) either specifically addressed TTD or included TTD alongside related topics such as doctoral persistence, attrition, or progress, (b) was conducted in the United States, except Dinham and Scott's (1999), study which was conducted in Australia but "the bulk of participants were American citizens who had completed their doctorate in the USA" (p. 11), and (c) focused on doctoral students—undergraduate students were included only when illustrating the development of theories of college persistence or when illustrating how a given statistical analysis technique was employed.

The review is divided into several sections beginning with a definition of the term, doctoral persistence, followed by a discussion of possible explanations for the paucity of studies on doctoral persistence. Next, a chronological review of the models

and theories of college persistence, first for undergraduates followed by doctoral students, and an integrated conceptual scheme of doctoral persistence are presented. Measurement of TTD, a historical overview of studies on TTD, what these studies focus on, and the factors related to TTD follow, respectively. Lastly, the utility of hazard analysis and multilevel modeling, focus groups, and mixed methods approach in studying TTD is discussed. A summary concludes the chapter.

Why the Paucity of Studies on Doctoral Student Persistence?

Persistence refers to "holding firmly and steadfastly to a purpose or undertaking despite obstacles, warnings, and setbacks" (*Merriam-Webster's*, 1993, p. 877). Doctoral persistence is defined in this study as the process of pursuing the doctorate with the intention to complete it in a *timely*[3] manner despite the obstacles that may be met. This definition is consistent with Tinto's (1993), Strayhorn's (2005), Kerlin's (1997), and Ivankova and Stick's (2007) use of the term doctoral persistence. Unlike the term *retention*, which is viewed as being *dichotomous* and refers to the behaviors of completers and non-completers of a doctoral program, Lovitts (2001) views [doctoral] *persistence* as being *continuous*, denoting the behavior of completers and non-completers of the doctorate. Girves and Wemmerus (1988) use the term doctoral *progress*, which they argue, expresses the milestones attained.

Research on doctoral persistence is relatively scarce (Abedi & Benkin, 1987; Bair, 1999) and lacks a comprehensive model or methodological strategies akin to those that have been applied in studying undergraduate persistence (Tinto, 1993). Bair (1999)

[3] What is considered *timely* depends on an individual student; however, the time limit set by the college may be used as a reference point.

echoed the same concern: "little has been written about the general pattern of [doctoral students'] completion rates" (p. 107). Why the dearth of research on doctoral persistence?

Few universities keep systematic data on doctoral persistence (Malone et al., 2001). Because students seldom give official notification of their intentions, it is difficult to know whether those who stop out[4] intend to come back, switch to other programs, transfer to other institutions, seek employment, or return to graduate school (Golde, 2000). Where such data exist, most institutions lack personnel to search student files and compile reports on student progress. Some institutions that are able to gather such information fail to publicize it for fear of their reputations being tarnished, especially if the data might lead to a negative report.

Harnett and Katz (1977) contend that, in academe, there is a tendency to assume that graduate [doctoral] students are motivated and task-oriented individuals and thus less attention is paid to them compared to undergraduate students or to the process through which they attain the degree. Lovitts (2001), describing doctoral attrition as an "invisible problem," observed that faculty in her study, despite having been in the department for more than 30 years, were unaware of the high rates of students' departure (p. 1).

An institutional researcher at one public university contends that, despite its costs, preparation of doctoral students represents a small portion of the total effort in higher education and thus, raises little interest among administrators. He adds that, besides academia, where the doctorate is generally but not always required, the dissertation is viewed as nice but unnecessary because the students have already developed the skills

[4] Stopout refers to taking a break from active enrollment in doctoral studies for a period of time.

needed by most employers. The ABD is the "most common degree" among doctoral students (T. Micceri, personal communication, October 18, 2006).

Models and Theories of College Persistence

Undergraduate Students

Unlike studies focusing on doctoral students' persistence, numerous studies have been conducted on undergraduate student persistence and models empirically tested to generate a theoretical base. Before embarking on doctoral persistence models, what follows is a chronological overview of undergraduate persistence models noting that earlier models were more suited to traditional student populations, whereas later models take cognizance of the changing demographics of the student populations.

Spady's (1970) Model of Student Dropout

Before 1970, persistence research was primarily "atheoretical" and "narrowly empirical in design" (Rootman, 1972, p. 258). The first theoretical model of student persistence was developed by Spady in 1970. According to this model, attrition among undergraduate students occurs due to lack of integration[5] into the academic and social environments of the institution. Academic environment may include a student's academic performance in the form of grades achieved, whereas the social environment may include the support a student receives from peers and faculty.

Tinto's (1975) Student Integration Model

Tinto (1975), extending Spady's model, employed the notion of environmental fit to explain the longitudinal process of persistence. His model postulated that the degree of

[5] Pascarella and Terenzini (2005) define integration as the degree to which a student "shares the normative attitudes and values of peers and faculty in the institution and abides by the formal and informal structural requirements for membership in that community or in subgroups of it" (p. 54).

congruency between students' expectation and institutional characteristics such as academic performance and faculty and peer support, determines the decision to persist or not. Strong goal commitment (i.e., to complete the degree) and institutional commitment (i.e., to remain in the same institution) added to high levels of academic achievement and social integration reduce the chances of attrition among undergraduate students.

Fishbein and Ajzen (1975) Student Attrition Model

This model, which emphasizes the importance of students' intention to leave as a predictor of academic success, was among the first to address psychological factors related to persistence. According to this model, a student's intention to leave is a function of certain beliefs that influence attitude and behaviors. Thus, a withdrawal decision, which is a behavior, is a consequence of a diminished intention to stay.

Pascarella's (1980) Student-Faculty Informal Contact Model

Holding constant the influence of pre-enrollment characteristics such as sex, race, and previous academic performance, Pascarella (1980) theorized a positive relationship between persistence, defined as first to second year retention, and the extent and quality of student-faculty informal contact. Prior models including Pascarella's were based on *traditional* student populations—predominantly middle-class White males aged 18 to 24 years, enrolled fulltime, and live on campus (Andres & Carpenter, 1997). Continued changes in student demographics led to the development of models reflective of *nontraditional* student populations—tend to be females older than 24 years, enroll part-time because they work fulltime, live off-campus, and include transfer and international students (Andres & Carpenter, 1997). The next sets of models are based on nontraditional student populations.

Bean and Metzner's (1985) Student Attrition Model

This model had its unique features and also shared some features with Tinto's and Pascarella's models. One of the similarities is the emphasis on the academic achievement, socialization, and interpersonal outcomes of students. Contrary to Pascarella's model, Bean and Metzner's (1985) model theorized that students' peers were more important agents of socialization than were informal contact with faculty. In contrast to Tinto's model, social integration variables contributed only minimally in this model. Instead, environmental variables such as finances, hours of employment, and opportunities to transfer to another institution have a greater influence on students' withdrawal decisions among nontraditional students. Later, Bean and Mertzner (1987) indicated that environmental factors had a greater influence on persistence than did demographic factors, academic performance, or personal intent.

Cabrera, Nora, and Castaneda's (1993) Integrated Model of Student Retention

This model combines Tinto's (1975) model and Bean and Mertzner's (1987) models and includes the role of significant others to the persistence process. Intent to persist exerts the greatest influence on persistence (defined as re-enrollment in the same institution). This is followed by academic performance (e.g., cumulative GPA), institutional commitment (i.e., confidence in one's choice of an institution), encouragement from friends and family, goal commitment (i.e., importance of earning the degree), academic integration (i.e., satisfaction with one's academic experiences), and social integration (i.e., development of close personal relationships and ease of making friends), respectively. The model views persistence as a longitudinal process that results from complex interactions over time. Unlike Tinto's model, which implies that

environmental factors merely shape commitments, this model suggests that environmental factors influence socialization and academic experiences of students.

Sandler's (2000) Integrated Model of Student Persistence

Building on Cabrera et al.'s (1993) work, Sandler (2000) developed a model that included career decision-making self-efficacy (CDMSE), perceived stress, and financial attitudes. He defined CDMSE as the degree of confidence students express about their ability to embark on educational activities; perceived stress as the amount of stress students experience due to energy involved to meet academic demands; and financial difficulty as attitudes students express about financial difficulty while in college. The degree of affiliation with the institution, academic integration (i.e., the feeling of being part of the academic life of an institution), household income, and financial aid were positively related to the intent to persist; however, CDSME, attitude about career tasks, and gender, each had small effects on intent to persist.

In sum, various factors, institutional and student-related, are associated with undergraduate persistence. Earlier models tended to focus on institutional responsibilities for student retention whereas later models, cognizant of the changing demographics of students, emphasized the duality of involvement. Discussed next are doctoral persistence models that build on the undergraduate models.

Doctoral Students

Girves and Wemmerus's (1988) Model of Graduate Student Degree Progress

According to Girves and Wemmerus's (1988) model, four factors are associated with doctoral degree progress. *Department characteristics* (i.e., number of students, percent female, percent White, and percent foreign) and students' *perception of faculty*

(e.g., whether faculty are perceived to treat students as colleagues and offer quality advising) are each directly related to doctoral degree progress. Perception of faculty and *financial support* (e.g., GA, fellowship, and personal sources) are jointly related to the extent of *involvement* in one's program, which in turn, is related to degree progress. Grades (a proxy for academic integration) and satisfaction/alienation (a proxy for social integration), however, are not theorized as being significantly related to doctoral degree progress. This model emphasizes the importance of creating an environment conducive for doctorate attainment rather than focusing on characteristics of the students admitted, a view that is consistent with Lovitts's (2001) contention that institutional factors exert more influence on persistence than do student characteristics. Lovitts noted that reasons for withdrawal from graduate programs had less to do with what students bring to the university than what occurs to them upon admission.

Tinto's (1993) Longitudinal Model of Doctoral Persistence

Tinto's (1993) model emphasized the concept of graduate communities, which is influenced by internal factors (i.e., department or institution) and external factors (i.e., family, employment, and society). Specifically, he identified five factors that are related to doctoral persistence. The first factor, *student attributes* includes student characteristics, educational experiences, student background, and financial resources. These attributes lead to the second factor, *entry orientation*, which consists of educational and occupational goals; educational, occupational, and institutional commitments; and financial assistance. The goals and commitments of the second factor, which are also connected to student participation in departmental activities, lead to the third factor, *institutional experiences*, which occur in the academic and social systems of the

department. The institutional experiences lead to the fourth factor, *integration*, which may be academic (e.g., classroom relations) or social (e.g., peer or student-faculty relations). Integration leads to candidacy, which is followed by *research experience*, which includes faculty advising, financial support, and research opportunities.

Tinto's three stages of degree progress illustrate the longitudinal nature of doctoral persistence. In Stage 1, the period of *transition and adjustment*, doctoral persistence depends on the social and academic interactions (which may be formal and/or informal) and whether a student enrolls part-time or fulltime. Stage 2, the period leading to *attainment of candidacy*, is characterized by knowledge acquisition and development of competencies necessary for conducting doctoral research. Here, academic and social integration are less pronounced and faculty judgment of students' competency is pivotal. In Stage 3, the period from *candidacy to final defense*, a few faculty members, the dissertation committee, heavily influence persistence. These three stages mirror Nerad and Cerny's (1993) five stages (viz., coursework; preparation for the oral and written qualifying exam; finding a dissertation topic, selecting a dissertation advisor, and writing a proposal; conducting and writing the actual dissertation research; and applying for professional employment) that students undergo in pursuit of the doctorate.

Strayhorn's (2005) Integrated Model of Graduate Student Persistence

Strayhorn (2005) identified three factors that are related to graduate student persistence: *economic factors* (i.e., total aid amount received, total amount borrowed, type of assistantship, and whether or not grants and loans were received); *academic factors* (i.e., undergraduate GPA, GRE scores, and SAT/ ACT scores); and *nonacademic factors* (i.e., marital status, age, sex, and parental status).

Tinto's model subsumes most of the constructs identified in other models. Its emphasis on the longitudinal nature of doctoral persistence is supported by other studies. Similar to undergraduate persistence models, doctoral persistence models show that institutional and personal factors are related to persistence in general or to TTD in particular. To understand the complex interplay of the institutional and personal factors in relation to TTD, an integrated conceptual scheme of doctoral persistence was developed. The scheme draws on the empirical and theoretical works of Girves and Wemmerus (1988), Tinto (1993), Sandler (2000), and Strayhorn (2005).

Integrated Conceptual Scheme of Doctoral Persistence

A systems approach can aid the understanding of the structures and processes that underlie doctoral persistence. Conceptualizing doctoral persistence as a system requires thinking about it in terms of a model and identifying the model's elements and the interrelationships among the elements. Doctoral persistence is viewed as a system consisting of three basic elements: *inputs*, *process*, and *output* as shown in Figure 1.

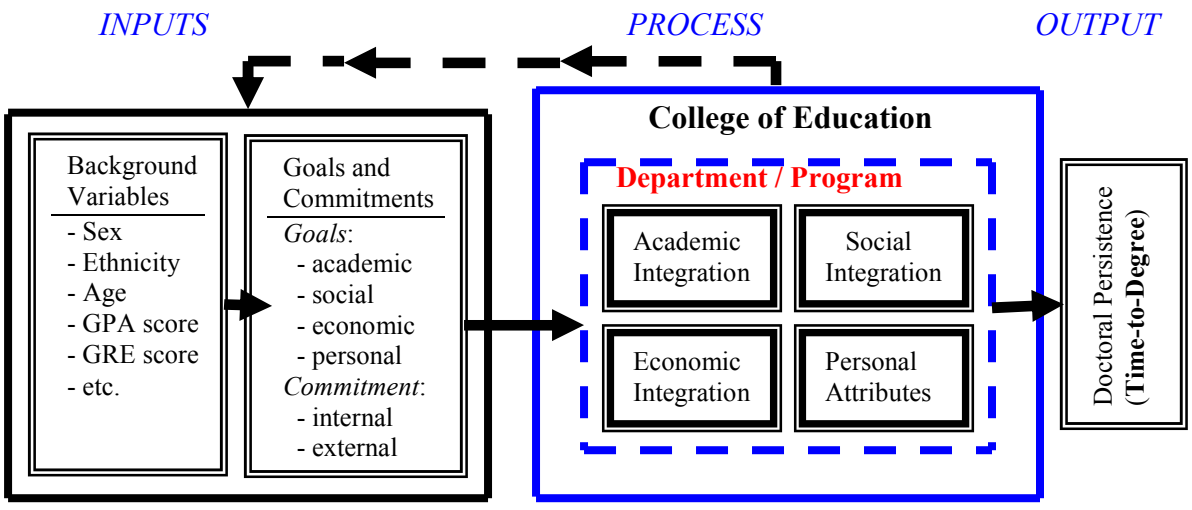


Figure 1. Integrated conceptual scheme of doctoral persistence

Doctoral persistence models identify student background characteristics such as age, sex, ethnicity, and GRE scores that are viewed as *inputs* to the system. The inputs determine the goals for entering the system and the level of commitments students have at entry (Tinto, 1993). Tinto identified educational (academic) and occupational (economic) goals for entering the system, to which I add social and personal goals. Collectively, there are four broad categories of goals for pursuing the doctorate. Students may have a combination of these goals. Tinto (1993) and Sandler (2000) identified commitment to goals and to the institution, however, I subdivide commitments into internal commitments (including commitment to goals and the institution) and external commitments (including commitment to work, family, and friends).

According to Tinto, upon entry into a department, students experience academic and social integration. To these, I add economic integration and personal attributes. Thus, students, entering the program with varying goals and commitments, may undergo different experiences in these four domains of integration. Depending on the level of integration experienced in these four domains, TTD is hypothesized to vary. The four domains thus constitute the *process* element of the system.

Academic integration refers to the feeling students express about becoming part of the academic life of an institution (Sandler, 2000) or of the work world of the discipline (Golde, 2000). It includes satisfaction with one's academic performance, structure of curriculum, and degree of involvement in program activities. Other factors held constant, it is hypothesized in this study that high levels of academic integration are associated with timely doctorate attainment. Academic integration is present in both

Tinto's and Sandler's models. It subsumes academic variables in Strayhorn's model, and grades and involvement in Girves and Wemmerus's model.

Cabrera et al. (1993) defined *social integration* as the feeling students have with forming "close personal relationships," the "ease of making friends," and the feeling of being valued as a member of a department (p. 132). Simply put, it refers to the nature and extent of interaction students experience with peers and faculty as they engage in departmental activities. Other factors held constant, it is surmised in this study that high levels of social integration is associated with timely doctorate attainment. Social integration is present in Tinto's and Sandler's models; however, in Girves and Wemmerus's model, it is surrogated by the variable, alienation or isolation.

Economic integration is defined in this study as the degree to which students' financial needs are met while pursuing the doctorate. The finances may be secured in the form of loans or assistantships. Other factors held constant, I surmise that high levels of economic integration is associated with timely degree attainment. Economic integration is proxied as economic variables in Strayhorn's model, as financial satisfaction/difficulty in Sandler's model, and as financial support in Girves and Wemmerus's model.

The last domain, *personal attributes* (e.g., motivation) refer to certain psychological traits that students possess and which are related to their goals and commitments while pursuing the doctorate. I surmise that these attributes also are modified in the process of integration and thus are related to doctoral persistence. Personal attributes are infrequently featured in doctoral persistence models. Exceptions include Sandler's model that identified students' self-efficacy and perceived stress.

Generally, it is posited that the level of integration in each of the four domains or a combination of them is related to TTD. The more students experience satisfaction in each of the four domains, the more likely that they will attain the doctorate in a timely manner. The domains are viewed as being complementary: dissatisfaction in one or more should be compensated by satisfaction in the others in order to attain the doctorate in a timely manner. The ultimate outcome, TTD, thus constitutes the *output* of the system. Figure 1 shows unidirectional arrow but for a student who join a program with a social goal, experience inadequate social integration in the department and decide to stop out for some years; if upon readmission the student experiences adequate social integration and attains the doctorate, then for such a student, the arrows are bi-directional.

Measurement of TTD

The literature reveals at least three ways of measuring TTD: *total TTD*, *elapsed TTD*, and *registered TTD*. Total TTD refers to the number of years from completion of the baccalaureate to the attainment of the doctorate, including time not enrolled in graduate school (Henderson et al., 1998). Elapsed TTD refers to the number of years that elapse from entry into a doctoral program to the time the doctorate is attained including periods of breaks from active involvement (Bowen & Rudenstine, 1992). Registered TTD includes only the number of years that a student is registered in the program (Henderson et al., 1998). In this study, unless stated otherwise, elapsed TTD is used because of the interest in the time lapse from admission to the year the doctorate is attained.

Historical Overview of Studies on TTD

Table 1 presents a summary of the findings of selected studies on TTD conducted between 1960 and 2006. These studies, in which quantitative, qualitative, or mixed

methods were employed, yielded various factors related to TTD. The relationships may be "significant" (i.e., a statistically significant factor or an important factor) and "non-significant" (i.e., a non-statistically significant factor or a non-important factor).

Table 1

Studies on Time to Degree Between 1960 to 2006 Ordered by Year

	Study	Method	Factors	Significance
1.	Berelson (1960)	Quantitative	Finances	Significant
2.	Wilson (1965)	Quantitative	Advising, Finances	Significant
3.	Grissom (1985)	Quantitative	Health	Not significant
4.	Powell & Dean (1986)	Quantitative	Emotional Stress	Significant
5.	Abedi & Benkin (1987)	Qualitative	Finances, Advising	Significant
6.	Girves & Wemmerus (1988)	Quantitative	Program size Program race diversity Advising	Significant Significant Significant
7.	Civian (1990)	Quantitative	Sex, Race/Ethnicity Age, GPA	Not significant Significant
8.	Germeroth (1991)	Quantitative	Perfectionism	Not significant
9.	Muszynski & Akamatsu (1991)	Quantitative	Procrastination Perfectionism	Significant Not significant
10.	Baird (1992)	Quantitative	Advising	Significant
11.	Bowen & Rudenstine (1992)	Mixed	Dissertation topic, GPA Program size, Finances GRE-Verbal/Quant Program race diversity Advising, Orientation	Significant Significant Not significant Significant Significant
12.	Nerad & Cerny (1993)	Qualitative	Finances, Advising Research mode Dissertation Climate View of dissertation Structure of program	Significant Significant Significant Significant Significant
13.	Green (1995)	Quantitative	Procrastination	Significant
14.	Lenz (1995)	Mixed	Perfectionism Dissertation topic Advising Family/Peer support	Not significant Significant Significant Significant
15.	Boydstun (1996)	Quantitative	Sex, Race/Ethnicity Finances	Not significant Significant
16.	Kerlin (1997)	Qualitative	Sex, Advising	Significant
17.	Schwarz (1997)	Quantitative	Advising Personal attributes Family support	Significant Significant Significant

(table continues)

Table 1 (continued)

	Study	Method	Factors	Significance
18.	Boyle & Boice (1998)	Qualitative	Orientation	Significant
19.	Seagram et al. (1998)	Quantitative	Enrollment status	Significant
			Finances, Advising	Significant
			Procrastination	Significant
			Sex	Not significant
			Timing of dissertation	Significant
20.	Tuckman et al. (1998)	Quantitative	Enrollment status	Significant
21	Dinham & Scott (1999)	Quantitative	Sex, Finances	Significant
			Advising	Significant
			Emotional Stress	Significant
22.	Faghihi, Rakow, & Ethington (1999)	Quantitative	Age	Not significant
			Advising, Self-efficacy	Significant
23.	Bair (1999)	Mixed	Sex, Age, race/ethnicity	Not significant
			GRE-Verbal/Quant.	Significant*
			Enrollment status, GPA	Significant*
			Emotional stress, health	Significant
			Motivation Advising	Significant
			Self-efficacy, Finances	Significant
			Student-faculty relation	Significant
24.	Berger & Milem (2000)	Quantitative	Program race diversity	Significant
25.	Ferrer de Valero (2001)	Mixed	Finances, Orientation	Significant
26.	Siegfried & Stock (2001)	Quantitative	Program size	Not significant
27.	Maryka (2002)	Mixed	Dissertation topic	Significant
			Procrastination	Significant
28.	Stiles (2003)	Quantitative	Sex, Age	Significant
			Enrollment status	Significant
29.	Bauer (2004)	Mixed	Advising, Finances	Significant
			Dissertation topic	Significant
			Orientation, Motivation	Significant
			Student-faculty relation	Significant
			Peer mentoring	
30.	Maher et al. (2004)	Mixed	Commitment to finish	Significant
			Student-faculty relation	Significant
			Finances, Family	Significant
			Motivation	Significant
			Research experience	Significant
31.	Crayton (2005)	Quantitative	Race/Ethnicity	Not significant
32.	Strayhorn (2005)	Quantitative	Race/Ethnicity	Significant
			GRE-Verbal/Quant.	Not significant
			Finances	Significant
33.	McLaughlin (2006)	Quantitative	Age, GPA	Significant

Note. Significant* = some studies showed statistically significant relationship whereas others showed none.

The interest in the topic of TTD has been in existence as early as 1960 when Berelson first conducted a seminal study examining graduate education in the United States. Berelson's (1960), which was based on a national database, established that provision of financial assistance in the form of fellowships, rather than allowing students to work as TAs and RAs, was associated with shorter TTD. Following this study, Wilson (1965), surveying graduates, deans, and faculty in 23 doctoral institutions, established that discontinuity of attendance, inadequate finances, inadequate academic advisement, working as a TA, writing a dissertation while not in attendance or while working full-time, and family obligations were among the factors associated with longer TTD. He found that median TTD was approximately 8 years.

Based on the results of the studies in the 1960s, the federal government continued to provide more financial support, especially in the form of fellowships and traineeship, to the doctoral-degree granting institutions in order to shorten TTD. In the sixties, the interest in the topic of TTD was largely motivated by the demand for teachers and the anticipated shortage of Ph. D. graduates, however, when the predicted shortage did not occur, the interest in the topic declined in the 1970s and early 1980s (Tuckman et al., 1990). Noticing that national estimates of total TTD mask individual variations by institutions, Abedi and Benkin (1987) used data from the National Research Council's Doctorate Record File for the University of California at Los Angeles (UCLA) doctorate recipients between 1976 and 1985. Using a stepwise multiple regression analysis, they found that the source of financial support (e.g., assistantship, fellowship, loan, or personal sources) was the most important variable associated with total TTD. Students relying on

personal sources took longer than those who relied on fellowships. They estimated that the longest mean total TTD for the UCLA doctoral graduates was in Education, 11 years.

Analyzing degree completion for 11 science and engineering fields covering a 20-year period (1967-1986), Tuckman et al. (1990) found that TTD was not related to any single factor, rather, "it was affected by a variety of factors including availability of student support, labor-market conditions, socio-demographic characteristics of degree recipients, and the characteristics of both undergraduate and graduate degree-granting institutions" (p. 4). Although limited to science and engineering fields, this study was considered a benchmark for research in the area of TTD due to its comprehensiveness: it was based on a national database (Survey of Earned Degree [SED]). Its results could thus be used to validate previous research that relied on homogenous populations.

It is worth noting that early research on TTD until the 1990s, tended to focus on student-characteristics (e.g., age, sex, race, and undergraduate GPA) and institutional characteristics (e.g., financial support offered to students such as GA, TA, RA, and fellowships). These variables were relatively easy to quantify and thus were amenable to quantitative approaches that were predominant during this period. Following this wave of quantitative studies, Bowen and Rudenstine (1992) conducted a meta-analysis (i.e., synthesis of results of multiple quantitative studies that address a particular topic of interest) that culminated in the publication of a landmark book, *In pursuit of the Ph.D*. The study focused on the Ph. D. programs within the Arts and Sciences at 10 selected elite universities with data covering 35 years (1962 to 1986). Among the findings from this study were: (a) approximately one half of all Ph. D. students completed the degree even after pursuing it for between 6 to 12 years, (b) TTD varied systematically by field of

study, (c) programs with smaller groups of students (cohorts) had shorter TTD, (d) students who relied on personal sources of finance had longer TTDs than those relying on TA and fellowships, (e) proper dissertation advising, clearly communicated objectives and guidelines, and flexible funding were associated with shorter TTD, and (f) selection of an appropriate dissertation topic was associated with shorter TTD.

Generally, up to the late 1980s, few researchers examined the relationship between TTD and student personal attributes (e.g., motivation) and institutional factors (e.g., academic advisement). Unlike demographics (e.g., age, gender, and race) and financial factors, factors that were easy to quantify, student attributes are not easily quantifiable. Because these 'not-easy-to-quantify' factors may be related to TTD, it was necessary to examine the nature of their relationship with TTD. Examining these factors required employing qualitative rather than quantitative approaches as discussed next.

In the early 1990s, researchers began to employ qualitative approaches to examine factors related to TTD. Among the first qualitative studies was one by Nerad and Cerny (1993), which identified several institutional and field-specific factors related to TTD. These included: (1) research mode (i.e., programs that practiced apprenticeship, teamwork and were laboratory-intensive were associated with shorter TTD, whereas individualistic, solitariness, and library-intensive programs were associated with longer TTD); (b) structure of program (i.e., programs that required Master's degree before admission, conducted qualifying exams, and undertook annual self-evaluation were associated with shorter TTD, whereas programs that did not practice these activities were associated with longer TTD); (c) dissertation definition (i.e., programs that viewed the dissertation as a test of future ability tended to experience shorter TTD than did those that

viewed it as a major contribution to knowledge); (d) advising (i.e., programs that practiced faculty mentoring and advising were associated with shorter TTD than did those that did not engage more in these practices); (e) departmental climate (i.e., programs characterized with a sense of community tended to experience shorter TTD, whereas programs where students were treated as adolescents tended to experience longer TTD); (f) research money (i.e., programs that had a variety of financial sources tended to be associated with shorter TTD than were those that had few sources of finance); and (g) type of financial support (i.e., RAs and fellowships were associated with shorter TTD whereas TAs, loans, and own funding were associated with longer TTD).

As the number of studies employing qualitative approaches accelerated in the 1990s, researchers also began to employ mixed methods to examine factors related to TTD. Among the first attempts in this direction was a study conducted by Lenz (1995) to examine factors that inhibit or enable completion of the doctoral dissertation for nontraditional aged women in a Ph. D. program in Education. In the qualitative portion, she conducted six case studies and semi-structured interviews, whereas in the quantitative portion, she analyzed data gleaned from academic records and a survey comprising a perfectionism scale. She found that among the completers, the factors that were associated with timely completion included a stimulating and exciting dissertation topic, a caring advisor, and supportive family members and peers. Among the ABDs, the factors that hindered the completion of the degree included lack of a strong dissertation topic, lack of a solid advisor-advisee relationship, lack of an active support network, and inadequate time and finances. No statistically significant differences were noted in perfectionism between completers and ABDs.

Boydstun's (1996) study on trends and factors that affect TTD at the University of Texas at Austin addressed several issues related to persistence; however, this review focuses on research questions addressing TTD. The various analyses performed revealed that registered TTD varied significantly by academic disciplines. Receipt of financial support was associated with shorter registered TTD; however, there were no statistically significant differences in registered TTD by gender or race.

Kerlin's (1997) qualitative study identified two broad categories of factors that shaped women's perceptions of their doctoral experiences: personal/social factors (e.g., academic self-concept, gender, age, health, finances, family status and class/cultural identity) and institutional factors (e.g., program status, department climate, department policies and practices, and advisor/advisee relationships). For instance, with respect to academic self-concept, students who were self-confident about their academic ability were likely to experience shorter TTD than did those who lacked self-confidence.

Schwarz's (1997) qualitative case study of the college of Liberal Arts at a large research university established that the nature of advisement by the dissertation chair (e.g., advisor's values, the frequency of meetings, advisor's communication style, and advisor's dedication to help students graduate on time) and the student's own characteristics (e.g., intent to graduate, work style, expectation for scope of dissertation, and individual characteristics) were related to TTD. In addition, relationships with partners and parental support were also related to TTD.

Seagram et al. (1998) investigated variables related to time to completion of the doctoral degree by conducting a survey of 154 students who graduated between 1987 and 1992 from Natural Science, Social Science, and Humanities programs at York University.

Using techniques such as analysis of variance (ANOVA) and multiple regression, they found that: (a) whereas gender differences in TTD were not statistically significant, males were more satisfied with the quality of supervision they received than were females, (b) slower completers tended to be recipients of financial support in the form of TAs, and (c) beginning the dissertation early, remaining with the original topic and supervisor, and engaging in collaborative work with the supervisor were associated with shorter TTD.

Examining factors related to TTD, Faghihi et al. (1999) study involving 97 doctoral candidates in the College of Education at a large urban university, established that demographics (e.g., gender and age) and fiscal variables (financial status) had little effect on TTD. However, students with higher levels of research self-efficacy (i.e., perception of ability to conduct own research) and good relationships with advisors were more likely to complete their dissertation and other major research related projects than were those who lacked these characteristics.

Just before the turn of the century, Bair (1999) employed the methodology of *meta-synthesis* [6](i.e., a synthesis of findings from both quantitative and qualitative studies addressing a particular topic) to examine doctoral attrition and persistence. The meta-synthesis included 118 studies conducted between 1970 and 1998 that met certain inclusion criteria set by this researcher. Although the meta-synthesis did not specifically address TTD, owing to the uncontested finding that the longer the time spent in graduate school, the greater the chances that a student will not persist to the degree (Bowen & Rudenstine, 1992; Nerad & Cerny, 1993), the review included sections of the meta-

[6] Bair (1999) used the term "meta-synthesis" to refer to the synthesis of findings of both quantitative and qualitative studies. This should not be confused with qualitative meta-synthesis (meta-summary) whereby the findings of only qualitative studies are examined (Sandelowski & Barrosso, 2003).

synthesis that tangentially addressed TTD. The meta-synthesis revealed that: (a) aspects of the departmental culture such as faculty-student interaction, opportunities for involvement in professional activities, and presence of a variety of financial support were associated with doctoral degree completion; (b) presence of positive student-advisor relationship was associated with timely completion of the doctorate; (c) frequent involvement in programmatic activities was associated with timely degree completion; (d) degree completers were more likely to be involved with their academic peers than were non-persisters; (e) students who held RAs, GAs, TAs, and fellowships were more likely to complete in a timely manner than were those who relied on other sources of funding; (f) academic variables such as GPA scores and GRE scores were not effective predictors of degree completion; (g) personal and psychological factors such as motivation to complete, having career goals, and having a positive sense of self were positively related to degree completion; and (h) demographic variables such as sex, race, age, enrollment patterns did not conclusively distinguish completers and non-persisters.

Ferrer de Valero (2001) employed a mixed methods approach to examine departmental factors that affect TTD and completion rates of doctoral students at a public, research land-grant university. In the quantitative phase, he computed median TTD and completion rates whereas in the qualitative component, he employed semi-structured open-ended interviews to gather participants' perspectives of factors influencing TTD. Integrating the findings of both components, he established that the kind of financial support and the relationship between coursework and research were related to TTD. Specifically, serving as a TA was associated with longer TTD.

Bauer (2004) employed a mixed methods approach to examine the effect of departmental factors on students' completion of doctoral requirements, focusing on four departments (i.e., Clinical Psychology, Environmental Science, Gerontology, and Higher Education Administration) at a comprehensive, public, urban university. In the quantitative phase, she computed median TTD and completion rates whereas in the qualitative phase, she interviewed 16 ABD and graduate students from these programs. She established that the following departmental factors were associated with shorter TTD: strong student/faculty relationships and peer mentoring; varied opportunities for professional identification; sufficient financial support; thorough student orientation programs; good advising; careful topic selection; strong internal motivation; and clear understanding of departmental expectations.

To examine factors that constrain, facilitate, or differentiate degree progress among women at Stanford University, Maher et al.'s (2004) mixed methods study involved focus groups and interviews that led to the development of a survey instrument for use in collecting quantitative data from 160 alumni of the doctoral program in Education. They then combined the results of the quantitative analysis (using chi-squares tests) and qualitative analysis (using thematic analysis), which revealed six themes differentiating early and late finishing women: (a) commitment to degree completion (e.g., early finishers described themselves as goal-oriented and disciplined whereas late-finishers felt less urgency to complete the degree), (b) relationships with faculty (e.g., early finishers were more likely to have established positive relationships with advisors than were late finishers), (c) funding opportunities (e.g., early finishers tended to cite less financial problems than did late finishers), (d) family issues (e.g., early finishers were

more likely to report family support than were did late finishers), (e) research experience (e.g., early finishers tended to experience less problems with identifying a dissertation topic, data collection, and data analysis than did late finishers), and (f) capability to make "the system" work for them (e.g., early finishers were more likely to ask for help from at least two sources beyond the assigned faculty compared to late finishers).

Foci of Studies on TTD

Researchers examining TTD have focused on various subpopulations and issues. Using national data, Bowen and Rudenstine (1992) examined TTD across various fields such as the physical sciences, engineering, life sciences, social sciences, humanities, education, and professional fields. Prior to this, Tuckman et al. (1990) had analyzed degree completion using a national database but their study focused only on science and engineering fields. Some researchers have compared TTD in various institutions within one state, such as Florida (e.g., McLaughlin, 2006), or various fields or programs within a single university (e.g., Abedi & Benkin, 1987; Boydstun, 1996; Nerad & Cerny, 1993; Seagram et al., 1998; Stolzenberg, 2006). Noticing that TTD varies by fields and/or programs, some researchers have focused on a single field such as Education (e.g., Lenz, 1995; Maher et al., 2004) or various doctoral programs offered (e.g., Civian, 1990; Stiles, 2003; Schwarz, 1997). Other investigators have focused on departmental factors (e.g., nature of advising and provision of orientation) related to TTD within a given college (e.g., Bauer, 2004; Faghihi et al., 1999; Ferrer de Valero, 2001) or nationwide (e.g., Baird, 1990). Realizing that TTD differs by programs, some researchers have narrowed the focus to a single program such as economics (Siegfried & Stock, 2001), clinical psychology (Maryka, 2002), and social work (Crayton, 2005). A few investigators have

examined TTD in specific subpopulation such as women (Kerlin, 1997; Maher et al., 2004), whereas others have focused on single issues, for instance, the relationship between TTD and self-efficacy (Faghihi et al., 1999), perfectionism (Germeroth, 1991; Lenz, 1995; Muszynski & Akamatsu, 1991), or procrastination (Green, 1995; Muszynski & Akamatsu, 1991). These studies, though based on different foci, provide a complementary portrait of TTD in the United States.

Factors Related to TTD

Whereas studies on TTD may focus on various subpopulations or issues, the historical overview shows that constellations of factors are associated with TTD. Because each study may cover varying number of factors, in this section, the findings on the relationship between the individual factor and TTD is summarized by indicating magnitude, statistical significance, and/or direction of the relationship. In studies where statistical significance of a factor is not indicated, the terms "(un)related" is used to describe the relationship.

Sex

Whereas many researchers found that sex is not associated with TTD (Bair, 1999; Boydstun, 1996; Civian, 1990; Seagram et al., 1998), others have found that women tend to experience longer TTD than do men (Dinham & Scott, 1999; Kerlin, 1997). Stiles (2003) discovered that, controlling for other factors, men are more likely than are women to graduate during the first five years; however, this difference dissipates over time.

Race/Ethnicity

The findings on race/ethnicity are inconclusive. Many studies have established that race/ethnicity is not related to TTD (Bair, 1999; Boydstun, 1996; Civian, 1990;

Crayton, 2005). Strayhorn (2005) found that ethnicity was statistically significantly related to TTD wherein, compared to Whites, Blacks and Hispanics were half as likely and Asians 1.5 times more likely to attain the doctorate.

Age at Admission

The findings on age at admission are mixed. Faghihi et al.'s (1999) study showed that age was not associated with dissertation progress. Similarly, the weight of evidence in Bair's (1999) meta-synthesis indicated that age was not associated with degree completion. In contrast, Stiles (2003) documented a statistically significant interaction effect whereby younger minority and Whites had similar doctorate attainment probabilities whereas older minority were less likely to attain the doctorate than were older Whites. Civian (1990) found that younger (age < 30 years) non-White students completed 1.5 years earlier than did Whites, whereas older (age ≥30 years) non-Whites students took more than a year longer than did Whites to graduate. Mclaughlin (2006) also found age to be negatively associated with degree completion.

GPA Scores at Admission

The findings of the few studies examining the relationship between this variable and TTD are inconclusive. Bair (1999) found no association between GPA scores and doctorate completion but in other studies, GPA was found to be statistically significantly related to TTD (Bowen & Rudenstine, 1992; Civian, 1990; McLaughlin, 2006).

GRE Quantitative Scores

The findings of the few studies that have examined the relationship between this factor and TTD are mixed. Bair (1999) found that GRE Quantitative score was associated

with TTD in 11 out of 26 studies whereas Strayhorn (2005) found that GRE quantitative scores did not statistically significantly predict doctorate attainment.

GRE Verbal Scores

In the few studies that have examined the relationship between GRE verbal score and TTD, there are indications that this variable is not associated with TTD. In Bair's (1999) study, this variable was associated with TTD in only 3 out of 20 studies, an indication that it may not be a good predictor of doctorate attainment. Strayhorn (2005) found this variable not statistically significantly related to doctorate attainment.

Program Size

Program size refers to the number of students admitted in an academic program (Bowen & Rudenstine, 1992). The findings of the few studies on this factor are mixed. Bowen and Rudenstine's (1992) meta-analysis revealed that larger programs are associated with longer TTD. Similarly, Girves and Wemmerus's (1988) study showed that department characteristics such as number of students (program size) were related to doctoral degree progress. Siegfried and Stock (2001), however, found no evidence that size of the doctoral program was related to TTD.

Racial/Ethnic Diversity in the Program

Program racial/ethnic diversity refers to the level of heterogeneity with respect to the racial/ethnic composition of an academic program. There seems to be agreement in the results of the few studies that have examined this factor in relation to TTD. Bowen and Rudenstine (1992) established that program ethnic/racial diversity is related TTD. Similarly, Girves and Wemmerus (1988) and Berger and Milem (2000) found that students in racially/ethnically less diverse programs tend to experience longer TTD.

Advising, Mentoring, and Supervision

Most studies document that good relationship between student and faculty, especially at the dissertation phase, is associated with shorter TTD (Abedi & Benkin, 1987; Bair, 1999; Bauer, 2004; Bowen & Rudenstine, 1992; Nerad & Cerny, 1993; Dinham & Scott, 1999; Faghihi et al., 1999; Girves & Wemmerus, 1988; Kerlin, 1997; Lenz, 1995; Schwarz, 1997; Seagram et al., 1998; Wilson, 1965). Similarly, Baird (1992) established that close social interaction with fellow doctoral students, that is, peer mentoring, was associated with shorter TTD.

Dissertation Topic

Consistent findings emanate from studies examining the relationship between dissertation topic and TTD. Careful selection of a dissertation topic, beginning the dissertation early, remaining with the original topic, and a sense of efficacy and passion for the topic are associated with timely doctorate attainment (Bauer, 2004; Bowen & Rudenstine, 1992; Lenz, 1995; Maryka, 2002).

Orientation

The findings seem conclusive: departmental orientation is related to timely doctorate attainment (Bauer, 2004; Ferrer de Valero, 2001). Departments that excel in enculturation supplement a general orientation with a departmental orientation to enable students to learn program expectations (Boyle & Boice, 1998).

Financial Factors

The findings on financial factors are mixed. Bair's (1999) meta-synthesis showed that financial variables are poor predictors of degree completion; however, the type of financial support matters: recipients of assistantships tend to attain the doctorate earlier

than nonrecipients of these types of aids. The nature of funding influences the timing of degree completion (Abedi & Benkin, 1987; Bauer, 2004; Berelson, 1960; Bowen & Rudenstine, 1992; Dinham & Scott, 1999; Maher et al., 2004; Nerad & Cerny, 1993; Seagram et al., 1998; Strayhorn, 2005; Wilson, 1965). According to Tinto (1993), the effect of finances is not constant over all stages of the doctoral program: TAs and RAs tend to be more effective in promoting involvement in early stages of the program than in the later stages when they tend to distract students from concentrating on dissertation research. Instead, in the later stages, fellowships and scholarships, Tinto argues, free students to focus on dissertation research.

Enrollment Status

The findings are inconclusive. About one-half of the studies in Bair's (1999) meta-synthesis showed that fulltime enrollment is associated with shorter TTD, whereas the other half of the studies showed the reverse. Wilson (1965) and Seagram et al. (1998) found that full time or part-time attendance and discontinuity of attendance are related to TTD. Stiles (2003) established that women tend to have longer TTD than do men if both enroll part-time, but no gender difference emerges if both enroll full-time.

Self-efficacy

According to Bandura's (1977) self-efficacy theory, individuals tend to engage in tasks they believe they have the ability to complete successfully. Faghihi et al. (1999), employing self-efficacy theory to examine the relationship between research self-efficacy and dissertation progress, found that students with higher levels of research self-efficacy (i.e., a student's perception of ability to conduct own research) were more likely to complete their dissertations than did those who lacked research self-efficacy.

Motivation

The findings seem conclusive. Bair (1999) found a strong relationship between motivation (i.e., the determination to complete the degree against all odds) and doctorate attainment. Maher et al. (2004) established that early women completers had a stronger motivation to attain the doctorate than did late completers. Bauer's (2004) found that students' internal motivation, though not a departmental characteristic, influenced TTD.

Emotional Stress

The results from the few studies seem consistent. Powell and Dean (1986) found that stress, whether emanating from undertaking a task such as dissertation writing or stress in the social sense, is associated with longer TTD. Having family that demands a lot of time or attention is associated with longer TTD (Dinham & Scott, 1999).

Procrastination

Procrastination refers to the tendency to delay undertaking a task until a future date and is characterized by low frustration tolerance, difficulty in decision-making, need for approval, and insufficient reinforcement (Green, 1995). Muszynski and Akamatsu's (1991) study of doctoral students in a clinical psychology program revealed a statistically significant difference in TTD between delayers and completers. Similarly, Green's (1995) study comparing dissertation completers and noncompleters on facets of procrastination found that the mean scores for the cognitive and affective factors resulting in procrastination were statistically significantly higher for ABDs than for completers.

Perfectionism

Among students, perfectionism may include such behaviors as insisting that a dissertation must be a perfect product. The findings on this factor are mixed. In a study

involving 132 doctoral students in the field of communication across several institutions, Germeroth (1991) established that whereas completers and ABDs did not differ in levels of perfectionism, women were more likely to let their own perfectionism inhibit their completion of the dissertation compared to men. Whereas completers and ABDs showed perfectionism traits, completers tended to overcome perfectionism traits with the support that they received compared to ABDs (Lenz, 1995). In Muszynski and Akamatsu's (1991) study, however, delayers and completers did not differ in perfectionism.

Health

The findings of the few studies examining the relationship between health and TTD are mixed. Bair (1999) and Maher et al. (2004) found that good health is associated with shorter TTD. Grissom (1985) found no relationship between health and TTD.

Summary of Factors Related to TTD

In sum, 19 factors were identified that may be related to TTD. With respect to the quantitative studies, the nature of relationship between each of these factors and TTD may be described in terms of significance of association (i.e., either statistically significant or not) and direction (i.e., positive or negative). With respect to the qualitative studies, the factors may be described in terms of frequency of endorsement of a theme or based on perceived importance by participants (i.e., either important or not). To summarize the relationship of these factors to TTD, the terms "significant" (i.e., referring to a statistically significant factor or an important factor) and "non-significant" (i.e., referring to statistically non-significant factor or a non-important factor) are used as shown in Table 2. For continuous variables, positive (+) and negative (-) signs are used to indicate the direction of the relationship.

Table 2

Factors Related to TTD: Summary of the Literature

Factor	Sig/ NS	Methods/Findings		
		Quantitative	Qualitative	Mixed Methods
1. Sex	Sig	Dinham & Scott (1999) Stiles (2003)	Kerlin (1997)	
	NS	Civian (1990) Boydstun (1996)		Bair (1999)
2. Race/ Ethnicity	Sig NS	Strayhorn (2005) Boydstun (1996) Civian (1990) Crayton (2005)		Bair (1999)
3. Age at admission	Sig.	Civian (1990) McLaughlin (2006) Stiles (2003)		
	NS	Faghihi et al. (1999)		Bair (1999)
4. GPA scores	Sig+	McLaughlin (2006)		B & R (1992)[c]
	NS	Civian (1990)		Bair (1999)
5. GREV Scores	Sig+			Bair (1999)*
	NS	Strayhorn (2005)		B & R (1992)[c]
6. GREQ Scores	Sig+			Bair (1999)*
	NS	Strayhorn (2005)		B & R (1992)[c]
7. Enrollment Status	Sig.	Stiles (2003) Seagram et al. (1998) Wilson (1965)		Bair (1999)
8. Financial Factors	Sig.	Dinham & Scott (1999) Seagram et al. (1998) Strayhorn (2005) Wilson (1965) Berelson (1960)	Abedi & Benkin (1987) Nerad & Cerny (1993)	Bair (1999)* Ferrer (2001) Bauer (2004) Maher et al. (2004) B & R (1992)[c]
9. Program Size	Sig-	G & W (1998)[a]		B & R (1992)[c]
	NS	Siegfried & Stock (2001)		
10. Program Racial Diversity	Sig+	Berger & Milem (2000) G & W (1998)[a]		B & R (1992)[c]
11. Advising, Mentoring, or Supervision	Sig	Dinham & Scott (1999) Faghihi et al. (1999) Seagram et al. (1998) G & W (1998)[a] Schwarz (1997) Baird (1992)	Nerad & Cerny (1993) Kerlin (1997) Abedi & Benkin (1987)	Bauer (2004) B & R (1992)[c] Bair (1999) Lenz (1995)
12. Dissertation Topic	Sig			Bauer (2004) Maryka (2002) B & R (1992)[c] Lenz (1995)
13. Orientation	Sig		Boyle & Boice (1998)	Bauer (2004) B & R (1992)[c]
14. Self-efficacy	Sig	Faghihi et al. (1999)		Bair (1999)

(table continues)

Table 2 (Continued)

Factor	Sig/ NS	Methods/Findings		
		Quantitative	Qualitative	Mixed Methods
15. Motivation	Sig			Bair (1999) Bauer (2004) Maher et al. (2004)
16. Emotional Stress	Sig	Powell & Dean (1986) Dinham & Scott (1999)		
17. Procrastination	Sig	Green (1995) M & A (1991)[b]		
18. Perfectionism	NS	Germeroth (1991) M & A (1991)[b]		Lenz (1995)
19. Health	Sig			Bair (1999) Maher et al. (2004)
	NS	Grissom (1985)		

Note.

* Some studies analyzed showed significance, other did not; Sig. = Significant; NS = Not Significant;
[a] Girves & Wemmerus (1998); [b] Muszynski & Akamatsu (1991); [c] Bowen & Rudenstine (1992);

Utility of Hazard Analysis and Multilevel Modeling in Studying TTD

As shown in the historical overview, most studies addressing TTD have been quantitative. Compared to qualitative approaches, quantitative approaches are preferred for various reasons: data collection and analysis tend to be relatively faster, they involve large sample sizes, and they are comparatively replicable in other populations. Although the attainment of the doctorate is described as a longitudinal process (Tinto, 1993), most quantitative studies tend to employ a pretest-posttest design whereby a cohort of students is selected and after a certain period of time has elapsed, say five years, they are categorized into two groups, 'those who have attained the doctorate' and 'those who have not,' without regard to the timing of doctorate attainment. Using techniques such as logistic regression, these two groups then are compared on factors of interest.

With such a design, the temporal nature of doctorate attainment is masked. One is not able to identify periods of elevated 'risks' of doctorate attainment and the information about students who fail to attain the doctorate during the observation period (i.e.,

censored cases) is lost. The practical implications of results obtained when these techniques are employed are thus wanting due to their tendency to emphasize whether an event occurs but ignoring the timing of occurrence. Willet and Singer (1993) attributed this tendency to the analytic and logistic constraints (e.g., inability to follow cases until everyone in the sample experiences the event of interest) these researchers encounter in attempting to address questions related to the timing of longitudinal events. They contend that these constraints might stem from researchers' lack of exposure to some statistical techniques such as hazard analysis that are well suited for examining occurrence and timing of longitudinal events.

Hazard analysis (also called, event history analysis) is a class of statistical methods designed for studying *occurrence* and *timing* of longitudinal *events* (Allison, 2001). An event refers to a transition from one discrete state to another, for instance, a change from 'have not attained doctorate' to 'have attained doctorate.' This technique allows the estimation of predictive models in which the timing of doctorate attainment depends on covariates such as age at admission, sex, ethnicity, and so forth. Several benefits accrue when this technique is employed: it allows for inclusion of information about censored cases, thereby providing an unbiased estimate of timing of doctorate attainment; it considers the periodicity of doctorate attainment rather than focusing only on the start and end points but ignoring the temporal variations of doctorate attainment occurring between these two points; and it allows for analysis of covariates whose effects fluctuate over time (Allison, 2001; Willett & Singer, 1991).

Different nomenclatures are used in different fields to refer to this modeling technique. In the biomedical sciences, the term *survival analysis* is used given their

interest in measuring how long patients or laboratory animals survive following treatment. The term *time to event analysis* is used widely in the social sciences where the interest is on analyzing time to events such as births, marriage, and so forth. Economists prefer the term *hazard modeling* stemming from their interest in analyzing the duration of employment before an employee quits a job. In the engineering sciences, the terms *reliability analysis* or *failure time analysis* are used based on their interest in measuring the time to breakdown of machines as part of quality control procedures. *Hazard analysis* is adopted in this study whereby attaining the doctorate is considered the "hazard." Note that the terms "hazard," "survival," and "risk" as used in this study differ from everyday parlance. For instance, attaining the doctorate, although is a positive event, is viewed as the "hazard" in this study.

Ott and Markewich (1985), Civian (1990), and Willett and Singer (1991) were among the first to apply hazard analysis in examining educational outcomes. There has been a burgeoning body of literature employing hazard analysis to study undergraduate students' behaviors such as graduation (e.g., Deike, 2003; DesJardins, Ahlburg, & McCall, 2002; Stiles, 2003), stopouts (e.g., DesJardins, Ahlburg, & McCall, 1994; Ronco, 1994), retention (e.g., DesJardins & Moye, 2000; DesJardins, Ahlburg, & McCall, 1999; Han & Ganges, 1995; Murtaugh, Burns, & Schuster, 1999), and attrition/dropout/ departure (e.g., Ishitani, 2003; Ishitani & DesJardins, 2002). Some researchers have employed competing risks analysis whereby two or more of these events are simultaneously examined (e.g., Denson & Schumacker, 1996; Ronco, 1995).

Few researchers, however, have employed hazard analysis to study factors related to the timing of doctorate attainment. Exceptions are Civian (1990), who employed it to

examine degree progress among students at the Harvard University Graduate School of Education and Stiles (2003) who employed it to examine the variation in TTD among doctoral students at the same institution. In both studies, however, the researchers did not consider the interactive processes that the institution and its subsystems such as departments and/or programs might have had on the timing of doctorate attainment. Simply put, they did not model the hierarchical structure of the data in their analysis. Students (level-1 unit of analysis) may be conceptualized as nested within programs (level-2 unit of analysis) or in departments, depending on the nature of the data being analyzed. A difference in the timing of doctorate attainment for students with certain student-level characteristic (e.g., males vs. females) may be due in part to the characteristic of the program to which they belong. The more highly correlated the timing of doctorate attainment is within programs (i.e., intra-program correlation), the more likely that ignoring program clustering might result in misestimated standard errors. By ignoring the hierarchical data structure, these researchers assumed that the timing of doctorate attainment was independent of the program to which students belonged, an assumption that might have led to incorrect conclusions being drawn from the inferential statistics obtained. Multilevel modeling, however, can be used to evaluate the amount of variability in the timing of doctorate attainment at both student and program levels.

This review identified two studies that illustrated the use of multilevel modeling to examine educational outcomes. Umbach and Porter (2002) used multilevel modeling to determine individual (level-1) and departmental (level-2) factors that affect student satisfaction and perceptions of the impact of college experience on skill development. Smyth and McArdle (2002) employed the same technique to determine student (level-1)

and college (level-2) variables associated with graduation with science, mathematics or engineering majors. Apart from focusing only on an undergraduate population, hazard analysis was not incorporated alongside multilevel modeling in these two studies.

Discrete-time multilevel hazard models, despite their appropriateness to a wide variety of data, have only recently been employed in examining educational outcomes. Ma and Willms (1999), using secondary data comprising 3,116 students nested in 52 schools, employed discrete-time multilevel hazard models to estimate the effects of student (level-1) and school (level-2) characteristics on students' decision to drop out of advanced math courses. Biggeri, Bini, and Grilli (2001), using data comprising 10,338 graduates nested in 766 course programs, which were also nested in 64 universities, employed three-level discrete-time hazard models to determine graduates' characteristics (level-1), course program factors (level-2) and university factors (level 3) related to time to obtaining the first job upon graduation. Paccagnella (2006), using data set composed of 427 individuals nested in 43 vocational training courses, employed discrete-time hazard model to determine individual (level-1) and course (level-2) variables related to the duration of the first unemployment spell after training. Various statistical software packages have been used to undertake these analyses including HLM (in Ma and Willm's study), MLwiN (in the Biggeri et al. study), and SAS (in Paccagnella's study). This review, however, did not identify a study where discrete-time multilevel hazard analysis was employed to examine factors related to the timing of doctorate attainment.

Utility of Focus Group Research Strategy in Studying TTD

Researchers examining TTD have emphasized the need for more qualitative research that captures students' thoughts, feelings, and behaviors regarding continuation

or withdrawal decisions (e.g., Bair, 1999; Tinto, 1993). Consequently, as indicated in the historical overview, more and more qualitative studies are being conducted to examine factors related to TTD. A frequently employed data collection technique has been semi-structured or individual interviews. Only in one study, Maher et al. (2004), was focus groups employed although with little information on how the technique was applied.

In analyzing the qualitative data in these studies, researchers have employed data reduction procedures whereby interview transcripts are coded to yield themes. These qualitative studies, however, have had various limitations: results may be influenced by researchers' personal biases; seldom are emergent themes quantified; the results may not generalize to other people or settings owing to the small sample sizes involved; and it is difficult to make quantitative predictions based on these results. These limitations suggest a quantitative component of the study is necessary as an attempt to fill these gaps.

Because few studies have employed focus groups to gather data on students' perceptions of factors influencing TTD, the appropriateness of this technique in this study is discussed next. Krueger and Casey (2000) define a focus group as a "carefully planned series of discussions designed to obtain perceptions on a defined area of interest in a permissive, nonthreatening environment" (p. 5). The participants typically are homogeneous but with sufficient variation among them to allow for contrasting opinions. Focus groups yield qualitative information that allows the researcher to complement quantitative findings. In this study, for instance, discrete-time multilevel hazard analysis may indicate a statistically significant sex difference in the odds of doctorate attainment. By conducting focus groups, we may be able to understand, for instance, that the 'chilly climate' that females encounter in some departments offering certain programs might be

associated with the difference observed. The researcher is able to see through the eyes and hearts of students who experience longer/shorter TTD or through the eyes and hearts of faculty who interact closely with the students. That is, focus groups reveal insights about participants' thoughts, feelings, and emotions regarding factors related to the TTD.

Doctoral students tend to be relatively voiceless individuals especially due to their powerless or dependent positions (Golde, 2000). Focus groups helps in soliciting "emic [insider] viewpoints" and establishing "meanings [*verstehen*] and purposes" that students ascribe to their actions thus giving them a voice (Guba & Lincoln, 1994, p. 110). Participants' responses during the session may trigger memories of others. They may act as checks and balances to one another by identifying factual errors or extreme views during the session. The technique allows the researcher to involve participants in data analysis, for instance, by asking a question such as "Out of the factors that have been identified, list three that contribute most to lengthening time the doctorate." Focus groups, however, have some shortcomings. Unless checked, dominant participants may skew responses of other participants. Data obtained require skill, time, and experience to analyze. As discussed in chapter III, efforts were made to alleviate these shortcomings by having skilled and experienced moderators in addition to other design considerations.

Utility of Mixed Methods Approach in Studying TTD

Few researchers have employed mixed methods despite Tinto's (1993) suggestion that this approach rather than monomethod approaches be employed to understand better the factors related to TTD. Several benefits accrue from employing a mixed methods approach. One way to think of the advantages of employing a mixed methods approach is that it allows the researcher to maximize on the combined complementary strengths

and/or minimize on the nonoverlapping weaknesses of both approaches (Onwuegbuzie & Teddlie, 2003). The words from the qualitative component add meaning to the numbers in the quantitative component; it allows the researcher to answer a broad range of questions; and it allows the researcher to provide stronger evidence by using different data sources, data collection methods, and data collectors. Mixed methods approaches, however, are expensive, time-consuming, and require proper planning in advance. Of the mixed methods studies reviewed, in none was hazard analysis or multilevel analysis or both incorporated despite their utility in understanding factors related to TTD. The present study attempts to fill this methodological gap in the literature.

Summary of Chapter II

Doctoral persistence in general and doctorate attainment in particular continues to attract the attention of educational researchers. Models or theories of doctoral persistence, compared to undergraduate persistence, are still in the infancy stages. Constellations of factors are related to the time taken to attain the doctorate. Whereas some of the factors are complex to define, from a theoretical standpoint and based on findings of studies reviewed, the factors may be broadly categorized as institutional (e.g., program size, program's racial/ethnic diversity, advising practices/mentoring/supervision, finances, dissertation topic, orientation, and enrollment status) and personal (e.g., sex, ethnicity, age, GPA score, GRE verbal score, GRE quantitative score, self-efficacy, motivation, emotional stress, procrastination, perfectionism, and health). Personal factors may be conceived as characteristics specific to a student's situation and are not directly controlled by the institution whereas institutional factors are those over which the institution has control.

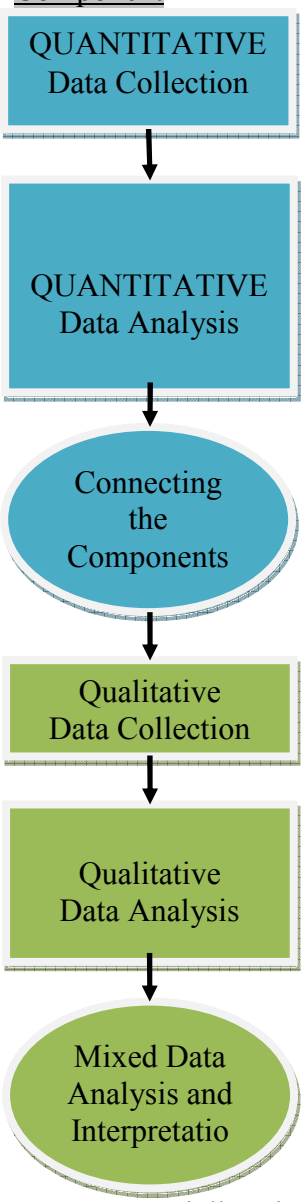
CHAPTER III: METHODS

Chapter III begins with description of the research design, rationale, and paradigm for the overall study. Presented next are two broad sections, the quantitative and qualitative components. Included in the quantitative component are descriptions of the research design, participants, data source, and quantitative data analysis. The qualitative component includes a description of the research design and paradigm, participant/case selection and sampling schemes, data collection procedures, and qualitative data analysis.

Research Design, Purpose, and Paradigm

A *partially mixed sequential equal status design* (see Figure 2) was employed whereby both quantitative and qualitative components of the study occurred sequentially, were weighed equally with respect to addressing the research questions, and mixing occurred only at the data interpretation stage (Leech & Onwuegbuzie, in press). That is, the results of the discrete-time multilevel hazard analysis were combined with the results from focus groups and interviews. A research design whereby both quantitative and qualitative methods are employed in a single study is referred to as *mixed methods*.

Employing mixed methods was expected to yield *complementary* results (Greene, Caracelli, & Graham, 1989). In the quantitative component, the statistical data were designed to identify student- and program-level factors significantly related to the timing of doctorate attainment and provide an empirical basis for selecting participants for the qualitative component, whereas the themes (i.e., words and narratives) in the qualitative component complemented (i.e., elaborated and clarified) the quantitative results.



Component	Procedure/Features	Product/Result/Outcome
QUANTITATIVE Data Collection	~Secondary Data ~Level-1 (N_1 = 1,028 students) ~Level-2 (N_2 = 24 programs)	- Numeric Data - Person-oriented (1,028 cases) - Person-period (3,545 records)
QUANTITATIVE Data Analysis	~Data cleaning (e.g., duplicate cases & missing GRE scores) ~Hazard analysis: logistic and multilevel logistic models ~ Univariate, multivariate, and multilevel models ~ Excel and SAS software used	- Descriptive statistics - Parameter estimates: log odds and standard errors, odds ratios and confidence intervals - Median TTD - Hazard/survival functions - Microsoft Words used
Connecting the Components	Select participants based on program's median TTD: ~ STTD cases ~ LTTD cases	- Four student focus groups (n_1 = 6; n_2 = 4; n_3 = 5; n_4 = 3) - 4 student interviews (n = 4) - 2 faculty focus groups (n = 8)
Qualitative Data Collection	~ Focus groups ~ Individual interviews	- Text data: transcripts & notes - Use of pseudonyms
Qualitative Data Analysis	~ Coding and binarizing[7] themes ~Classify themes in meta-themes ~ Within-case analysis ~ Cross-case analysis ~ Interrespondent matrix ~ Intrarrespondent matrix	- Within-case description - Frequency effect size (FES) - Intensity effect size (IES) - Percentile ranks of effect size - Theme association with TTD - Similarities in perceptions - Differences in perceptions
Mixed Data Analysis and Interpretatio	~ Interpretation and explanation of results of both components	- Discussion of findings - Implications of the study - Future research suggestions

Figure 2. Partially mixed sequential equal status design: Procedures and outcomes

In the social and behavioral sciences, methodological debates often arise over the relative merits of quantitative versus qualitative methods of studying human behaviors (Johnson & Onwuegbuzie, 2004). Recognizing that neither quantitative nor qualitative methods are individually sufficient to examine a complex phenomenon such as TTD, this

[7] Binarizing is a term coined by Onwuegbize and Teddlie (2003) and refers to the process of converting qualitative data to scores of 1s and 0s to facilitate computation of effect sizes of themes.

study took a conciliatory and pragmatic approach that taps the strengths of both methods. The tenets of pragmatism include existence of external reality; subjective and objective methods of knowing are important; and values may influence interpretation of results.

Quantitative Component

Research Design

The quantitative component involved a secondary data analysis of archival data maintained by a College of Education. A non-experimental correlational research design was employed whereby discrete-time multilevel hazard analysis (i.e., a combination of discrete-time hazard analysis and multilevel modeling) was used to address the quantitative research questions. Sixteen entering cohorts of students were observed from 1 to 10 years (see Table 3), a period within which at least one-half of the sample, after accounting for censored cases, was expected to attain the doctorate. Willett and Singer (1991) recommend that a sample be followed until at least one-half of it experiences the event of interest, a rule of thumb they contend, yields reasonable statistical power.

Table 3

Number of Students Admitted in Each Year

Year	Students	Year	Students
1990	18	1999	85
1991	15	2000	83
1992	40	2001	97
1993	53	2002	91
1994	63	2003	81
1995	45	2004	82
1996	59	2005	74
1997	50	2006*	12
1998	80		

Note. * Only data for Spring of 2006 admission was considered for this year

Several challenges were faced in the process of merging quantitative data. To keep track of duplicate records of students in dual programs, unique IDs were created. Due to the interest in time spent while pursuing the doctorate, students who were readmitted after stopping out (i.e., taking a break from active enrollment in doctoral studies for a period of time) were considered as continuing students unless they changed programs upon readmission, in which case they were considered new admission. With the help of data entry personnel in the Dean's office, printed copies of GRE scores were obtained and scores entered manually for students whose scores were missing. Although five programs were inactive (i.e., no longer admitting students) by Spring of 2006, they were included in the analysis for the period that they were admitting students.

Participants

Viewed hierarchically, the quantitative component consisted of level-1 sample size (number of students) and level-2 sample size (number of programs). The level-1 sample included students who were admitted to the College between Spring of 1990 and Spring of 2006, whereas the level-2 sample consisted of 24 programs (18 Ph.D. and 6 Ed. D.) offered in the College. Consistent with the Institutional Review Board's (IRB) requirement, the identity of the College and the doctoral programs remained anonymous; however, a descriptive overview of the type of institution under study and examples of typical instructional programs offered is appropriate.

The college is located at a southeastern state university classified as a research university with very high research activity (The Carnegie Foundation for the Advancement of Teaching, n.d). Instructional programs such as Adult Education,

Counselor Education, Educational Psychology, Instructional Technology, Mathematics Education, and Special Education were among the 24 programs.

Although the researcher did not undertake sampling per se, the final sample resembled what would be obtained by employing a *criterion sampling scheme* (Onwuegbuzie & Leech, 2007b), whereby only doctoral students in the college were considered. Initially 1,189 students who were admitted into the doctoral program between the Spring of 1990 and Spring of 2006 were identified; however, the sample size reduced to 1,028 after excluding duplicate records of 225 students who stopped and were readmitted into the same program and including records of 64 students who were enrolled in dual programs (i.e., 1,189 – 225 + 64 = 1,028). Due to the interest in time spent while pursuing the doctorate, stopout time was included in computing TTD. In line with the enrollment policy at this institution, a student in dual enrollment was counted in both programs. Noting that considering dual programs might violate the assumption of independence of observations, the analyses were conducted with and without dual cases; however, similar results were obtained in both cases. The sample sizes were considered a census because all the students who were admitted in the college and all the programs that were offered in the college during the observation period were included.

According to Singer and Willett (1991), the simplest measure of effect size in hazard analysis is the median lifetime (i.e., median TTD). Using their guidelines, a sample size of 976 students followed for one and a half times the average median TTD is adequate to detect a small effect ($R = 1.25$)[8] between two groups with a power of .80 at

[8] Letting m_1 be median TTD in one group and m_2 be median TTD in the comparison group, then the ratio of median TTD is $R = (m_2 / m_1)$. When R =1.25, the median TTD for comparison group is 25% longer than the

.05 level for two-tailed tests. Bigger effect sizes require fewer than 976 students. As shown in Table 4, the level-1 sample size in this study (N = 1,028) observed for up to 10 years, is comparable to Civian's 625 students and Stiles's 1,640 students.

Table 4

Comparison of the Current Study with Two-Closely Related Studies

Features	Civian (1990)	Stiles (2003)	Current Study (2008)
Site	Harvard Graduate School of Education	Harvard Graduate School of Education	A College of Education
Sample size (N)	625	1,640	1,028
Percent female	58	65	69
Percent White	62	49	75
Observation period	Fall 1982-Fall 1988	Fall 1982–Spring 2000	Spring 1990-Spring 2006
Observation range	1 to 7 years	3 to 20 years	1 to 10 years
Number of cohorts	7	18	16
MTTD	5.8 years	Not computed	5.8 years

No consensus exists on the number that should constitute the minimum sample sizes in a multilevel analysis. Pedhazur (1997) suggests at least 400 units for level-1 whereas Kreft (1996) recommends at least 30 units for level-2, each with at least 30 units for level-1. Snijders and Bosker (1993), Cohen (1998), Raudenbush and Liu (2000) and Snijders (2005) recommend having as many units as possible in the upper levels in order to achieve accuracy and higher power. Because the sample sizes in this study (1,028 for level-1 and 24 for level-2) fall within commonly recommended guidelines, it was anticipated that these sample sizes were adequate to achieve accurate results with a power of .80 or more. Table 5 shows the distribution of students in the 24 programs by sex and race/ethnicity. The sample consisted of approximately 43 students per program and was predominantly White female (75% White, 69.07% female).

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median TTD for the other group; when R = 2.00, the median TTD for comparison group is twice as long (Singer & Willett, 1991).

Table 5

Distribution of Students in Programs by Sex and Race/Ethnicity

Program[a]	Sex (*n*)		Race/Ethnicity (*n*)				Total
	Male	Female	White	Black	Hispanic	Other[b]	*n* (%)
P01	18	28	35	8	1	2	46 (4.5)
P02	5	8	12	0	1	0	13 (1.3)
P03	4	14	11	4	2	1	18 (1.8)
P04	2	4	6	0	0	0	6 (0.6)
P05	9	5	13	1	0	0	14 (1.4)
P06	28	46	58	7	3	6	74 (7.2)
P07	13	14	16	6	2	3	27 (2.6)
P08	47	81	98	13	12	5	128 (13)
P09	2	14	16	0	0	0	16 (1.6)
P10	35	37	54	3	3	12	72 (7.0)
P11	13	11	14	1	1	8	24 (2.3)
P12	5	5	10	0	0	0	10 (1.0)
P13	5	13	16	1	1	0	18 (1.8)
P14	10	21	27	2	2	0	31 (3.0)
P15	14	34	25	1	2	20	48 (4.7)
P16	3	25	27	1	0	0	28 (2.7)
P17	2	12	9	3	1	1	14 (1.4)
P18	4	52	49	4	2	1	56 (5.4)
P19	6	10	10	2	3	1	16 (1.6)
P20	22	96	83	17	8	10	118 (11)
P21	31	68	80	7	5	7	99 (9.6)
P22	24	35	47	2	2	8	59 (5.7)
P23	15	69	52	21	4	7	84 (8.2)
P24	1	8	7	2	0	0	9 (0.9)
Total	318	710	775	106	55	92	*N* =1,028
%	31%	69%	75%	10%	6%	9%	(100)

Note. [a] The Institutional Review Board (IRB) required that the program names remain anonymous
[b] This cluster included Asians, Indians, Unknown, and other races/ethnicity.

Data Source and Ethical Considerations

The university's IRB approved the request to obtain the secondary data. Student-level data such as sex, race/ethnicity, age, GPA scores, and GRE scores were existing and were provided by the Office of the Dean. They were extracted from an official repository for all data related to admissions, degree programs, grades, graduation, and other information on all students admitted to the university. Information gets into this system via a variety of means. Demographic information such as sex, race, and age are reported

by the applicants and entered by the Graduate Admissions office. Test score information such as GRE scores are delivered electronically by the testing agency, the Education Testing Services (ETS). Occasionally, some students submit official printed copies of GRE scores, which are then entered manually into the system. The GPA scores are entered by the Registrar's Office. These data are then matched and uploaded by automatic routines in the system. Besides program size and size of department housing the program, program-level data were obtained by aggregating student-level data.

Data Analysis Procedures

Defining the Covariates Used in the Analysis

Student-level covariates. These included two dichotomous variables, sex and race/ethnicity, with male and White as the reference groups, respectively; and four continuous variables: age, master's GPA scores, GRE verbal, and GRE quantitative scores at admission. Table 6 shows the distributions of continuous student-level covariates. Whereas the original data contained seven race/ethnic groups (i.e., American Indian or Alaskan Native, Asian, Black or African American, Hispanic or Latino, Native Hawaiian or Other Pacific Islander, White or Caucasian, and Others), due to the small percentages of the category labeled "Others," these were merged into four racial/ethnic categories, namely, White (75%), Black (10%), Hispanic (6%) and Other (9%).

Table 6

Distribution of Continuous Student-level Covariates (N = 1,028)

	M	*SD*	Min.	Max.	Median	Skewness	Kurtosis
GPA	3.79	0.31	1.33	4.00	3.89	-3.25	16.49
GRE-V	516.70	89.92	220.00	770.00	510.00	0.12	-0.03
GRE-Q	548.47	101.68	240.00	800.00	540.00	-0.04	-0.22

Continuous student-level covariates were group (program) mean centered. For instance, group mean centering AGE implies subtracting the program's mean age from the student's age (i.e., $AGE_g = AGE_{ij} - \overline{AGE}_j$, where AGE_g is the group mean centered age of student *i*, AGE_{ij} is age of student *i* in program *j*, and $\overline{AGE}_j$ is the mean age in program *j*). Under this scaling option, the intercept term denotes the log odds of doctorate attainment for a student whose age is equal to the mean age in the program (group), not one whose age is equal to zero. Group mean centering thus provides interpretable parameter estimates that can be used to address substantive research questions involving the relationship between each of the continuous student-level covariates and the log odds of doctorate attainment. Group mean centering is recommended "when unbiased estimate of β_w is desired" (Raudenbush & Bryk, 2002, p. 139) or when the level-1 covariates are of substantive interest (Enders & Tofighi, 2007).

Program-level covariates. The following program-level covariates were used: size of the program (psize), size of the department housing the program (dsize), percentage of female students in the program (pfem), percentage of White students in the program (pwhite), mean age at admission of students in the program (AGE_j), mean master's GPA score at admission of students in the program (GPA_j), mean GRE verbal score at admission of students in the program ($GREV_j$), and mean GRE quantitative score at admission of students in the program ($GREQ_j$), as shown in Table 7.

Table 7

Distribution of Program-level Variables (n = 24)

Prog[a]	psize	pwhite	pfem	dsize	AGE_j	GPA_j	$GREV_j$	$GREQ_j$
P01	4	0.76	0.61	4	44.4 (7.4)	3.7 (0.34)	530 (84)	522 (94)
P02	2	0.92	0.62	4	42.3 (5.7)	3.9 (0.11)	495 (68)	542 (65)
P03	2	0.61	0.78	4	43.6 (7.3)	3.8 (0.29)	503 (110)	513 (97)
P04	1	1.00	0.67	4	47.0 (5.2)	3.9 (0.22)	485 (15)	515 (49)
P05	3	0.92	0.36	4	43.1 (9.9)	3.7 (0.32)	533 (88)	541 (120)
P06	5	0.78	0.62	4	39.5 (8.4)	3.7 (0.32)	512 (82)	537 (100)
P07	4	0.59	0.52	4	39.2 (8.7)	3.8 (0.22)	509 (81)	587 (98)
P08	6	0.76	0.63	4	39.7 (8.7)	3.8 (0.34)	490 (81)	528 (102)
P09	2	1.00	0.87	7	37.8 (8.7)	3.8 (0.22)	557 (55)	508 (80)
P10	6	0.75	0.51	7	37.5 (8.8)	3.8 (0.31)	541 (84)	598 (86)
P11	2	0.58	0.46	7	37.6 (8.3)	3.8 (0.33)	479 (104)	693 (61)
P12	1	1.00	0.50	7	36.0 (6.2)	3.8 (0.30)	489 (77)	531 (95)
P13	2	0.89	0.72	7	34.9 (7.3)	3.7 (0.24)	543 (87)	592 (87)
P14	3	0.87	0.68	7	36.7 (8.3)	3.8 (0.25)	520 (96)	516 (105)
P15	4	0.52	0.71	7	35.0 (8.6)	3.7 (0.34)	550 (106)	568 (115)
P16	3	0.96	0.69	3	36.6 (7.8)	3.9 (0.19)	525 (87)	559 (80)
P17	2	0.64	0.86	3	33.9 (8.6)	3.8 (0.13)	464 (61)	511 (93)
P18	4	0.88	0.93	3	38.4 (9.0)	3.9 (0.19)	531 (87)	528 (81)
P19	8	0.63	0.62	2	36.7 (8.4)	3.9 (0.11)	455 (95)	500 (80)
P20	8	0.70	0.81	2	27.0 (6.1)	3.8 (0.42)	518 (84)	563 (102)
P21	8	0.81	0.69	1	38.1 (9.2)	3.8 (0.28)	536 (95)	530 (87)
P22	4	0.80	0.59	1	36.7 (7.6)	3.8 (0.30)	521 (84)	608 (93)
P23	6	0.62	0.82	2	35.5 (8.3)	3.7 (0.33)	505 (93)	518 (105)
P24	1	0.78	0.91	2	36.4 (8.0)	3.7 (0.40)	482 (77)	433 (73)
M	5.19	0.75	0.69	3.64	37.0	3.78	517	548
SD	2.02	0.11	0.12	2.04	4.30	0.06	21.5	38.3
Skew	-.12	-0.05	0.07	0.50	-.96	0.11	-0.52	1.26
Kurt	-0.95	-0.19	-0.41	-.90	1.13	-0.45	-0.06	3.23

Note. [a] The Institutional Review Board (IRB) required that the program names remain anonymous
- Lowercase j in AGEj, GPAj, GREVj, and GREQj indicate mean values at the program level
- psize = 'program size': the average number of students admitted in the program per year
- dsize = 'department size": the total number of programs in the department housing the program
- pwhite = Percentage of White students in a program during the observation period
- pfem = Percentage of female students in a program during the observation period
- Skew = Skewness value, Kurt = Kurtosis value

Continuous level-2 covariates were grand mean centered. For instance, grand mean centering of age implies subtracting grand mean age from the program's mean age (i.e., $AGE_c = AGE_j - \overline{AGE}$, where AGE_c is the grand mean centered age in the program, AGE_j

is mean age in program j, and $\overline{AGE}$ is the grand mean age). Grand mean centering yields an intercept term denoting the log odds of doctorate attainment in the program where the program's mean age equals the grand mean age.

The variable, size of the program (psize), indicated the average number of students admitted per year in the program. It was computed using the formula, psize = (n_A/T), where n_A is the total number of students admitted in the program and T is the number of years the program was in operation. This computation considers the fact that not all programs were offered at the start of the observation period (i.e., Spring 1990).

The percentage of White students (pwhite) indexed the racial/ethnic diversity of the program and was computed using the formula, pwhite = (n_W/n_T)*100, where n_W is the number of Whites admitted in the program during the observation period and n_T is the total number of students admitted in the program during the observation period. White was the modal race/ethnic category. The variable, size of the department (dsize), indicated the number of programs in the department where the program was housed. This information was obtained from the College's website and was confirmed by chairperson of each department. For instance, dsize = 1 if a department housed only one program, and so forth. The percentage of female students (pfem), a measure of gender composition of the program, was computed using the formula, pfem = (n_F/n_T)*100, where n_F is the total number of females admitted in the program during the observation period and n_T is the total number of students admitted in the program during the observation period.

Program as a Level-2 Unit of Analysis

Much of the persistence literature emphasizes student characteristics with less attention on characteristics of the educational environment that may contribute partly to

the persistence (Golde, 2005). Previous researchers have viewed the department as constituting this environment. In most universities, student admission and degree requirement policies are determined at the department level (Bowen & Rudenstine, 1992). It is thus appropriate to consider the department as a unit of analysis when examining TTD. However, because the department (e.g., Secondary Education) may house programs (e.g., English Education, Mathematics Education, and Science Education) with varying characteristics, the differences in TTD, if observed, may partly be due to program characteristics and partly due to student characteristics. Thus, program rather than the department was chosen as the level-2 unit of analysis in this study.

Metric Used to Measure TTD

In hazard analysis, the time scale for an event occurrence is classified as either *continuous* or *discrete* (Allison, 1982). Observed event times are said to be continuous if the timing of the event occurrence is known precisely whereas discrete-time is where the time is divided into meaningful discrete intervals such as years and the event occurs within exactly one of these intervals. Because doctorate attainment occurs on a given day but is recorded as occurring at discrete-times, the semester/year of graduation, discrete-time metric was used to measure TTD. Years, instead of semesters, were used to facilitate comparison of results with previous studies that report TTD in terms of years.

Censoring Assumptions

Some students may not experience the *hazard* of doctorate attainment during the observation period: whether and when they attain the doctorate is unknown. In hazard analysis parlance, such students constitute *censored cases*. According to Singer and

Willett (1993, 2003), the validity of hazard analysis is based on the assumption that (a) censoring is *noninformative* and (b) *right-censoring* occurs.

Noninformative censoring is censoring that occurs independent of event occurrence. In this study, all students who remained in the study after the censoring date were assumed to be representative of everyone who would have remained in the study had censoring not occurred. Censoring occurred not due to any actions taken by the censored students but because the observation period ended. In right-censoring, an event time is unknown because event occurrence is not observed. It was unknown when a student attained the doctorate if this did not occur during the observation period. The two assumptions regarding censoring were thus met in this study.

Constructing Person-Period Data Set

The secondary data that were analyzed were obtained in the person-oriented format as shown in Table 8. To obtain the maximum likelihood estimates of the coefficients in the discrete-time hazard models, Table 8 was transformed to a person-period format (Table 9), which chronicles what happens to each student during each year when doctorate attainment could occur, either until it occurred or until Spring 2006, the end of observation period, whichever occurred first (Singer & Willett, 1991).

Table 8

Person-Oriented Data Set Example

ID	Program	AGE	SEX	ETHN	GREV	GREQ	YEARS	CENSOR
01	P05	33	1	2	370	610	3	0
02	P01	25	0	3	390	570	5	0
03	P03	40	1	4	510	410	7	0
04	P04	29	0	1	460	400	7	1
etc…								

Note. ETHN = Race/Ethnicity; YEARS = Number of years of enrollment in doctoral program

In Table 8, each student in the sample is represented by a single row. For instance, student 01 is a 33-year-old African American female admitted in P05 with GRE verbal and quantitative scores of 370 and 610, respectively. She registered for three consecutive years (YEARS = 3) and eventually attained the doctorate. YEARS indicates the total number of years a student registers in the program (including any stopout period(s) provided the student is not deregistered) either until the doctorate is attained or until the year last observed. CENSOR indicates whether a student attains the doctorate in the last year observed or not. Student 04 has CENSOR=1 indicating that he is censored in year 7.

Table 9

Person-Period Data Set

		¦<---------Time indicators---->							¦<---------- Covariates--------->							
ID	Pr	t_1	t_2	t_3	t_4	t_5	t_6	t_7	V1	V2	V3	V4	V5	V6	C	G
01	5	**1**	0	0	0	0	0	0	1	2	33	3.6	370	610	0	0
01	5	0	**1**	0	0	0	0	0	1	2	33	3.6	370	610	0	0
01	5	0	0	**1**	0	0	0	0	1	2	33	3.6	370	610	0	**1**
02	1	**1**	0	0	0	0	0	0	0	3	25	4.0	390	570	0	0
02	1	0	**1**	0	0	0	0	0	0	3	25	4.0	390	570	0	0
02	1	0	0	**1**	0	0	0	0	0	3	25	4.0	390	570	0	0
02	1	0	0	0	**1**	0	0	0	0	3	25	4.0	390	570	0	0
02	1	0	0	0	0	**1**	0	0	0	3	25	4.0	390	570	0	**1**
03	3	**1**	0	0	0	0	0	0	1	4	40	3.2	510	410	0	0
03	3	0	**1**	0	0	0	0	0	1	4	40	3.2	510	410	0	0
03	3	0	0	**1**	0	0	0	0	1	4	40	3.2	510	410	0	0
03	3	0	0	0	**1**	0	0	0	1	4	40	3.2	510	410	0	0
03	3	0	0	0	0	**1**	0	0	1	4	40	3.2	510	410	0	0
03	3	0	0	0	0	0	**1**	0	1	4	40	3.2	510	410	0	0
03	3	0	0	0	0	0	0	**1**	1	4	40	3.2	510	410	0	**1**
04	4	**1**	0	0	0	0	0	0	0	1	29	3.8	460	400	0	0
04	4	0	**1**	0	0	0	0	0	0	1	29	3.8	460	400	0	0
04	4	0	0	**1**	0	0	0	0	0	1	29	3.8	460	400	0	0
04	4	0	0	0	**1**	0	0	0	0	1	29	3.8	460	400	0	0
04	4	0	0	0	0	**1**	0	0	0	1	29	3.8	460	400	0	0
04	4	0	0	0	0	0	**1**	0	0	1	29	3.8	460	400	0	0
04	4	0	0	0	0	0	0	**1**	0	1	29	3.8	460	400	1	**0**

Note. P = Program; t1-t7 = year 1 to year 7; V1 = SEX; V2 = Race/Ethnicity; V3= AGE; V4 = GPA score; V5 = GREV score; C = CENSOR; G = GRADUATE

In Table 9, each student in the sample has multiple records or lines of data, one for each discrete-time the student is observed. Thus, the four cases in Table 8 expand to 22 cases: 3 years for student 01, 5 years for student 02, and 7 years each for students 03 and 04. The other covariates remain as they were in Table 8. Two new variables are created to identify the year to which each record corresponds. First, a *time indicator* consisting of a set of dummy variables, t_1 through t_7, identifies the year being referenced in the record. For all students, $t_1 = 1$ for the record for the first year, $t_2 = 1$ for the record for the second year, and so forth, with other values being set to $t_i = 0$. Second, a dichotomous *event indicator*, *GRADUATE* (G), identifies whether and when the doctorate was attained. For example, both students 03 and 04 were each followed for seven years, with *GRADUATE* = 0 for the first six years in each case but *GRADUATE* = 1 in the seventh year for student 03 indicating that she attained the doctorate in that year. Student 04 has *GRADUATE* = 0 in the seventh year indicating that he did not attain the doctorate in the last year he was observed (i.e., he was censored).

Conversion of a person-oriented data set to a person-period data set enhances the number of records, in this illustration, from 4 to 22. In the actual study, the 1,028 student records expand to 3,545 year-level records. Because person-periods are treated as cases rather than observations (Yaffee & Austin, 1995), the resulting "analytic sample" is much larger than the number of students under study (Singer & Willett, 2003, p. 384).

In constructing the person-period data set, it was assumed that (a) a student stays enrolled until either the doctorate is attained or censoring occurs; (b) a student who stops out is continuously enrolled; (c) readmission amounts to a fresh admission if a student changes the program in the subsequent admission; and (d) there is a single risk, doctorate

attainment, because other events such as withdrawal, were not determinable based on the information obtained from archival data. Except for the second assumption, which was motivated by the interest in computing the total time spent pursuing the doctorate, the rest were consistent with the college's enrollment policy. Because all students either attained a doctorate or were censored, there were no missing data with respect to TTD.

Pattern of Doctorate Attainment

A useful tool that describes the distribution of event occurrence is the life table. As shown in Table 10, it displays 10-year[9] doctorate attainment histories ("lives") of the 1,028 students in the sample. In column 1, the year the doctorate is attained is labeled using ordinal numbers. Column 2 defines precisely which event times appear in each year interval by using brackets "[" to denote inclusion of beginning time and parentheses ")" to denote exclusion of concluding time. Thus, the interval [5, 6) corresponding to year 5 represents doctorate attainment occurring between the first day of year 5 up to but excluding the first day of year 6. Column 3 shows the number of students still enrolled at the beginning of each year who are eligible to attain the doctorate during that year interval (i.e., the risk set). A student drops out of the risk set for all future years on attaining the doctorate or when censored. In year 1, 39 students attained the doctorate (column 4) and 210 students were censored (column5). This yielded a risk set of 779 students at the beginning of year 2. At the end of the observation period (i.e., year 10), approximately 40% had attained the doctorate whereas 60% were censored.

[9] Although the length of observation was 15 years, no student was followed for more than 10 years, thus the table indicates the doctorate attainment history of up to 10 years.

Table 10

Life Table Describing the Time at Which the Doctorate is Attained (N = 1,028)

Year	Interval	Number of students who:			Proportion of:	
		enrolled at the start of the year (*Risk Set*)	attained doctorate during the year	were censored at the end of the year	students at start of the year who attained the doctorate during year (*Hazard*)	students still enrolled at end of the year (*Survival*)
(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
0*	[0, 1)	1028	-	-	0	1.0000
1	[1, 2)	1028	39	210	0.0432	1.0000
2	[2, 3)	779	57	97	0.0812	0.9577
3	[3, 4)	625	77	92	0.1425	0.8830
4	[4, 5)	456	75	79	0.1979	0.7656
5	[5, 6)	302	73	50	0.3035	0.6277
6	[6, 7)	179	42	40	0.3043	0.4623
7	[7, 8)	97	29	23	0.4085	0.3402
8	[8, 9)	45	9	11	0.2571	0.2248
9	[9, 10)	25	5	11	0.2941	0.1736
10	[10, 11)	9	3	6	.	0.1291
Total			409 (40%)	619(60%)		

Note. * Year 0 can be conceptualized as the period between acceptance to the doctoral program to the first day of class, a period when doctorate attainment could not have occurred at all.

Discussed next are three statistical summaries of information about doctorate attainment (i.e., hazard function, survival function, and median lifetime).

Hazard function. The quantity used to assess the risk of doctorate attainment in each year is referred to as the *hazard*. Considering attaining the doctorate as the *hazard*, discrete-time *hazard* is defined as the conditional probability that a student attains the doctorate in a given year given that the student had not done so in any earlier years. Column 6 of Table 10 displays the hazard probabilities, that is, the proportion of students enrolled at the start of the year that attained the doctorate during the year. Stated differently, this is the proportion of each interval's risk set that experiences the event

during that year interval. A plot of the hazard probabilities over the years of observation yields the *hazard function*, a chronological summary of the 'risks." Further discussion and illustrations of hazard functions are covered in Chapter IV.

Survival function. Because the fundamental event of interest is doctorate attainment, discrete-time *survival probability* is defined in this study as the probability that a student 'survives' (i.e., does not attain the doctorate). Column 7 of Table 10 presents the survival probabilities, that is, the proportion of all students who have not attained the doctorate and are still enrolled at the end of each year. At the beginning of year 1, the survival probability is 1.0, however, it decreases with time as more and more students attain the doctorate. A plot depicting the pattern of survival probabilities over time is referred to as the *survival function*. Additional discussion and illustrations on survival functions are covered in Chapter IV.

Median lifetime. Having described the distribution of doctorate attainment using the hazards and survivor functions, it suffices to characterize the distribution's center. A meaningful measure of central tendency that incorporates information of both censored and noncensored cases is referred to as the *median lifetime* (i.e., median TTD). The median TTD is the length of time until one-half of the sample, adjusting for censored cases, attains the doctorate. It corresponds to a survival probability of 0.50 and can be thought of as the length of time a typical student takes to attain the doctorate. The median TTD is computed in response to the first quantitative research question, "*How long does the typical student take to attain the doctorate in the Education?*" Further discussion on median TTD is covered in Chapter IV.

Modeling TTD

Prior to the model-fitting process, correlations between potential covariates were examined to determine presence of multicollinearity (i.e., highly correlated variables) or

singularity (i.e., perfectly correlated variables). Presence of multicollinearity or singularity implies that the covariates are measuring nearly the same construct and thus only one of them or a consolidated variable involving two or more of them is needed in the analysis. The largest correlation, -.62, was between percentage of females and size of the department implying that only 38% of the variance was shared between these covariates. The covariates were thus included in the models because there was no reason to suspect that multicollinearity or singularity existed.

The modeling process expected to produce estimates of the odds of doctorate attainment in each year was conducted in stages. An appropriate model was specified for the hazard followed by fitting of statistical model(s) to the person-period data set. This yielded a set of models progressing in complexity depending on covariates included. For each model, the population parameters were estimated and results interpreted based on the quantitative research questions.

Model specification. To analyze duration data of a non-repeatable event recorded as occurring in discrete time intervals (i.e., years), the appropriate empirical model was the *discrete-time hazard model*. Further, because the primary outcome, doctorate attainment, was binary (i.e., coded 1 if doctorate is attained and 0 otherwise), *logistic regression* was employed to model the log-odds of attaining the doctorate (Willett & Singer, 1991). A logistic regression model, as opposed to the Cox regression model, seemed appropriate for the data because it handles with ease ties that result from students attaining the doctorate in the same year (Allison, 2001; Yaffee & Austin, 1995).

Model assumptions. Singer and Willett (1993) explicate three basic assumptions that undergird discrete-time hazard analyses: linearity of the logit, proportionality of the

odds, and no unobserved heterogeneity. The *linearity assumption* implies that equal differences in the value of a covariate are associated with equal vertical displacements of the logit hazard profile. As a test for the tenability of this assumption, addition of polynomial terms should not significantly improve the fit of the model. According to the *proportionality of the odds assumption* (parallel slopes assumption), the effect of a covariate is constant at all time points. If there is a significant interaction of a covariate with time then the logit-hazard profiles of the different values of the covariate may intersect, in which case, the interaction term is retained to ensure appropriate estimation of covariate effects. Lastly, the *no unobserved heterogeneity assumption* holds that all of the variation in the logit hazard profile is accounted for by variation in the values of the covariates included. These assumptions are considered in the model-building process.

Fitting statistical models to person-period data. The task was to construct a statistical model of hazard that expressed the hypothesized relationships between the entire hazard profiles (i.e., TTD) and one or more covariates. Unlike the case of a linear regression model where the event of interest is a continuous variable, here, the entire hazard profile was a set of conditional probabilities, each bounded by a value of 0 and 1. To build a statistical model using a weighted linear combination of covariates, the range of the event needed to be unbounded (Singer & Willett, 2003) and the variables to be included needed to be on the same level of measurement (Yaffee & Austin, 1995). Following Cox's (1972) recommendation, the hazard probabilities were transformed to have a logarithmic dependence on the time periods and the covariates, a transformation that yielded models representing log-odds (*logits*) of attaining the doctorate as a function of the covariates. Defining odds of attaining the doctorate as the ratio of the conditional

probability of attaining the doctorate to the conditional probability of not attaining the doctorate, that is, $odds = h/(1-h)$, where h is the hazard rate, then, logit of the hazard is given by $\log(h/[1-h])$. The logit of the hazard served as the criterion and was estimated using two SAS procedures: LOGISTIC and NLMIXED (SAS Institute, 2006).

The decision to employ the two SAS procedures concurrently was motivated by the desire to determine if considering the multilevel structure of the data made a difference in describing the relationship between the log odds of doctorate attainment and the covariates. To determine whether the effect changed when program clustering was considered, models containing these covariates were run using the LOGISTIC procedure (where no nesting was considered) and the NLMIXED procedure (where nesting was considered) and the results compared. The LOGISTIC procedure fits only the fixed effects in the models whereas the NLMIXED procedure fits models in which both fixed and random effects are allowed to have a nonlinear relationship to the outcome.

The NLMIXED procedure requires writing out regression equations, declaring parameter names, and providing initial parameter estimates. The GENMOD procedure was used to obtain the initial values for the intercept and slope parameters whereas the MIXED procedure was used to obtain the initial values for between-program variance. Hereafter, the models based on LOGISTIC procedure are referred to as "logistic" models and those based on NLMIXED procedure are referred to as "multilevel logistic" models.

Student-Level Discrete-Time Hazard Models

Baseline model. This is a time-only hazard model whereby program clustering was ignored and only the main effect of time (i.e., year dummy variables) was estimated. Letting h_{ijt} index the entire log hazard profile of doctorate attainment for student i in

program *j* in year *t*, and T_{ijt} be a dummy indicator of year *t* for student *i* in program *j*, then using a logit link to regress the binary event indicator *GRADUATE* on all the time dummies yields the *baseline discrete-time logit hazard model* represented in Equation 1a:

$$\eta_{ijt} = \text{logit}_e \left(\frac{h_{ijt}}{1 - h_{ijt}} \right) = [\alpha_1 T_1 + \alpha_2 T_2 + \ldots + \alpha_t T_t] = \sum_{t=1}^{10} \alpha_t (T_{ijt}) \quad \text{(1a)}$$

where η_{ijt} is the log odds of doctorate attainment and the coefficients $\alpha_1, \alpha_2 \ldots, \alpha_{10}$ are the intercept parameters indicating the conditional log odds that students whose covariate values are all zero will attain the doctorate in each year, given that they have not attained it in prior years (Singer & Willett, 1993). Note the following points about the baseline model. First, it does not contain a stand-alone intercept term, rather, $\alpha_1, \alpha_2 \ldots, \alpha_{10}$ act as intercepts parameters, one per year for the 10 years. Second, rather than directly estimating TTD in Model 1, the log odds of doctorate attainment in each year is estimated. Singer and Willett (1993) explain why this switch is inevitable:

> By saying that our initial model includes only the main effect of time, we highlight a seeming paradox in discrete-time hazard modeling: TIME, the conceptual outcome, is the fundamental predictor of the hazard profile. This seeming anomaly occurs because, to make the problem of censoring amenable to analysis, we have reformulated the question "When does the event occur?" to "What is the risk of event occurrence in each time period?" This switch sacrifices nothing intellectually because we can, via summary statistics, interpret fitted models in the original metric of interest—time (p. 176)

Third, the level-1 error variance is absent because with a binary outcome, the variance is completely determined by the mean and thus is not a separate term to be estimated (Luke,

2004). Finally, program clustering is not considered in Model 1, the subscript *j* is used only for consistency with notations in the rest of the models.

The multilevel logistic baseline model corresponding to Equation 1a included no covariates and only a single random effect, $u_{j0,}$ for the intercept as shown in Equation 1b:

$$\eta_{ijt} = \sum_{t=1}^{10} \alpha_{jt} (T_{ijt}) \qquad (1b)$$
$$\alpha_{jt} = \gamma_t + u_{j0}, \; t = 1, 2, \ldots, 10, \;\; u_{j0} \sim N(0, \tau_{00})$$

where the intercept, γ_t, refers to the predicted log odds of doctorate attainment for student *i* in program *j* at time *t* and u_{j0} is the program's random effect. Equation 1b is expressed in a combined form by replacing α_{jt} with level-2 fixed and random effects:

$$\eta_{ijt} = \sum_{t=1}^{10} \gamma_t (T_{ijt}) + u_{j0}, \qquad t = 1, 2, \ldots, 10, \;\; u_{j0} \sim N(0, \tau_{00})$$

The magnitude and direction of variation in the values of α's (in 1a) and γ_t (in 1b) describe the shape of the logit hazard function and help in determining whether the risk of doctorate attainment increases, decreases, or remains steady over time. Approximately equal values of α's yield a flat hazard function implying that the risk is not related to time; decreasing values of α's implies a decreasing risk of doctorate attainment over time and vice versa. In the logit hazard scale, the closer the α values are to zero, the higher the odds of doctorate attainment, and vice versa. By substituting the estimated α's into Equation 1a, for instance, the fitted risk of attaining the doctorate in each year is obtained, which provides results to address the second quantitative research question, "*When (or, after how many years) are students in the College of Education likely to attain the doctorate?*"

The baseline discrete-time logit hazard model assumed that every student had the same risk of attaining the doctorate in each year if enrolled; that is, there was no unobserved heterogeneity among students. This model served as a benchmark to which more complex models were compared. Because the parameters of the baseline hazard model for each time period were expressed in logit metrics (i.e., log odds), to facilitate easy interpretation, these were exponentiated into odds ratios (OR). An odds ratio facilitates the assessment of risk of occurrence of doctorate attainment, that is, the relative effect of an independent variable on the odds of doctorate attainment. Odds ratios were interpreted in conjunction with variable significance (i.e., *p* values) and the 95% confidence level (CI), the range of possible values for the OR. Values of OR >1.0 indicate increased risk, values of OR < 1.0 indicate reduced risk, and OR = 1.0 indicates no change in the risk of occurrence. A CI including 1.0 indicates non-significance because 1.0 implies equal risk.

Univariate[10] *models.* After establishing the median TTD and the periods of elevated and/or reduced risks of the hazard, the next task was to establish whether including student-level covariates in the model made a difference. In other words, unobserved heterogeneity was accepted in the sample owing to the expectation that students with varying characteristics exhibit different hazard functions. This was achieved by adding student-level covariates to the baseline model, yielding a set of univariate models represented by Equations 2a, 3a, 4a, 5a, 6a and 7a in the logistic forms:

$$\eta_{ijt} = \text{logit}_e\left(\frac{h_{ijt}}{1-h_{ijt}}\right) = \sum_{t=1}^{10} \alpha_t\,(T_{ijt}) + \beta_1 \text{SEX}_{ij} \qquad (2a)$$

[10] The term "univariate" as used here refers to a model that contains only one level-1 covariate.

$$\eta_{ijt} = \text{logit}_e\left(\frac{h_{ijt}}{1-h_{ijt}}\right) = \sum_{t=1}^{10} \alpha_t\,(T_{ijt}) + \beta_{\mathbf{Z}}\text{Ethnicity}_{ij}\ ,\ z = 1, 2, 3. \quad (3a)$$

$$\eta_{ijt} = \text{logit}_e\left(\frac{h_{ijt}}{1-h_{ijt}}\right) = \sum_{t=1}^{10} \alpha_t\,(T_{ijt}) + \beta_1\text{AGEg}_{ij} \quad (4a)$$

$$\eta_{ijt} = \text{logit}_e\left(\frac{h_{ijt}}{1-h_{ijt}}\right) = \sum_{t=1}^{10} \alpha_t\,(T_{ijt}) + \beta_1\text{GPAg}_{ij} \quad (5a)$$

$$\eta_{ijt} = \text{logit}_e\left(\frac{h_{ijt}}{1-h_{ijt}}\right) = \sum_{t=1}^{10} \alpha_t\,(T_{ijt}) + \beta_1\text{GREVg}_{ij} \quad (6a)$$

$$\eta_{ijt} = \text{logit}_e\left(\frac{h_{ijt}}{1-h_{ijt}}\right) = \sum_{t=1}^{10} \alpha_t\,(T_{ijt}) + \beta_1\text{GREQg}_{ij} \quad (7a)$$

where βs are slope parameters describing the "effect" of each covariate on the baseline hazard function, albeit on a logistic scale. For example, the magnitude and direction of the variation in the value of β_1 in Equation 5a describe the effect of GPAg on the timing of doctorate attainment. The univariate models provided part of the answer to the third quantitative research question that examined the extent to which the timing of doctorate attainment is related to each of the student-level covariates.

The multilevel logistic models, corresponding to the logistic models represented by Equations 2a to 7a, express the relationship between the timing of doctorate attainment and each of the student-level covariates. For instance, the relationship between the timing of doctorate attainment and sex is expressed by Equation 2b:

$$\eta_{ijt} = \sum_{t=1}^{10} \alpha_t\,(T_{ijt}) + \beta_{1j}\,\text{SEX}_{ij}$$

$$\alpha_{jt} = \gamma_t + u_{j0},\ t = 1, 2, \ldots 10,\quad u_{j0} \sim N\left(0, \tau_{00}\right) \quad u_{j0} \sim N\left(0, \tau_{00}\right) \quad (2b)$$

$$\beta_{1j} = \gamma_1,$$

which in the combined form becomes $\eta_{ijt} = \sum_{t=1}^{10} \gamma_t\,(T_{ijt}) + \gamma_1\text{SEX}_{ij} + u_{j0}$. The relationship between the timing of doctorate attainment and each of the other student-level covariates are shown in Equations 3b, 4b, 5b, 6b and 7b in the multilevel logistic forms:

$$\eta_{ij} = \sum_{t=1}^{10} \gamma_{t}(T_{ijt}) + \gamma_{Z}\text{Ethnicity}_{ij} + u_{j0}, \quad z = 1, 2, 3\ ; \quad u_{j0} \sim N(0, \tau_{00}) \tag{3b}$$

$$\eta_{ij} = \sum_{t=1}^{10} \gamma_{t}(T_{ijt}) + \gamma_{1}\text{AGEg} + u_{j0}, \quad u_{j0} \sim N(0, \tau_{00}) \tag{4b}$$

$$\eta_{ij} = \sum_{t=1}^{10} \gamma_{t}(T_{ijt}) + \gamma_{1}\text{GPAg} + u_{j0}, \quad u_{j0} \sim N(0, \tau_{00}) \tag{5b}$$

$$\eta_{ij} = \sum_{t=1}^{10} \gamma_{t}(T_{ijt}) + \gamma_{1}\text{GREVg} + u_{j0}, \quad u_{j0} \sim N(0, \tau_{00}) \tag{6b}$$

$$\eta_{ij} = \sum_{t=1}^{10} \gamma_{t}(T_{ijt}) + \gamma_{1}\text{GREVg} + u_{j0}, \quad u_{j0} \sim N(0, \tau_{00}) \tag{7b}$$

Multivariate model. To assess the relationship between the timing of doctorate attainment and a student-level covariate while statistically controlling for the "effects" of other covariates in the model, covariates were entered sequentially one at a time in the multivariate models and only statistically significant covariates and interactions retained in the subsequent steps if their retention improved the fit of the models (Raudenbush & Bryk, 2002). The resultant multivariate model, comprising only significant student-level covariates, is shown in Equation 8a in the logistic form:

$$\eta_{ijt} = \sum_{t=1}^{10} \alpha_{t}(T_{ijt}) + \beta_{1}X_{1j} + \beta_{2}X_{2j} + \ldots + \beta_{n}X_{nj} \tag{8a}$$

where X_{1j}, X_{1j} . . . X_{nj} are *n* level-1 significant covariates. The multilevel logistic model corresponding to Equation 8a, is shown in Equation 8b:

$$\eta_{ijt} = \sum_{t=1}^{10} \gamma_{t}(T_{ijt}) + \gamma_{1}X_{1j} + \gamma_{2}X_{2j} + \ldots + \gamma_{n}X_{nj} + u_{j0}, \quad u_{j0} \sim N(0, \tau_{00}) \tag{8b}$$

Because some variables were expected to interact (e.g., age and ethnicity; Civian, 1990), preliminary analyses were conducted to identify significant level-1 interaction effects before arriving at Model 8a or 8b. Models 8a and 8b provided part of the answer to the third quantitative research question that examined the extent to which each of the student-level covariates was related to the timing of doctorate attainment.

Program-Level Discrete-Time Hazard Models

Justification for employing multilevel modeling is demonstrable theoretically, empirically, or statistically (Luke, 2004). As indicated earlier in the conceptual framework (refer to Figure 1), students in different programs may exhibit different TTD due to the varying types and levels of integration experienced in the programs. Tinto (1993) aptly sums it up stating that graduate persistence is "shaped by the personal and intellectual interactions that occur within and between students and faculty and the various communities that make academic and social systems of the institution" (p. 231). Expecting TTD to vary by programs, the next task was to examine the relationship between significant student-level covariates and the log odds of doctorate attainment when program-level covariates were considered. For instance, assuming only two level-1 covariates (X_1 and X_2) were statistically significant, adding all program-level covariates to Model 8a yielded a model represented by Equation 9a in the logistic form:

$$\eta_{ijt} = \sum_{t=1}^{10} \alpha_t (T_{ijt}) + \beta_1 X_{1j} + \beta_2 X_{2j} + \beta_3 \text{psize}_j + \beta_4 \text{dsize}_j + \beta_5 \text{pwhite}_j + \beta_6 \text{pfem}_{ij} + \beta_7 \text{AGEc}_j + \beta_8 \text{GPAc}_j + \beta_9 \text{GREVc}_j + \beta_{10} \text{GREQc}_j \quad (9a)$$

where β_1 to β_3 are the "effects" of significant student-level covariates and β_4 to β_{11} are the "effects" of the program-level covariates. The combined form of the multilevel logistic model corresponding to Equation 9a is represented by Equation 9b:

$$\eta_{ijt} = \sum_{t=1}^{10} \gamma_t(T_{ijt}) + \gamma_1 X_{1j} + \gamma_2 X_{2j} + \gamma_3 \text{csize}_j + \gamma_4 \text{dsize}_j + \gamma_5 \text{csdi}_j + \gamma_6 \text{pfem}_j + \gamma_7 \text{AGEc}_j + \gamma_8 \text{GPAc}_j + \gamma_9 \text{GREVc}_j + \gamma_{10} \text{GREQc}_j + u_{j0}, \quad u_{j0} \sim N(0, \tau_{00}) \quad (9b)$$

where γ_t is the average intercept across program units at time *t*, the regression slopes γ_1 to γ_3 and γ_4 to γ_{10} express the direct "effect" of student-level covariates and program-

level covariates, respectively, on the timing of doctorate attainment, and u_{j0} is the unique increment to the intercept associated with program unit. The logistic model including only statistically significant covariates from Model 9a is represented by Equation 10a:

$$\eta_{ijt} = \sum_{t=1}^{10} \alpha_t (T_{ijt}) + \beta_1 X_{1j} + \beta_2 X_{2j} + \beta_3 W_1 + \beta_4 W_2 + \beta_5 W_3 \quad (10a)$$

where *X*s are significant level-1 covariates and W's are significant level-2 covariates. The multilevel logistic model corresponding to Model 10a is shown in Equation 10b:

$$\eta_{ijt} = \sum_{t=1}^{10} \gamma_t (T_{ijt}) + \gamma_1 X_{1j} + \gamma_2 X_{2j} + \gamma_3 W_1 + \gamma_4 W_2 + \gamma_5 W_3 + u_{j0}, \quad u_{j0} \sim N(0, \tau_{00}) \quad (10b)$$

Equations 10a and 10b provided part of the answer to the fourth quantitative research question that examined the relationship between the timing of doctorate attainment and program-level covariates after controlling for student-level covariates.

In estimating the multilevel logistic models the following set of assumptions suggested by Raudenbush and Bryk (2002) were considered: (a) odds of doctorate attainment for students within a program was assumed identical, (b) TTD between programs was assumed to be independent whereas TTD for students within a program was assumed to be correlated, (c) each random effect was assumed to be independent and follow a normal distribution, (d) model predictors at all levels were assumed to be independent, and random effects at level-2 were assumed to be independent.

Evaluating Model Fit to Person-Period Data

Because it is not possible to know the underlying covariance structure to be estimated, researchers tend to rely on fit indices to select among various covariance structures. Two indices, *deviance* and the *Akaike Information Criterion* (AIC) (Akaike, 1973), were used to evaluate the fit of each model to the person-period data set.

Deviance. For a given set of data, deviance quantifies how much worse a model is compared to the saturated model whereby the saturated model is one that reproduces every observed value of the event in the person-period data set. In discrete-time multilevel hazard models, the deviance statistic is a type of chi-square equal to negative two multiplied by the log-likelihood statistic (-2LL). The -2LL statistic has a chi-square distribution under the null hypothesis that all coefficients in the model are equal to zero. For nested models, the smaller the deviance, the better the model fits the person-period data, that is, the variance can be ascribed to the independent variable(s).

AIC. The AIC was used to compare the goodness-of-fit of nonnested models. This criterion is based on the log-likelihood but with a reduced number of parameters, that is, AIC = -2LL + 2((*k*-1) + *s*), where *k* is the number of levels and *s* is the number of predictors in the model. An AIC value closer to zero represents a better fit to the person period data set although the AIC value itself is not meaningful.

Qualitative Component

Research Design and Paradigm

Given the complex nature of the topic being explored (i.e., understanding factors perceived to influence TTD), and to enable the researcher gain a detailed view of the topic and actively tell the story from the participants' viewpoint rather than acting as an expert passing judgment on participants' views, a *multiple (collective) case study* design was employed to collect and analyze the qualitative data (Yin, 2003). Studying multiple cases allows for within-case and cross-case analyses. Two extreme cases of prime interest in the study included (a) three programs where median TTD was among the longest and (b) two programs where median TTD was among the shortest. The units of analysis

embedded in the two cases were students and faculty. A *constructivist paradigm* (Tashakkori & Teddlie, 1998) guided the qualitative analyses whereby the researcher used inductive logic to move from specific statements to general inferences or themes. Constructivists assume that meaning and values that constitute knowledge are inseparable from the knower; that is, meaning is constructed rather than discovered.

Participants/Case Selection and Sampling Schemes

There were two distinct types of participants in the qualitative component: students and faculty. To select the participants, a systematic four-stage procedure involving various *sampling schemes* (Onwuegbuzie & Leech, 2007a) was employed. The first stage involved a *stratified purposeful sampling* whereby the programs were divided into two clusters: short TTD (STTD) cluster wherein the median TTD was less than 5.8 years and long TTD (LTTD) cluster where median TTD was longer than 5.8 years, 5.8 years being the median TTD in the sample. Apart from the seven programs where the median TTD was never attained, each student belonged to either the STTD cluster (which contained 10 programs) or the LTTD cluster (which contained seven programs). Each faculty belonged to a department housing a program falling into either of these clusters.

The second stage involved *extreme sampling* whereby programs with extreme median TTD in each cluster were identified. From the STTD cluster, the programs P02 and PO3, each with median TTD of 3.6 years, were selected. From the LTTD cluster, programs P08, P10, and P15, with median TTD of 6.8, 7.2, and 8.0 years, respectively, were selected. The five programs (two representing the STTD cluster and three representing the LTTD cluster) were considered extreme representatives of the two clusters.

In *"A call for qualitative power analysis,"* Onwuegbuzie and Leech (2007a) encouraged researchers to consider both the length of time and the number of participants in focus groups. They argue that, in order to capture the voice, a sufficient number of words need to be collected from the participants. Failing to do so, leads to a *crisis of representation* (i.e., inability to capture lived experiences) and a *crisis of legitimation* (i.e., inability to interpret and evaluate data) (Denzin & Lincoln, 2000). Consequently, in the third stage, four student focus groups (two drawn from two programs representing the STTD cluster; and two from three programs representing the LTTD cluster) and two faculty focus groups (one representing the STTD cluster and one representing the LTTD cluster) were constituted. Attempts were made to follow Krueger and Casey's (2000) suggestion of recruiting between six and nine participants per focus group. Details of the focus group composition are provided in Chapter IV. In this stage, *convenience sampling* was employed whereby only participants who were conveniently available and willing to participate in the study were recruited from the two program clusters. In order to obtain an adequate sample size for student focus groups, *snowball/chain sampling* (i.e., asking students to contact other students to participate in the study) was also employed.

Finally, in the fourth stage, participants were expected to meet certain selection criteria. To participate in either the focus groups or individual interview, a student either had to be in the ABD stage or had attained the doctorate. Such students were considered to possess adequate experience related to the process of attaining the doctorate and thus were *information rich*. Participants are said to be "information rich" if a great deal about the phenomenon being studied can be learned from them (Patton, 1990, p. 169). Faculty members were selected based on: (a) rank (i.e., at least an Associate Professor), (b) level

of experience (i.e., preferably one who had taught graduate level courses and served on at least three dissertation committees), and (c) years of experience in a particular department (i.e., preferably one who had been in a particular department for at least five consecutive academic years). Faculty members with these characteristics were viewed as information rich based on wealth of experience interacting with doctoral students.

Data Collection Procedures and Instruments

Qualitative data were primarily collected by conducting student and faculty focus groups where participants shared their perceptions regarding factors that influence TTD. In addition, four student interviews were conducted to enable the researcher to follow up on prevalent themes and any "surprises" or unexpected results from the focus groups.

Although the major focus of the qualitative component was students' perceptions, due to the influence that faculty have on doctoral students, their views were germane to understanding the factors perceived to influence TTD. Faculty members are the primary agents of integration in the department (Golde, 2000), serving as "role models and mentors," and inculcating into students the "norms, expectations and standards of acceptable performance for the field" (McFarland & Caplow, 1995, p. 3). Despite the influence that faculty have on doctoral students, seldom are their views incorporated when examining doctoral persistence. Even the models of college persistence discussed the previous chapter focused on doctoral persistence mainly from students' perspectives.

Instrument Development

Scripts for introducing the focus groups and *questioning routes* (i.e., a sequence of questions in complete sentences) were developed based on information gleaned from the literature review. A researcher of similar educational preparation as the principal

investigator reviewed these drafts. Similarly, a script for introducing individual interviews and interview protocol were developed and reviewed by the same peer. The reviewer evaluated whether the questions were understandable, likely to elicit relevant responses, logically flowed from one topic to another, and used language that participants typically use to talk about TTD. Next, the revised drafts were field-tested on a group of graduate students enrolled in a focus group course offered outside the college. During the field-test, the researcher took note of how smoothly words flowed during questioning and whether participants appeared confused when asked certain questions. Based on feedback from this group, some questions were rephrased to be more conversational before conducting the first focus group. In order to elicit explanations from the participants, the questions were structured to be open-ended and they progressed from simple (opening and introduction questions) to complex (transition and key questions) and back to simple (ending questions). Scripts for introducing focus groups are shown in Appendices D and E; the questioning routes in Appendices F and G; and the student interview protocol and introduction script are shown in Appendices H and I, respectively.

Recruitment

The chairpersons of the identified departments provided lists of potential student participants. Based on information obtained from department websites, the principal researcher prepared a list of names of potential faculty participants and had one of the dissertation committee co-chairs review the list. Email was the primary means of contacting potential participants; however, telephone was used when necessary. A generic email was sent to participants describing the purpose of the study and its importance, a request for participation, and the logistics of scheduling actual meetings

(see Appendices J and K). Only the chairperson, doctoral coordinators, and/or department representatives knew who the potential participants were. A personalized follow-up email was sent when no reply was received two weeks before the meeting. The follow-up email provided additional details about the session, location, and topic of discussion. A similar procedure was undertaken to recruit participants for the interviews. Whereas most participants preferred face-to-face attendance, where geographically and logistically not feasible, participation via telephone was encouraged. Although focus groups and interviews were the major form of qualitative data collection, during recruitment, some participants spontaneously provided vital information related to TTD. Such information was noted and explored further during scheduled sessions. A day prior to the scheduled date, the participants were reminded of the session and request to confirm participation.

Study Setting

Focus groups were conducted in a conference room located in the college whereas the interviews took place either in a room located in the university library or inside interviewees' offices, venues that had minimal distractions and were convenient to the interviewees. The conference room was furnished with comfortable chairs and a table that enabled the moderator to see all participants. Participants were provided with bottled drinking water during the sessions. The focus group sessions lasted between 50 minutes to one hour whereas the individual interviews took between 30 to 45 minutes with a follow-up interview as needed. Immediately after each session, the moderator and note-taker engaged in a reflective exercise, re-writing the notes to ensure that the information collected were accurate representations of the recorded responses.

Moderators and Note-Takers

Noting that "subjects [participants] tend to disclose more about themselves to people who resemble them in various ways than people who differ from them" (Jourard, 1964, p. 15), efforts were made to ensure moderators and note takers were individuals with which the participants were likely to be comfortable. The principal investigator, being a doctoral student, moderated the student focus groups and conducted the interviews. A graduate student in Human Development and Family Studies who had experience in note-taking served as a note taker in the student focus groups. Two female assistant professors who had experience in qualitative research, one Hispanic and the other White, served as the moderator and note-taker in the faculty focus groups. They were from within the college but not members of the researcher's dissertation committee.

Actual Sessions

In the focus groups, the moderators employed a welcoming strategy of engaging the participants in small talk to maintain a warm and friendly environment until a sufficient number of participants arrived. During each focus group or interview session, the moderator briefly explained the purpose of the study, emphasized the importance for participation, provided the ground rules, and gave assurance that no anticipated risks were associated with participating in the study. The rules, for instance, "one person to talk at a time," coupled with the moderator's body language, were expected to control dominant participants in the focus groups. When such rules were broken, the moderator would cautiously interject by saying, for instance, "Thank you, Jupiter. That's one point of view, does anyone feel differently?" coupled with nonverbal techniques such as avoiding eye contact with the dominant participant. The moderators, however, would try

to have eye contact with a shy respondent and occasionally called this person by pseudonym to encourage the person's contribution to the discussion. Whenever a participant provided a spontaneous response before a question was asked, the response was accepted as presented so long as it covered the topic sufficiently. The moderators adhered to the questioning route as much as possible, not asking leading questions but allowing for situational variations depending on needs of each session. The moderator probed reasonably whenever it was believed that the participant had additional information to offer, for example, when a vague comment was given, the moderator would ask, "Please, would you explain what you mean" or if a participant nodded in agreement with another participant, the moderator would ask, "Tell us more." Non-verbal behaviors were noted as a supplement to verbal responses provided.

Cognizant of the fact that some participants might be uncomfortable talking about certain aspects of their experiences in the focus groups regardless of who the moderated the session, participants were encouraged to write down anything with which they felt uncomfortable sharing in the focus group and to hand it to the moderator at the end of the session. Arrangements were made to ensure that participants who were extremely emotional about their experiences receive free counseling services from the Counseling Center. The moderator summarized the main points, asked if anything was missed, and thanked the participants at the end of the session.

Ethical Considerations

Participants were asked to sign an informed consent form (see Appendices A, B, and C), which described the purpose of the study and provided background information (see Appendices L and M). With the consent of participants, each session was tape-

recorded to ensure no response was omitted. Noting that anonymity is critical for promoting honest disclosures, participants were assigned pseudonyms (names of the planets such as Jupiter) and asked to refer to one another using the same during the sessions. In addition, the moderator asked the participants not to disclose to anybody outside the group what was discussed during the session.

Qualitative data were collected and analyzed concurrently and based on the results of the analyses, it was decided that four student focus groups and two faculty focus groups were adequate. The decision was based on how soon *data saturation* (i.e., a point when new data fit into categories that had already emerged; Morse, 1995) and *informational redundancy* (i.e., a point when hardly any new information was extracted from new units; Lincoln & Guba, 1985) were reached.

Data Analysis Procedures

Focus groups and individual interviews were audio taped and transcribed. Statements unrelated to the question were deleted to obtain an edited version of the transcript, which was then subjected to an eight-step qualitative data analysis process. The first step was a preliminary exploration of the data to get a general sense of the participants' perception regarding factors perceived to influence TTD. This was achieved by reading the transcripts in their entirety and taking note of significant statements, quotes, words, or key concepts cited. Next, significant[11] statements or descriptors of individual experiences or perspectives were coded or unitized (i.e., categorized into units) such that each code corresponded to a unique, non-repetitive significant statement that had equal status. Efforts were made to preserve the original language and sentence

[11] "Significant" implies the statement contained a word or phrase that captures a particular theme

structure of each significant statement. Three sources of category nomination were employed including *in vivo* coding (i.e., using participants' exact words), *descriptive* coding (i.e., coding based on the researcher's interpretation of actual events and emotions displayed by participants), and *deductive* coding (i.e., coding based on theory) (Miles & Huberman, 1994). Each code was constantly compared with preceding codes to ensure consistency in the coding process. In the third step, meanings were formulated by specifying the meaning of each significant statement (i.e., unit). In the fourth step, based on the aggregate formulated meanings, units or codes that contained statements deemed similar in content were grouped together to form emergent themes. In order to minimize bias while undertaking the iterative process of theme development, the researcher made a conscious effort to *bracket* any *epoche* or preconceptions held regarding participants' perceptions of factors that influence TTD (Moustakas, 1994). For instance, although some predetermined themes existed from literature review, there were no predictions or expectations regarding either their frequency or intensity in the focus groups.

The fifth step involved classifying the emergent themes into *a priori* meta-themes, the four domains of integration (i.e., academic, social, economic, and personal attributes) and external factors. Two peers, a doctoral candidate in Measurement and Evaluation and a doctoral candidate in Applied Anthropology, separately identified themes from the list of significant statements. The principal researcher then reconciled the labels for the identified themes with each peer. After the reconciliation, the peers separately agreed that the four *a priori* meta-themes under which the emergent themes were classified, were appropriate. In addition, a graduate student who served as note-taker in student focus groups critiqued the definitions of emergent themes. The sixth and seventh steps involved

a *within-case* analysis (i.e., describing in detail each case and themes within the case to establish patterns) and a cross-*case* analysis (i.e., conducting thematic analysis across the cases), respectively. These last two steps were accomplished by binarizing emergent themes whereby, for each participant, an emergent theme was scored "1" if it contained a significant statement pertaining to the participant or scored "0" otherwise. This process led to the formation of a participant by theme (*inter-respondent*) matrix and a unit by theme (*intra-respondent*) matrix (Onwuegbuzie & Teddlie, 2003).

The inter-respondent matrix identified which participants contributed to each emergent theme, whereas the intra-respondent matrix indicated which significant statements contributed to each emergent theme. From the inter-respondent matrix, *frequency effect sizes* (i.e., the proportion of participants who endorsed an emergent theme) were computed and expressed as percentages Similarly, from the intra-respondent matrix, *intensity effect sizes* (i.e., the proportion of statements referring to particular theme) were computed and expressed as percentages. Because these two effect sizes pertain to observable behaviors, Onwuegbuzie and Teddlie (2003) refer to them collectively as *manifest effect sizes*.

Because frequency effect size is based on the number of participants who cite a theme and intensity effect size on the number of statements that a theme contains, the last stage focused on the measurement of consensus in the endorsement of emergent themes. To do so, the manifest effect sizes were transformed into a common metric, percentile ranks. A percentile rank of a theme is the percentage of themes that fall below a given theme. For example, among students, the frequency effect size for "Communication," 50, is transformed into a percentile rank of 80. This implies that if all the themes from

student focus group were rank-ordered from lowest to highest based on frequency effect size, "Communication" falls at the 80th percentile. Simply put, 80% of the themes fall at or below "Communication." This transformation allowed for comparing the strength of association of each theme with TTD using the following criteria: (a) a theme with a percentile rank less than 25% was interpreted as having minimal association with TTD, (b) a theme with a percentile rank between 25% and 74% had a moderate association with TTD, and (c) a theme with a percentile rank greater or equal to 75% had a strong association with TTD. These three divisions, corresponding to the first quartile (lowest 25%), the middle 50%, and the upper quartile (upper 25%), also allowed for comparing and contrasting the endorsement of themes by different cases: LTTD students/faculty versus STTD student/faculty cases and student versus faculty cases.

The technique of computing and ranking the manifest effect sizes is an attempt to employ quantitative analysis to qualitative data, a strategy Baldwin (1942) contends allows for extraction of a greater amount of information from the qualitative data. Herwitt-Gervais (1997), examining the effect of applying quantitative analysis to narrative data, concluded that both quantitative and qualitative analyses of the same qualitative data yield greater similarities than differences in the results. Recently, Bauer (2004, p. 111) utilized "frequency tables" to summarize findings regarding departmental factors student perceived to be associated with TTD and Kitell-Limerick (2005) employed the technique of ranking themes to facilitate comparison of student and faculty perceptions of factors that prevent students from completing the academic doctorate.

Credibility and Dependability of Qualitative Results

The following techniques were employed to enhance credibility or dependability of the results of the qualitative component: triangulation, prolonged engagement, leaving an audit trail, checking representativeness, checking researcher bias, member checking, using extreme cases, follow-up surprises, peer debriefing, rich and thick descriptions, participatory research, and use of effect sizes. Each of these is discussed next.

Triangulation

Method triangulation (i.e., following student focus groups with individual interviews), *data triangulation* (i.e., gathering students' and faculty perspectives using focus groups), and investigator triangulation (i.e., using different individuals to serve as moderators and note-takers in student and faculty focus groups) were undertaken. These forms of triangulations were expected to yield convergence and/or contradictions, thereby enabling the researcher to construct accurate explanations of the phenomenon (TTD).

Prolonged Engagement

Although formally, each focus group and/or interview lasted less than one hour, these sessions were spread over a period of eight months to afford the researcher the opportunity to check on any inaccurate information and to verify the qualitative data collected. For instance, from the first to the second student focus group session, about four weeks elapsed. About the same length of time elapsed between the succeeding student focus groups. The interviews were conducted after all student focus groups had been completed. Following the interviews were faculty focus groups that were also spread out in almost similar pattern. The researcher also informally interacted with the participants and learned more from the latter during the eight-month period.

Leaving Audit Trail

Extensive documentation of records and data was kept that enabled the researcher to undertake constant comparison of significant statements, codes, and emergent themes during data analysis. These records constituted authentic evidence of activities undertaken by the researcher and were available, upon request, to the dissertation committee that acted as the "outside evaluator" (Lincoln & Guba, 1985).

Checking for Representativeness

Although participation in the study was voluntary, attempts were made to ensure that the sample of participants was representative of the college student body. For instance, besides ensuring gender and ethnic balance, the researcher purposely recruited contrasting participants: students from LTTD and STTD program clusters and faculty members from the two program clusters.

Checking for Researcher Bias

Researcher bias, which may be active (e.g., stemming from attributes of the researcher such as being a male international doctoral student in candidacy) or passive (e.g., due to the researcher's subconscious preference of one view over another) may impact the study. To avoid active bias, for instance, the possibility of some participants in the faculty focus groups withholding certain information due to the presence of the principal researcher, faculty members acted as the moderator and note taker in the faculty focus groups, not the researcher and/or other graduate students.

Member Checking

The researcher acted as a moderator in the student focus groups, listening, observing, and inductively analyzing the data based on the discussions and not on

preconceived hypotheses. To verify the accuracy in interpreting participants' viewpoints, meanings attached to words and actions, and feelings regarding factors perceived to influence TTD (i.e., *interpretive validity* of the findings), the moderator would comment, for instance, "Most students encountered problems with turnaround time, is that right?" Group consensus over a point was then viewed as a verification of the accuracy of the viewpoint. In addition, the researcher utilized informal meetings with the participants as opportunities to undertake verification of results obtained.

Extreme Cases

Two extreme cases were identified, two programs from the short TTD cluster and three programs from the long TTD cluster, from which student and faculty participants were selected as explained earlier. The researcher then verified whether themes emerging from the two cases were different or similar (Miles & Huberman, 1994).

Follow-up on Surprises

Rather than ignoring surprising responses during focus groups, the researcher probed. In addition, interviews provided an opportunity to follow up any surprises that were not exhaustively explored during focus groups sessions.

Debriefing

Three forms of debriefings were executed. First, the researcher scheduled frequent meeting with the co-chairs to discuss the progress of the study. During such discourse, issues about research design, logistics of the focus group sessions, and other critical questions related to preliminary findings were addressed. To keep the researcher honest, professional colleagues were given a chance to critique the research design/data collection procedures, data analysis procedures, and interpretations. Secondly, when

opportunity arose, the researcher held reflective dialogues with participants after focus group or interviews sessions to gain a more accurate understanding of participants' perceptions. Finally, the researcher met with the moderator and note-taker of the faculty focus group to verify the accuracy of data collected.

Rich and Thick Descriptions

The researcher collected detailed and complete data that were expected to maximize the ability to find meaning. These data were in the form of verbatim transcripts of focus groups and interviews coupled with notes on verbal and nonverbal cues. Such thick and rich data were expected to ensure *descriptive validity*, that is, the accuracy in documenting descriptive information such as the setting and participants' behaviors.

Participatory/Collaborative Research

Many individuals were actively involved in the qualitative component of the study. The dissertation committee co-chairs provided feedback at various points in the research process; peers with similar educational preparation as the researcher reviewed the instruments and provided feedback; and faculty and students who attended the dissertation proposal defense provided feedback that shaped the design of the study.

Effect Sizes

As noted by Onwuegbuzie and Teddlie (2003), the goal of binarizing themes is not to replace the descriptions and interpretations of the emergent themes, but to enhance the development of information that would complement thick descriptions. In quantitizing the qualitative data, manifest effect sizes (i.e., frequency effect sizes and intensity effect sizes) were computed and transformed into percentile ranks to facilitate comparison of perceptions within and across the cases.

Mixed Data Analysis Procedures

A *sequential quantitative-qualitative mixed data analysis* (Onwuegbuzie & Teddlie, 2003) was undertaken. Onwuegbuzie and Teddlie (2003) identified seven stages of mixed methods data analysis process (viz., data reduction, data display, data transformation, data correlation, data consolidation, data comparison, and data integration). Implementing the mixed-methods data analysis framework in this study, four of these stages were incorporated, namely, data reduction, data display, data transformation, and data integration.

Onwuegbuzie and Teddlie (2003) define *data reduction* as the process of reducing the dimensionality of the data. In this study, this included computing median TTD, parameter estimates, standard errors, and odds ratios (from the quantitative data) and conducting thematic analysis including coding, generating themes, and computing manifest effect sizes (from the qualitative data). Next, *data display* refers to a pictorial description of (a) quantitative data via hazard functions, survival functions, and tables of parameter estimates, standard errors, and odds ratios; and (b) qualitative data via interrespondent and intrarespondent (thematic) matrices. The third stage, *data transformation*, involved converting qualitative data into numerical codes that could be represented statistically (i.e., *quantitized*; Tashakkori & Teddlie, 1998). The final stage, *data integration*, involved integrating quantitative and qualitative results into two separate sets of coherent wholes.

CHAPTER IV: RESULTS

Chapter IV presents the results of the quantitative and qualitative analyses. In each subsection, the research questions guided the presentation of the results. The chapter concludes with a summary of the results from both subsections.

Results of Quantitative Analysis

Research Question1: Median Time to the Doctorate in Education

To answer the question, "*What is the median time to the doctorate in one College of Education at a state university*?," the pattern of doctorate attainment was examined with the aid of a survival function. As shown in Figure 3, the median time to the doctorate at this college was 5.8 years. This is the point in time when half of the students observed had attained the doctorate, taking into consideration the censored cases.

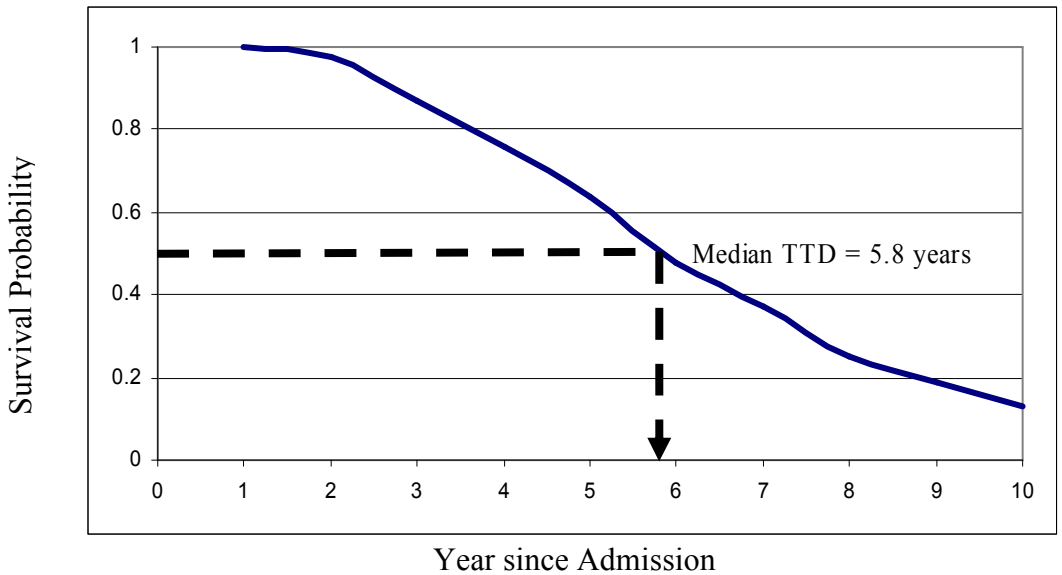

Figure 3: Fitted baseline survival function of doctorate attainment (N = 1,028)

Median TTD was attained in 17 out of the 24 programs. As shown in Figure 4, the lowest and highest median TTDs were 3.6 years (in P2 and P3) and 8.0 years (in P15), respectively. In 6 of the 17 programs, the median TTD was greater than 5.8 years, the college's median TTD, which is indicated by the horizontal broken line in Figure 4.

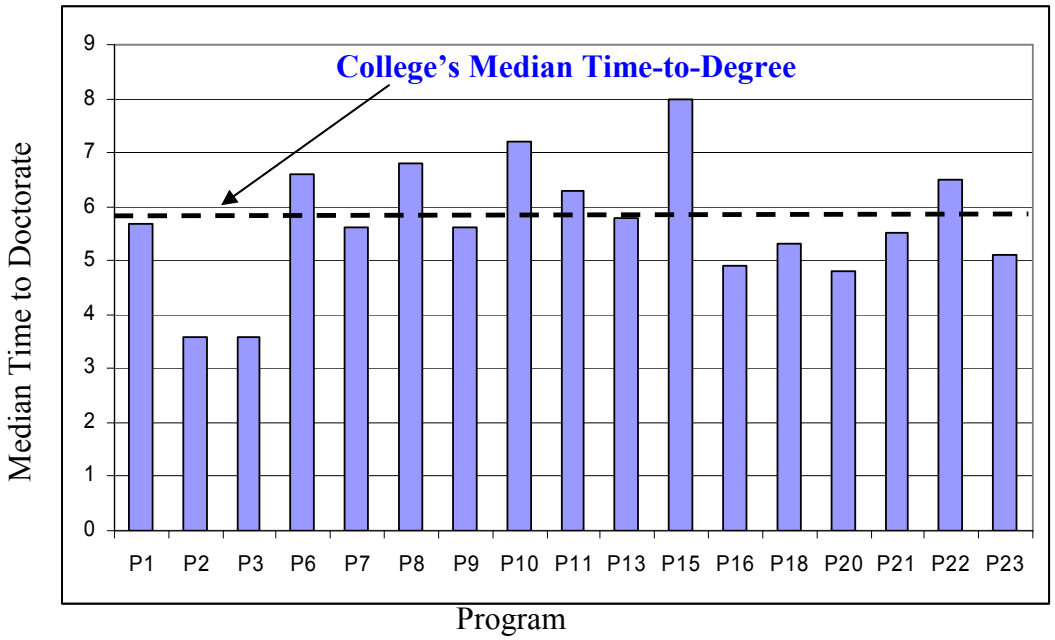

Figure 4. Median time to degree in 17 programs (n = 929)

Research Question 2: When Students are Likely to Attain the Doctorate in Education

In Table 11 (the baseline model), the logistic results show that the odds of doctorate attainment increased steadily from 0.04 in year 1 to 0.32 in the year 5, slightly dropped to 0.31 in the year 7 but shot to 0.43 in year 8 after which it stabilized at 0.25 between the 8th and 9th year before rising again to 0.50 in the 10th year. The multilevel logistic results, which take into account the nesting of students into programs, show that the odds of doctorate attainment increased from 0.03 in the year 1, reached the highest point, 0.66, in year 10, dipped slightly to 0.44 in year 8 but climbed to 1.20 in year 10. In general, both the logistic and multilevel logistic results show that students were most

likely to attain the doctorate in the seventh year although the logistic model had an additional peak in the fifth year too. Whereas the odds of doctorate attainment was highest in the tenth year, it should be interpreted with caution. It is based on a reduced risk set: three of the nine students "at risk" attained the doctorate and six were censored.

Table 11

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 1: Baseline *Model Predicting the Timing of Doctorate Attainment (N=1,028)*

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-3.23 (0.16)*	0.04	-3.64 (0.27)*	0.03
Year 2	-2.54 (0.14)*	0.08	-2.88 (0.23)*	0.06
Year 3	-1.96 (0.12)*	0.14	-2.19 (0.17)*	0.10
Year 4	-1.63 (0.13)*	0.20	-1.71 (0.15)*	0.18
Year 5	-1.14 (0.13)*	0.32	-1.04 (0.16)*	0.35
Year 6	-1.18 (0.18)*	0.31	-0.93 (0.23)*	0.39
Year 7	-0.85 (0.22)*	0.43	-0.41 (0.31)	0.66
Year 8	-1.39 (0.37)*	0.25	-0.81 (0.47)	0.44
Year 9	-1.39 (0.50)*	0.25	-0.70 (0.61)	0.50
Variance			0.93 (0.51)	
AIC	2362.7		2361.5	
-2LL	2342.7		2339.5	

Note. * $p < .05$; SE = Standard Error; AIC = Akaike Information Criterion; LL = Log likelihood
Variance = between-program variance representing random effects

The hazard function (see Figure 5) provides a graphical picture of the timing of doctorate attainment. It shows that the longer a student was enrolled, the more likely that the student would experience the "hazard" of doctorate attainment. Students were thus most likely to attain the doctorate in the seventh year as indicated by the peak of the hazard function. Between the seventh and ninth year, the odds of doctorate attainment decreased steadily. The increase in year 10, however, was probably an inflation resulting from the reduced risk set.

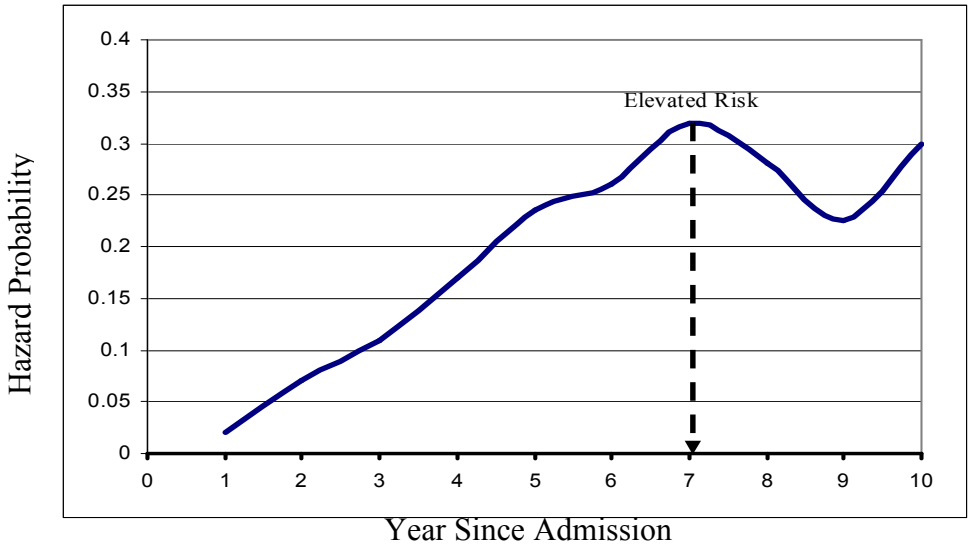

Figure 5. Fitted baseline hazard function of doctorate attainment (N = 1,028)

Research Question 3: Student-Level Characteristics and Timing of Doctorate Attainment

To answer the third quantitative research question, "*To what extent is the timing of doctorate attainment in Education related to the following student-level characteristics: (a) sex, (b) race/ethnicity (c) age at admission, (d) GPA score at admission, (e) GRE verbal at admission score, and (f) GRE quantitative score at admission?*," each of these covariates was added, one at a time, to the baseline hazard model, and the resultant models examined separately. The results are presented next.

Research Question 3(a): Sex and Time to Degree

Inspection of the survival function in Figure 6 shows that female students attained the doctorate faster than the male counterparts did, a median TTD of 5.4 years for female students compared to 6.2 years for male students.

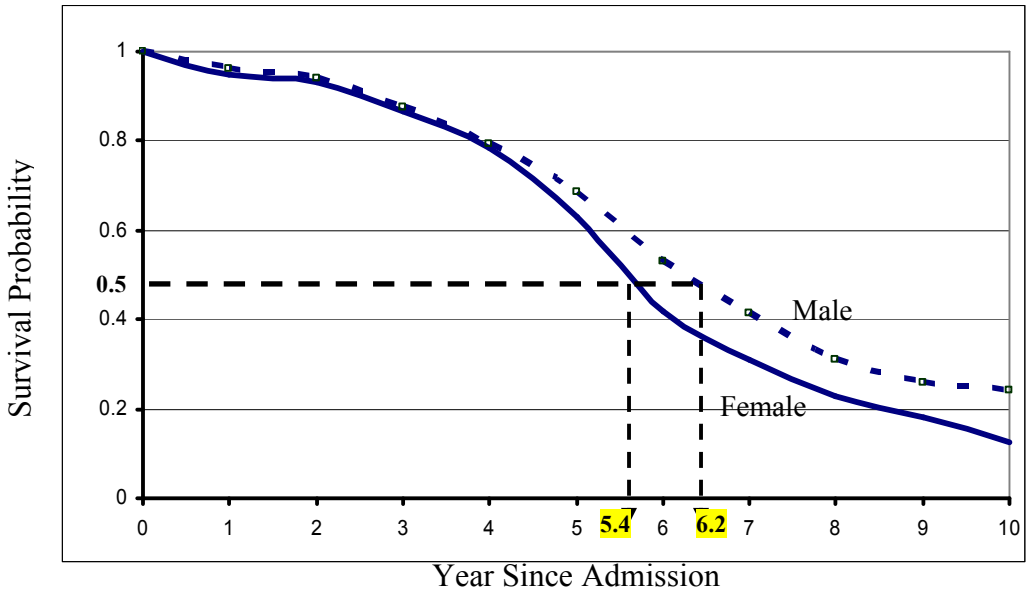

Figure 6. Fitted survival functions of doctorate attainment by sex (N = 1,028).

Table 12 shows a positive coefficient for the covariate SEX (i.e., 0.29 based on the logistic results and 0.35 based on the multilevel logistic results). This implies that a one-unit change in SEX (i.e., moving from male to female) was associated with a vertical elevation of the fitted logit-hazard function for female students above that of male counterparts. On the odds ratio scale, the odds of doctorate attainment in any given year were 1.33 times (logistic) or 1.42 times (multilevel logistic) greater for female students than for male students. Stated differently, in any given year, female students were 33% (logistic) or 42% (multilevel logistic) more likely to attain the doctorate than were male students. Although not shown in the table, the 95% confidence interval for the odds ratio were (1.19, 1.51) and (1.21, 1.67) based on the logistic and multilevel logistic results, respectively. Because these values exclude 1.0, the sex difference in the odds of doctorate attainment in any given year was thus statistically significant ($p < .05$).

Table 12

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 2: Sex Predicting the Timing of Doctorate Attainment (N = 1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-3.44 (0.19)*	0.03	-3.88 (0.31)*	0.02
Year 2	-2.74 (0.16)*	0.06	-3.12 (0.27)*	0.04
Year 3	-2.17 (0.15)*	0.12	-2.43 (0.22)*	0.09
Year 4	-1.83 (0.16)*	0.16	-1.96 (0.19)*	0.14
Year 5	-1.35 (0.16)*	0.26	-1.29 (0.19)*	0.28
Year 6	-1.39 (0.20)*	0.25	-1.17 (0.25)*	0.31
Year 7	-1.07 (0.24)*	0.34	-0.67 (0.33)*	0.51
Year 8	-1.58 (0.38)*	0.21	-1.05 (0.48)*	0.44
Year 9	-1.58 (0.51)*	0.21	-0.94 (0.62)	0.50
Year 10	-0.92 (0.71)	0.40	-0.08 (0.87)	1.08
SEX	0.29 (0.12)*	1.33	0.35 (0.16)*	1.42
Variance			0.92 (0.53)	
AIC	2363.6		2363.1	
-2LL	2337.0 (Δ = 5.7)		2334.3 (Δ = 5.2)	

Note. * $p < .05$; SE = Standard Error; AIC = Akaike Information Criterion; LL = Log likelihood
Variance = between-program variance representing random effects
SEX = the effect of being a female student (compared to being a male student)
AIC = Akaike Information Criterion; LL = Log likelihood
Δ = change in the -2LL when compared with the values in the baseline model (Model 1 with only time as a predictor)

Of prime interest was whether the odds of doctorate attainment of female students differed from that of male counterparts in each year during the observation period. A graphical display of the relationship between SEX and the timing of doctorate attainment over time was obtained by examining the hazard functions for both sexes. Figure 7 shows that during the first three years, males were almost equally likely as females to attain the doctorate as indicated by almost overlapping hazard functions, however, between the third and seventh year, males were less likely than females to attain the doctorate as indicated by rapidly diverging hazard functions. For both sexes, the hazard of doctorate attainment decreased between the seventh and ninth year by almost the same rate as shown by almost equal slopes between these two points. Beyond the ninth year, the

hazard of doctorate attainment decreased among males but increased among females, however, the difference in the hazard for the period beyond the ninth year was probably an inflation due to the smaller number of students in the risk set during this period.

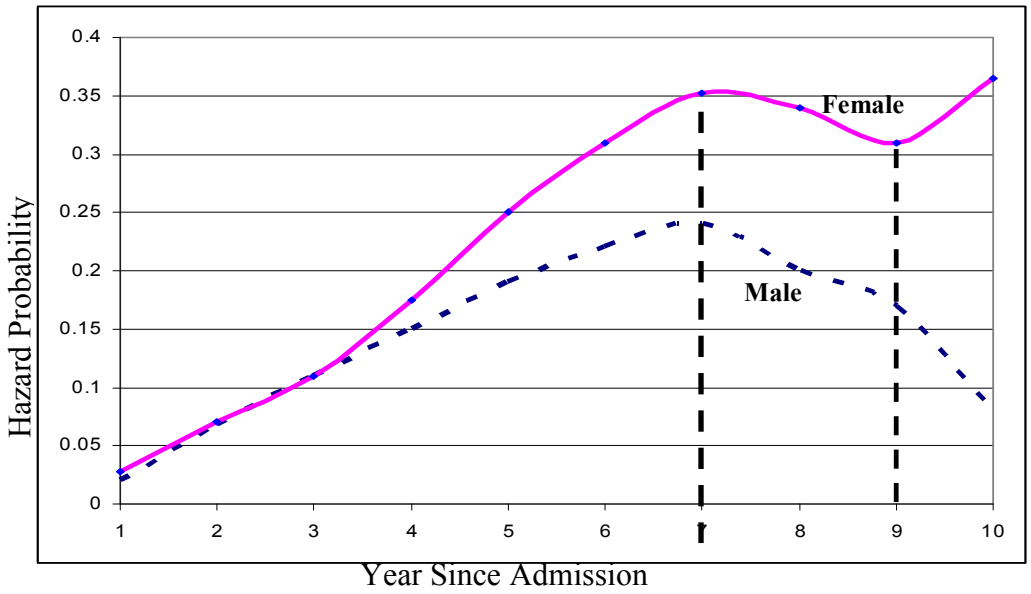

Figure 7. Fitted hazard function of doctorate attainment by sex (N = 1,028)

Previous studies have shown that the effects of covariates may vary with time (DesJardins et al., 2002). To ascertain whether the difference in timing of doctorate attainment by sex was constant over time, the proportional hazards assumption was tested by comparing the fit statistics of a model containing sex and time main effects with a model containing the interaction effects of sex and time in addition to the main effects. Although the interaction effect was statistically significant, as will be shown later, when other covariates were added, the interaction term became statistically nonsignificant. Moreover, the introduction of the interaction term did not improve the fit of the model as evidenced by the changes in the values of goodness of fit statistics (AIC and -2LL).

Research Question 3(b): Race/Ethnicity and Time to Degree

Model 3 (Table 13) shows no sufficient evidence that the timing of doctorate attainment was statistically significantly related to a student's race/ethnicity. Neither the logistic nor the multilevel logistic results showed that the three racial/ethnic groups were each different from Whites in terms of the timing of doctorate attainment.

Table 13

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 3: Race/Ethnicity Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-3.24 (0.17)*	0.04	-3.60 (0.28)*	0.03
Year 2	-2.54 (0.14)*	0.08	-2.85 (0.23)*	0.06
Year 3	-1.96 (0.13)*	0.14	-2.16 (0.17)*	0.12
Year 4	-1.63 (0.13)*	0.20	-1.69 (0.15)*	0.18
Year 5	-1.15 (0.14)*	0.32	-1.04 (0.17)*	0.35
Year 6	-1.18 (0.18)*	0.31	-0.93 (0.24)*	0.39
Year 7	-0.85 (0.22)*	0.43	-0.42 (0.32)	0.66
Year 8	-1.38 (0.37)*	0.25	-0.83 (0.48)	0.44
Year 9	-1.39 (0.50)*	0.25	-0.72 (0.62)	0.49
Year 10	-0.69 (0.71)	0.50	0.15 (0.87)	1.16
Black	0.16 (0.20)	1.17	0.10 (0.24)	1.11
Hispanic	0.17 (0.23)	1.18	0.10 (0.30)	1.11
Others	-0.29 (0.22)	0.75	-0.36 (0.27)	0.70
Variance			0.87 (0.52)	
AIC	2365.5		2365.2	
-2LL	2339.5 (Δ = 3.2)		2337.2 (Δ = 2.3)	

Note. * $p < .05$; SE = Standard Error; White is omitted (the reference race/ethnic category)
Variance = between-program variance representing random effect; LL = Log likelihood
AIC = Akaike Information Criterion; Δ = change in the -2LL when compared with the values in the baseline model (Model 1 with only time as a predictor)

Research Question 3(c): Age at Admission and Time to Degree

Model 4 (Table 14) shows no sufficient evidence of a statistically significant relationship between the timing of doctorate attainment and the students' age at admission. Other factors not controlled, both logistic and multilevel logistic results showed that the odds of doctorate attainment in any given year did not vary with age.

Table 14

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 4: Age at Admission Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-3.23 (0.16)*	0.04	-3.64 (0.28)*	0.03
Year 2	-2.54 (0.14)*	0.08	-2.88 (0.23)*	0.06
Year 3	-1.96 (0.12)*	0.14	-2.19 (0.17)*	0.11
Year 4	-1.63 (0.13)*	0.20	-1.71 (0.15)*	0.18
Year 5	-1.14 (0.13)*	0.32	-1.04 (0.17)*	0.35
Year 6	-1.18 (0.18)*	0.31	-0.93 (0.24)*	0.39
Year 7	-0.85 (0.22)*	0.43	-0.41 (0.32)	0.66
Year 8	-1.39 (0.37)*	0.25	-0.82 (0.48)	0.44
Year 9	-1.39 (0.50)*	0.25	-0.70 (0.62)	0.50
Year 10	-0.69 (0.71)	0.50	0.19 (0.87)	1.21
AGEg	0.0002 (0.01)	1.00	0.0002 (0.01)	1.00
Variance			0.93 (0.51)	
AIC	2364.7		2363.5	
-2LL	2342.7 (Δ = 0)		2337.2 (Δ = 0)	

Note. * $p < .05$; SE = Standard Error; AGEg = age at admission (centered on program mean age)
Variance = between-program variance representing random effect; LL = Log likelihood
AIC = Akaike Information Criterion; Δ = change in the -2LL when compared with the values in the baseline model (Model 1 with only time as a predictor).

Research Question 3(d): Master's GPA Score and Time to Degree

Model 5 (Table 15) shows a statistically significant relationship between the timing of doctorate attainment and the master's GPA scores at admission. A one-point increase in GPA score was associated with an increase in the log odds by 0.70 or 0.82 based on the logistic and multilevel logistic results, respectively. On the odds ratio scale, the odds of doctorate attainment in any given year for a student who scored one point above the program's mean score was 2.01 times (logistic results) or 2.27 times (multilevel logistic results) that of one whose score was equal to the program's mean score. Simply stated, the higher the GPA score at admission, the higher the odds of doctorate attainment.

Table 15

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 5: Master's GPA Score Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-3.25 (0.16)*	0.04	-3.65 (0.28)*	0.03
Year 2	-2.56 (0.14)*	0.08	-2.90 (0.23)*	0.06
Year 3	-1.99 (0.12)*	0.14	-2.21 (0.17)*	0.11
Year 4	-1.65 (0.13)*	0.19	-1.73 (0.15)*	0.18
Year 5	-1.17 (0.14)*	0.31	-1.08 (0.16)*	0.34
Year 6	-1.21 (0.18)*	0.30	-0.97 (0.22)*	0.38
Year 7	-0.87 (0.22)*	0.42	-0.44 (0.32)	0.64
Year 8	-1.41 (0.37)*	0.24	-0.85 (0.47)	0.43
Year 9	-1.38 (0.50)*	0.25	-0.72 (0.61)	0.49
Year 10	-0.75 (0.71)	0.47	0.11 (0.87)	1.12
GPAg	0.70 (0.25)*	2.01	0.82 (0.30) *	2.27
Variance			0.90 (0.52)	
AIC	2355.7		2354.9	
-2LL	2333.7 (Δ = 9.0)		2330.9 (Δ= 8.6)	

Note. * $p < .05$; SE = Standard Error; GPAg = Master's GPA at admission (centered on program mean GPA); Variance = between-program variance representing random effect; LL = Log likelihood; AIC = Akaike Information Criterion; Δ = change in the -2LL when compared with the values in the baseline model (Model 1 with only time as a predictor).

To ascertain whether the effect of master's GPA score on the timing of doctorate attainment varied with time, the fit statistics of a model containing the interaction of GPA score and time were compared with the fit statistics for the model containing only the main effects of time. Although the interaction term was statistically significant, which would have implied the effect of GPA varied with time, when other covariates, for instance, sex, was added, the interaction term became statistically nonsignificant.

Research Question 3(e): GRE Verbal Score at Admission and Time to Degree

As shown by Model 6 (Table 16), there was no evidence that the GRE verbal score at admission was statistically significantly related to the timing of doctorate attainment: the odds ratio was 1.00 in both the logistic and multilevel logistic models.

Table 16

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 6: GRE Verbal Score at Admission Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-3.23 (0.16)*	0.04	-3.68 (0.28)*	0.03
Year 2	-2.54 (0.14)*	0.08	-2.91 (0.23)*	0.05
Year 3	-1.96 (0.12)*	0.14	-2.21 (0.17)*	0.11
Year 4	-1.63 (0.13)*	0.20	-1.72 (0.15)*	0.18
Year 5	-1.15 (0.13)*	0.32	-1.04 (0.16)*	0.35
Year 6	-1.18 (0.18)*	0.31	-0.91 (0.22)*	0.40
Year 7	-0.86 (0.22)*	0.43	-0.39 (0.32)	0.68
Year 8	-1.39 (0.37)*	0.25	-0.78 (0.47)	0.46
Year 9	-1.39 (0.50)*	0.25	-0.60 (0.61)	0.55
Year 10	-0.71 (0.71)	0.49	0.11 (0.87)	1.12
GREVg	0.0004 (0.001)	1.00	0.001(0.001)	1.00
Variance			1.01 (0.52)*	
AIC	2364.2		2362.4	
-2LL	2342.2 (Δ = 1.1)		2338.4 (Δ = 0.4)	

Note. * $p < .05$; SE = Standard Error;
GREVg = GRE verbal score at admission (centered on the program's mean GREV score)
Variance = between-program variance representing random effect; LL = Log likelihood
AIC = Akaike Information Criterion; Δ = change in the -2LL when compared with the values in the baseline model (Model 1 with only time as a predictor)

Research Question 3f: GRE Quantitative Score at Admission and Time to Degree

Model 7 (Table 17) shows that there was no sufficient evidence indicating that the timing of doctorate attainment was statistically significantly related to the GRE quantitative score at admission. The odds ratio was 1.00 in both logistic and multilevel logistic results.

Table 17

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 7: GRE Quantitative Score at Admission Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-3.23 (0.16)*	0.04	-3.63 (0.27*	0.03
Year 2	-2.54 (0.14)*	0.08	-2.87 (0.23)*	0.06
Year 3	-1.96 (0.12)*	0.14	-2.18 (0.17)*	0.11
Year 4	-1.62 (0.13)*	0.20	-1.71 (0.15)*	0.18
Year 5	-1.14 (0.13)*	0.32	-1.04 (0.16)*	0.35
Year 6	-1.18 (0.18)*	0.31	-0.93 (0.23)*	0.39
Year 7	-0.85 (0.22)*	0.43	-0.42 (0.32)	0.66
Year 8	-1.39 (0.37)*	0.25	-0.83 (0.47)	0.44
Year 9	-1.39 (0.50)*	0.25	-0.72 (0.61)	0.49
Year 10	-0.70 (0.71)	0.50	0.16 (0.87)	1.17
GREQg	0.001 (0.001)	1.00	0.0004 (0.001)	1.00
Variance			1.01 (0.52)*	
AIC	2363.6		2363.1	
-2LL	2341.6 (Δ = 1.1)		2339.1 (Δ = 0.4)	

Note. * $p < .05$; SE = Standard Error; GREQg = GRE quantitative score at admission (centered on the program's mean GREQ score); Variance = between-program variance representing random effect; AIC = Akaike Information Criterion; LL = Log likelihood; Δ = change in the -2LL when compared with the values in the baseline model (Model 1 with only time as a predictor)

After identifying statistically significant student-level main effects from the univariate analyses and based on theory and the literature on TTD, a series of models was fit to test the combined "effect" of the student-level covariates including some two-way interaction effects that were identified in previous studies (e.g., race and age; Civian, 1990). Table 18 presents the model with the best fit (Model 8) showing that sex and master's GPA score were each statistically significantly related to the timing of doctorate attainment based on both the logistic and multilevel logistic results.

Table 18

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 8: Sex and GPA Score Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log Odds (SE)	Odds Ratio
Year 1	-3.45 (0.19)*	0.03	-3.88 (0.32)*	0.02
Year 2	-2.76 (0.16)*	0.06	-3.12 (0.27)*	0.04
Year 3	-2.18 (0.15)*	0.11	-2.44 (0.22)*	0.09
Year 4	-1.84 (0.16)*	0.16	-1.97 (0.19)*	0.14
Year 5	-1.36 (0.16)*	0.26	-1.30 (0.19)*	0.27
Year 6	-1.41 (0.20)*	0.24	-1.20 (0.25)*	0.30
Year 7	-1.07 (0.24)*	0.34	-0.68 (0.33)*	0.51
Year 8	-1.59 (0.38)*	0.20	-1.08 (0.48)*	0.34
Year 9	-1.56 (0.51)*	0.21	-0.95 (0.62)	0.39
Year 10	-0.96 (0.72)	0.38	-0.13 (0.87)	0.88
SEX	0.27 (0.12)*	1.31	0.33 (0.16)*	1.39
GPAg	0.68 (0.24)*	1.97	0.80 (0.30)*	2.23
Variance			0.89 (0.53)	
AIC	2352.7		2352.3	
-2LL	2328.7 (Δ = 14)		2326.3 (Δ = 13)	

Note. * $p < .05$; SE = Standard Error; GPAg = Master's GPA score at admission (centered on the program mean GPA score); Variance = between-program variance representing random effect;
AIC = Akaike Information Criterion; LL = Log likelihood; Δ = change in the -2LL when compared with the values in the baseline model (Model 1 with only time as a predictor)

Research Question 4: Program-Level Factors and the Timing of Doctorate Attainment

To answer the fourth quantitative research question, "*After controlling for student-level characteristics, to what extent is the timing of doctorate attainment in Education related to the following program-level factors: (a) size of the program, (b) size of the department housing the program, (c) racial/ethnic diversity in the program, (d) percentage of female students in the program, (e) mean age at admission in the program, (f) mean GPA score at admission in the program, (g) mean GRE verbal score at admission in the program, and (h) mean GRE quantitative score at admission in the program?*," all the program-level covariates were added to the multivariate model

containing SEX and master's GPA score. In the discussion that follows, the effects of program-level covariates are discussed individually.

Table 19 shows that when program-level factors were added to the multivariate model containing SEX and master's GPA score, SEX was no longer statistically significantly related to the timing of doctorate attainment. Both the logistic and multilevel logistic results showed that three program-level covariates (i.e., size of a department housing the program, percentage of female students in the program, and mean GRE quantitative score in the program) were each statistically significantly related to the timing of doctorate attainment. Before arriving at Model 10, several models were considered but not presented, each time retaining only statistically significant covariates in the succeeding models. The final model, (Model 10) fitted the data equally well compared to Model 9 as indicated by the goodness of fit indices. Although the change in the negative log likelihood for Model 10 was slightly less than that for Model 9 ($\Delta = 62$ vs. 64 based on the logistic results and 63 vs. 67 based on multilevel logistic results), Model 10 was preferred based on parsimony: it contained four covariates compared to 10 covariates in Model 9.

Table 19

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 9: Two Student-level Covariates and All Program-Level Covariates Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-6.01 (1.50)*	0.002	-7.05 (1.23)*	0.002
Year 2	-5.32 (1.49)*	0.005	-6.36 (1.23)*	0.005
Year 3	-4.76 (1.49)*	0.009	-5.80 (1.22)*	0.009
Year 4	-4.41 (1.49)*	0.012	-5.45 (1.22)*	0.012
Year 5	-3.93 (1.49)*	0.020	-4.97 (1.22)*	0.020
Year 6	-3.97 (1.50)*	0.019	-5.01 (1.23)*	0.019
Year 7	-3.65 (1.50)*	0.026	-4.68 (1.23)*	0.026
Year 8	-4.16 (1.53)*	0.016	-5.19 (1.27)*	0.016
Year 9	-4.12 (1.57)*	0.016	-5.14 (1.31)*	0.016
Year 10	-3.45 (1.64)	0.03	-4.48 (1.40)*	0.03
SEX	0.09 (0.13)	1.09	0.10 (0.13)	1.09
GPAg	0.81 (0.26)*	2.24	0.79 (0.26)*	2.25
psize	0.07 (0.05)	1.08	0.24 (0.09)	1.07
dsize	-0.09 (0.04)*	0.92	0.07 (0.18) *	0.91
pwhite	0.63 (0.97)	1.88	1.36 (0.92)	1.88
pfem	3.00 (1.06)*	20.1	2.98 (0.96)*	20.1
AGEc	0.02 (0.02)	1.02	0.01 (0.02)	1.02
GPAc	-0.18 (1.54)	0.83	-0.27 (1.47)	0.84
GREVc	-0.01(0.004)	1.00	-0.01(0.003)	1.00
GREQc	0.01(0.003)*	1.01	0.01 (0.003)*	1.01
Variance			<0.0001(.)	
AIC	2315.5		2317.5	
-2LL	2275.5 (Δ = 67)		2275.5 (Δ = 64)	

Note. * $p < .05$; SE = Standard Error; GPAg = Master's GPA score at admission (centered on program mean GPA score); psize = size of a program (where size refers to the number of students admitted); dsize = size of a department housing the program (where size refers to # of programs); pwhite = percentage of White students in the program; pfem = percentage of female students in the program; Lower case 'c' in AGEc, GPAc, GREVc, and GREQc indicate grand mean centered values; Variance = between-program variance representing random effect; AIC = Akaike Information Criterion; LL = Log likelihood; Δ = change in the -2LL when compared with the values in the baseline model (Model 1)

Table 20

Parameter Estimates, Standard Errors, Odd Ratios, and Goodness of Fit Statistics for Model 10: One Student-Level Covariate and Four Program-Level Covariates Predicting the Timing of Doctorate Attainment (N=1,028)

	Logistic		Multilevel Logistic	
Predictor	Log odds (SE)	Odds Ratio	Log odds (SE)	Odds Ratio
Year 1	-4.48 (0.46)*	0.01	-4.92 (0.64)*	0.01
Year 2	-3.80 (0.45)*	0.02	-4.17 (0.61)*	0.02
Year 3	-3.23 (0.45)*	0.04	-3.50 (0.59)*	0.03
Year 4	-2.89 (0.45)*	0.06	-3.02 (0.57)*	0.05
Year 5	-2.40 (0.45)*	0.09	-2.36 (0.56)*	0.09
Year 6	-2.45 (0.46)*	0.09	-2.28 (0.58)*	0.10
Year 7	-2.13 (0.48)*	0.12	-1.79 (0.61)*	0.17
Year 8	-2.64 (0.57)*	0.07	-2.16 (0.70)*	0.12
Year 9	-2.62 (0.66)*	0.07	-2.62 (0.00)*	0.07
Year 10	-1.92 (0.83)*	0.15	-1.12 (1.00)	0.33
GPAg	0.84 (0.26)*	2.31	0.95 (0.31)*	2.59
dsize	-0.13 (0.03)*	0.88	-0.17 (0.04)*	0.84
pfem	2.36 (0.55)*	10.5	2.66 (0.72)*	14.3
GREQc	0.01 (0.002)*	1.01	0.01 (0.002)*	1.01
Variance			0.82 (0.52)	
AIC	2307.4		2309.4	
-2LL	2279.4 (Δ = 63)		2277.4 (Δ = 62)	

Note. * $p < .05$; SE = Standard Error; GPAg = Master's GPA score at admission (centered on program mean GPA score); dsize = size of a department housing the program (where size refers to # of programs); pwhite = percentage of White students in the program; pfem = percentage of female students in the program; GREQc = Program mean GRE quantitative score (centered on the grand mean); Variance = between-program variance representing random effect; AIC = Akaike Information Criterion; LL = Log likelihood; Δ = change in -2LL when compared with the values in the baseline model (Model 1)

Research Question 4(a): Size of the Program and Time to Degree

As defined earlier, size of the program was operationalized as the average number of students admitted per year in the program. Controlling for two student level covariates (i.e., sex and GPA score) and eight program-level covariates, there was no evidence from both the logistic and multilevel logistic results (see Table 19) that the size of the program was statistically significantly related to the timing of doctorate attainment. Thus, a student admitted into a program that admits a large number of students per year was not

more or less likely to attain the doctorate than was one admitted in a program that admits fewer students per year.

Research Question 4(b): Size of a Department and Time to Degree

Size of the department, as defined earlier, refers to the number of doctoral programs housed by the department where the program was offered. Controlling for two student level covariates (i.e., sex and GPA score) and eight program-level covariates, both the logistic and multilevel logistic results (see Table 19) indicated a statistically significant relationship between the timing of doctorate attainment and the size of a department in which the program was housed. The succeeding analysis (Table 20) shows that a 1-unit change in the size of the department was associated with a -0.13 (logistic) or -0.17 (multilevel logistic) unit change in the log odds of doctorate attainment in any given year. On the odds ratio scale, a 1-unit increase in the size of the department was associated with a 12% (logistic) or 16% (multilevel logistic) decrease in the odds of doctorate attainment in any given year, holding constant the effect of one student-level covariate (i.e., master's GPA score) and two program-level covariates (i.e., percentage of female students in the program [*pfem*] and mean GRE quantitative score in the program [*GREQc*]). Simply stated, the larger the size of the department, the lower the odds of doctorate attainment in the program, other factors held constant.

Research Question 4(c): Program's Racial/Ethnic Diversity and Time to Degree

As defined earlier, a program's racial/ethnic diversity was operationalized as the percentage of White students in the program (*pwhite*) whereby White was the modal race/ethnic category. Controlling for two student level covariates (i.e., sex and GPA score) and eight program-level covariates, both the logistic and multilevel logistic results

(see Table 19) showed that the program's ethnic/racial student diversity index was not statistically significantly related to the timing of doctorate attainment. That is, a student admitted in a program with a high percentage of Whites did not differ statistically significantly in the odds of doctorate attainment in any given year from one admitted in a program with a low percentage of Whites, other factors held constant.

Research Question 4(d): Percentage of Females in the Program and Time to Degree

Controlling for two student level covariates (i.e., sex and GPA score) and eight program-level covariates, both the logistic and multilevel logistic results (see Table 19) revealed a statistically significant relationship between the timing of doctorate attainment and the percentage of female students in the program. Specifically, the succeeding analysis (see Table 20) showed that, holding constant the effect of the master's GPA score (*GPA*g) and two program-level covariates (i.e., size of a department housing the program [dsize] and mean GRE quantitative score in the program [*GREQc*]), a 1-unit change in the percentage of female students in the program was associated with the expected change in the log odds of doctorate attainment in any given year by 2.36 or 2.66 units based on the logistic and multilevel logistic results, respectively. On the odds ratio scale, a 1-unit increase in the percentage of female students in a program was associated with 10.5 times (logistic) or 14.3 times (multilevel logistic) increase in the odds of doctorate attainment in any given year, holding constant the effect of other covariates. Simply put, the higher the percentage of female students in the program, the higher the odds of doctorate attainment in any given year in the program, other factors held constant.

Research Question 4(e): Mean Age at Admission in the Program and Time to Degree

Controlling for two student level covariates (i.e., sex and GPA score) and eight program-level covariates, both the logistic and multilevel logistic results in Table 19 indicate no statistically significant relationship between the timing of doctorate attainment and the mean age at admission in the program. Thus two prototypical students, one admitted in a program with a high mean age at admission and the other in a program with low mean age at admission, do not differ statistically significantly in the odds of doctorate attainment in any given year, other factors held constant.

Research Question 4(f): Mean GPA Score in the Program and Time to Degree

Holding constant two student level covariates (i.e., sex and GPA score) and eight program-level covariates, both the logistic and multilevel logistic results in Table 19 show no statistically significant relationship between the timing of doctorate attainment and mean GPA score in the program (GPAc). Thus, holding constant other factors, a student admitted in a program where the mean GPA score at admission was high did not differ statistically significantly in the odds of doctorate attainment in any given year from one admitted in a program where the mean GPA score was low.

Research Question 4(g): Mean GRE Verbal Score in the Program and Time to Degree

Controlling for two student level covariates (i.e., sex and GPA score) and eight program-level covariates, both the logistic and multilevel logistic results (see Table 19) show no statistically significant relationship between the timing of doctorate attainment and the mean GRE verbal score at admission. That is, other factors held constant, a student admitted in the program where the mean GRE verbal score at admission was high

would not differ statistically significantly in the odds of doctorate attainment in any given year from one admitted in a program where the mean GRE verbal score was low.

Research Question 4(h): Mean GRE Quantitative Score in the Program and TTD

Controlling for two student level covariates (i.e., sex and GPA score) and eight program-level covariates, both the logistic and multilevel logistic results (see Table 19) showed a statistically significant relationship between the timing of doctorate attainment and the mean GRE quantitative score in the program. The succeeding analysis (see Table 20) showed that, holding constant the effect of the master's GPA score (*GPA*g) and two program-level covariates (i.e., size of a department housing the program [*dsize*] and percentage of female students in the program [*pfem*]), there was a statistically significant relationship between the timing of doctorate attainment and the mean GREQ score at admission in the program. A 1-unit change in the GRE quantitative score was associated with a 0.01 unit change in the log odds of doctorate attainment in any given year based on both logistic and multilevel logistic results. On the odds ratio scale, this implies that a 1-point increase in the GRE quantitative score was associated with a 1% increase in the odds of doctorate attainment in any given year based on both the logistic and multilevel logistic results, holding constant the effect of one student-level covariate (i.e., master's GPA score) and two program-level covariates (i.e., percentage of female students in the program [*pfem*] and mean size of a department housing the program [*dsize*]). In other words, the higher the program mean GRE quantitative score, the higher the odds of doctorate attainment in any given year in the program, other factors held constant. Though not indicated, the 95% confidence limits for the odds ratio did not include 1.0

(i.e., [1.002, 1.008] for both logistic and multilevel logistic) indicating a significant difference in the odds of doctorate attainment in any given year.

Summary of the Results of Quantitative Analysis

Table 21 displays a summary of the relationship between each covariate and the timing of doctorate attainment in Education at this college.

Table 21

Summary of Quantitative Results

	Other Factors Not Controlled		Other Factors Controlled	
Student Level	Logistic	Multilevel Logistic	Logistic	Multilevel Logistic
Sex	Sig.(2)	Sig. (2)	Sig. (8)/ NS (9)	Sig. (8)/NS (9)
Race/Ethnicity	NS (3)	NS (3)	a	a
AGEg	+ NS (4)	+ NS (4)	a	a
GPAg score	+ Sig. (5)	+ Sig. (5)	+ Sig. (8)	+ Sig. (8)
GREVg score	+ NS (6)	+ NS (6)	a	a
GREQg score	+ NS (7)	+ NS (7)	a	a
Program Level				
psize	a	a	+ NS (9)	+ NS (9)
dsize	a	a	- Sig. (9&10)	- Sig. (9 &10)
pwhite	a	a	+ NS (9)	+ NS (9)
pfem	a	a	+ Sig. (9&10)	+ Sig. (9 &10)
AGEc	a	a	+ NS (9)	+ NS (9)
GPAc	a	a	- NS (9)	- NS (9)
GREVc	a	a	- NS (9)	- NS (9)
GREQc	a	a	+Sig. (9&10)	+ Sig. (9 &10)

Note. "a"= indicate a possible model that was not estimated in this study

- "+" and "-" indicate positive and negative relationship with TTD, respectively
- "Sig." = significantly related to timing of doctorate attainment ($p < .05$)
- "NS" = not significantly related to the timing of doctorate attainment
- Model numbers are in parentheses for instance "(2)" indicate Model 2 and so on
- Lower case 'g' in AGEg, GPAg, GREVg, and GREQg indicates program mean values
- Lower case 'c' in AGEc, GPAc, GREVc, and GREQc indicates grand mean centered values
- psize = the size of a program whereby size refers to the number of student admitted
- dsize = the number of programs in the department housing the program
- pwhite = the percentage of white students in the program
- pfem = the percentage of female students in the program

Results of the Qualitative Analysis

Research Question 1: Factors that Students Perceive Influence TTD

Factors that students perceive influence TTD in Education were obtained by conducting both a *within-case* analysis (i.e., describing in detail each case and themes within the case to establish patterns) whereby data from the four student focus groups constituted a single case and a *cross-case* analysis (i.e., conducting thematic analysis across the cases) whereby data from the student focus groups were categorized into long TTD (LTTD) and short TTD (STTD) cases. The analysis involved classifying the statements made by the participants (which could be positive, negative, or neutral) into emergent themes (factors). For instance, consider the following three statements classified under the emergent theme, "Topic": (a) "I made sure that my topic was along the lines of what I wanted to do as my doctoral study," (b) "I didn't have a clear-cut idea of what I wanted to do," and (c) "It helps a lot if they [committee] know a lot in the area that you are in." The first statement is classified as positive because it suggests that aligning the dissertation topic with coursework is associated with timely completion: students who do this are likely to attain their doctorate faster than those who do not. The second statement may be considered negative because it suggests that lack of a clear-cut idea about a dissertation topic is associated with longer TTD: students who lack a clear-cut idea of the topic tend to attain the doctorate at a slower pace than those who have a clear-cut idea of the topic. The last statement is considered neutral: it does not indicate what happen but suggests a situation or state that may lead to timely doctorate attainment.

Description of the Case: Long TTD (LTTD) students

The first and second student focus groups consisted of six and four student participants, respectively. Collectively, these participants constituted the LTTD student case and included four White females, four White males, and two Asian females. When asked what motivated them to pursue the doctorate in Education (see Question 1 in Appendix F), one half of the students cited reasons that were classified as academic goals, 30% cited reasons classified as either economic or personal goals, whereas 20% cited reasons classified as social goals. Statements such as "I wanted advancement with degree," "the way it [the program] was set up had the best match of everything that I had been looking for," and "I had a technology background and I wanted to do something with education as well" were examples of statements classified as academic goals. "I came into it with an aspect of a job: I wanted to work in the academic field, not corporate world" and "just to open more doors for the future" were classified as economic goals. Statements such as "just for self-satisfaction," "it was very personal…to be the first in my family," and "I did a lot of this for my children" were classified as personal goals whereas "to *help* [assist] students [to] learn writing" was classified as a social goal.

One half of the students in the LTTD case had attained the doctorate and one half were at the ABD stage. For those who had attained the doctorate, the TTD ranged from three to seven years. Three of those who were at ABD stage were in their fourth year, whereas the other two were in their third and fifth year. Their ages at admission ranged from 28 to 53 (M = 38.6); master's GPA score ranged from 3.6 to 4.0 (M = 3.85); GREV scores at admission ranged from 450 to 620 (M = 521); and GREQ scores at admission ranged from 400 to 770 (M = 517). One half of them stopped for between one semester to

two years while pursuing the doctorate, with the majority of them stopping at the ABD stage. In addition, half of them responded that at least one of their parents had attained a college degree at the time they were admitted into the doctoral program. When asked to classify as either institutional or personal the factors perceived to influence TTD (see Question 8 in Appendix F), 70% of LTTD case cited personal factors.

Description of the Case: Short TTD (STTD) students

The third and fourth focus groups consisted of five and three student participants, respectively. Collectively, the STTD student case included one White female, two White males, three African American females, and two Asian females. Seventy five percent of them cited academic reasons for pursuing the doctorate, whereas 13% cited social goals. Six of the students had attained the doctorate, with the TTD ranging between 5 to 7 years, whereas the two who were at the ABD stage were in their fourth and seventh years. At the time of admission their ages ranged from 23 to 61 ($M = 41$); master's GPA score ranged from 3.0 to 4.0 ($M = 3.72$); GREV scores ranged from 500 to 700 ($M = 550$); and GREQ scores ranged from 500 to 660 ($M = 527$). Only a quarter of the participants in the STTD case stopped out for approximately half a year while pursuing the doctorate. Virtually all of them responded that their parents had not attained a college degree at the time they were admitted into the doctoral program. Classifying as either institutional or personal the factors perceived to influence TTD, one half of the STTD case cited personal factors, 38% cited institutional factors, and the remaining 12% were undecided between the two factors. There were few students in the fourth focus group ($n = 3$) but rich information was participants enthusiastically shared their experiences.

Every student provided at least four statements related to time to attainment of the doctorate. In total, 264 significant[12] statements (130 cited by the LTTD case and 124 cited by the STTD case) with a mean of approximately 15 statements per student were given. Table 22 presents a description of each the 20 emergent themes from student focus groups and two examples of significant statements categorized under each emergent theme. Note that emergent themes also were classified under meta-themes, for instance, the first four emergent themes (i.e., "Communication," "Preparation," "Structure," and "Topic") were classified under the meta-theme, academic integration, and so forth.

Table 22

Description and Examples of Emergent Themes from Student Focus Groups

Emergent Theme	Description of a Theme (D) and Examples of Statements (E1 and E2)
(a) *Academic Integration*	
1.Communication	D: The clarity and timeliness of program expectations and requirements E1: "I didn't know of a pre-proposal requirement in our program" E2: "I get most of my information from fellow doctoral students"
2. Preparation	D: The amount and quality of academic preparation a student receives E1: "I don't understand the difference between reliability and validity" E2: "The stats courses, I think they gave me a good background"
3. Structure	D: The nature and/or arrangement of curriculum tasks and resources E1: "We didn't have summer downtime" E2: "They have us on that fixed schedule—what you take each semester"
4. Topic	D: The characteristics of dissertation topic a student chooses E1: "I picked a topic that enabled me to move along faster" E2: "I didn't have a clear-cut idea of what I wanted to do"
(b) *Social Integration*	
5. Advising	D: Academic guidance, mentoring and supervising of students E1: "I experienced a sense of loss and confusion in terms of direction" E2: "I had a very strong faculty support, particularly my major advisor"
6. Accountability	D: Responsibility by a student for his/her actions E1: "I had a different level of accountability at work." E2: "I was accountable to my major professor and he was to me too"
7. Cohort/ Peer	D: The impact of peers or belonging to a student cohort E1: "I didn't have this kind of cohort [*thus took longer TTD*]" E2: "I was in a cohort so I didn't have to worry about course scheduling"

(table continues)

[12] "Significant" implies the statement contained a word/phrase capturing a theme that was classified as being associated with TTD.

Table 22 (continued)

Emergent Theme	Description of a Theme (D) and Examples of Statements (E1 and E2)
8. Committee	D: The characteristics of the dissertation committee a student forms E1: "I picked a good committee: available to me" E2: "I had a committee of people who were willing to work together"
9. Proximity	D: How far geographically a student resides from the institution E1: "So being around gives you a little bit of a push" E2: "I started working here as RA so I can get to people when I need to"
(c) *Economic Integration*	
10. Work	D: The impact of employment while pursuing the doctorate E1: "Working long hours and traveling [*lengthen my TTD*]" E2: "I stopped working for that company so I had time to get a lot done"
11. Finances	D: Type and amount of financial support a student receives E1: "The scholarship runs out in five years [*so I had to hurry up*]" E2: "I was on government Stafford loans"
(d) *Personal Attributes*	
12. Goal-oriented	D: Setting goals and timelines within which to achieve the goals E1: "*You should be* self-directed and goal-oriented" E2: "I was able to plan ahead"
13. Health	D: The impact of a student's physical and emotional wellbeing E1: "I had health problems and had to drop to three credit hours" E2: "I was hospitalized like five, twelve, fifteen times..."
14. Motivation	D: Desire to work and attain set goals despite obstacles encountered E1: "I was self-motivated, self-disciplined" E2: "I was always in my professors' face"
15. Perfectionism	D: The belief in achieving highest standards of performance always E1: "Your goal is to get finished, not to make this your life's work" E2: "I realized that this is not my life's work, the goal is get that Ph.D."
16. Self-efficacy	D: Degree of confidence to succeed in academic activity E1: "I said, Oh my God! Maybe I can't even finish" E2: "I could not sink my teeth around it so I never got anything going"
17. Stress	D: Emotional/physical strain due to pressure in pursuing doctorate E1: "I did not understand the intensity of a doctoral program" E2: "I deserve to take a break, I have reached a major milestone here..."
External factors	
18. Family	D: The restrictions that occur due to family obligations or support E1: "I had no children, no significant other so I was able to finish quickly" E2: "Being a parent working two jobs just takes time"
19. Life events	D: The impact of major episodes in one's life (e.g. divorce) E1: "I went through a divorce during that timeframe [*coursework*]" E2: "Life event (marriage) made me stop out"
20. Social support	D: Encouragement obtained from family, friends and/or work E1: "The support from home was very helpful to me" E2: "My boss asked me on a regular basis, how is you dissertation going?"

Frequency Effect Sizes (FES) of Themes from Students

As defined earlier, frequency effect size (FES) of an emergent theme refers to the percentage of participants who endorsed the theme: the higher the number of participants endorsing the theme, the larger the FES, and vice versa. Table 23 present the FES, the corresponding percentile ranks (pR) and perceived strength of association with TTD (Assoc) of each of the emergent themes from student focus groups. Based on the magnitude of FES, students (i.e., LTTD and STTD cases combined) perceived that three academic factors ("Communication," "Topic," and "Structure"), one social factor ("Committee"), and one personal factor ("Motivation") had strong associations with TTD; one academic factor ("Preparation"), three social factors ("Advising," "Cohort/Peer," and "Accountability"), one personal factor ("Goal-orientedness"), two economic factors ("Work" and "Finance"), and all external factors ("Family," "Life events," and "Social support") were each perceived to have moderate associations with the TTD; and one social factor ("Proximity") and four personal factors ("Health," "Perfectionism," "Self-efficacy" and "Stress") were perceived to have minimal associations with the TTD.

Whereas most themes emerging from student focus groups were classified as institutional factors (i.e., factors that may be influenced by the institution in various ways), students also provided statements that pertained to factors considered external to the institution. For instance, a statement such as "I went through a divorce during that timeframe" was classified under the theme "Life events," an external factor referring to what occurred outside the institution but which influenced TTD.

Table 23

Frequency Effect Sizes (FES) of Emergent Themes from Student Focus Groups

I: Institutional	Combined (n = 18)			LTTD Case (n = 10)			STTD Case (n = 8)		
	FES	pR	Assoc	FES	pR	Assoc	FES	pR	Assoc
(a.) *Academic*									
1. Communication	50	80	Strong	50	61	Moder	50	65	Moder
2. Preparation	39	58	Moder	50	61	Moder	25	18	Minim
3. Topic	50	80	Strong	50	61	Moder	50	65	Moder
4. Structure	67	93	Strong	70	89	Strong	63	85	Strong
(b.) *Social*									
1. Advising	22	28	Moder	20	26	Moder	25	18	Minim
2. Cohort	39	58	Moder	30	50	Moder	50	65	Moder
3. Accountability	33	38	Moder	20	26	Moder	50	65	Moder
4. Committee	78	98	Strong	70	89	Strong	88	97	Strong
5. Proximity	11	10	Minim	20	26	Moder	-		-
(c.) *Economic*									
1. Work	39	58	Moder	30	50	Moder	50	65	Moder
2. Finances	45	70	Moder	50	61	Moder	38	41	Moder
(d.) *Personal*									
1. Goal-oriented	33	38	Moder	-	-	-	75	91	Strong
2. Health	12	18	Minim	10	5	Minim	25	18	Minim
3. Motivation	61	88	Strong	80	97	Strong	38	41	Moder
4. Perfectionism	17	23	Minim	20	26	Minim	25	18	Minim
5. Self-efficacy	6	3	Minim	10	5	Minim	-	-	-
6. Stress	11	10	Minim	20	26	Moder	-	-	-
II: External									
1. Family	45	70	Moder	30	50	Moder	25	18	Minim
2. Life events	34	48	Moder	50	61	Moder	25	18	Minim
3. Social support	33	38	Moder	20	26	Moder	50	65	Moder

Note- Meta-themes are italicized; "-" indicates a theme was not cited by the student case

- FES =Frequency Effect Size (expressed as %); pR = Percentile Rank (expressed as %)
- Assoc = Strength of association between a theme and TTD, which may be strong ("Strong," pR≥75%), moderate ("Moder," 25 %<pR<75%) or weak ("Minim," pR < 25%).
- Frequency Effect Size (FES) = $\left[\frac{\text{Number of participants who mentioned a particular theme}}{\text{Total number of participants in the group (case)}}\right] X100$
- Percentile Rank (pR) = $\left[\frac{f_b + \frac{1}{2} f_w}{N}\right] X\,100$ where

f_b = # of themes whose effect sizes are less than the effect size of the theme in question

f_w = # of themes that have the same effect size as the theme in question (including the theme in question)

N = Total number of themes cited by the group (case) being analyzed

Intensity Effect Sizes (IES) of Themes from Students

As defined earlier, intensity effect size (IES) of an emergent theme refers to the frequency of endorsement of an emergent theme within a set of themes. It is based on the number of significant statements a theme contains: the larger the number of significant statements contained by a theme, the higher the IES, and vice versa. Table 24 presents the IES and the corresponding percentile rank (pR) and perceived strength of association with TTD (Assoc) of each of the emergent themes from student focus groups.

Based on the magnitude of IES, students (LTTD and STTD cases combined) perceived that three academic factors ("Communication," "Topic," and "Structure"), one social factor ("Committee") and one personal factor ("Motivation") had strong associations with the TTD; one academic factor ("Preparation"), three social factors ("Advising," "Cohort/Peer" and "Accountability"), one personal factor ("Goal-orientedness"), two economic factors ("Work" and "Finance"), and all external factors ("Family," "Life events," and "Social support") were perceived to have moderate associations with the TTD; and one social factor ("Proximity") and four personal factors ("Health," "Perfectionism," "Self-efficacy," and "Stress") were perceived to have minimal association with the TTD. These results, which are based on the magnitude of IES, are similar to those based on FES with respect to strength of association of the factors to TTD (see Table 23).

Table 24

Intensity Effect Sizes (IES) of Emergent Themes from Student Focus Groups

I: Institutional	Combined (264 statements)			LTTD Case (130 statements)			STTD Case (134 statements)		
	IES	pR	Assoc	IES	pR	Assoc	IES	pR	Assoc
(a.) *Academic*									
1. Communication	7.95	78	Strong	10	88	Strong	5.98	64	Moder
2. Preparation	4.17	48	Moder	6.15	65	Moder	2.24	22	Minim
3. Structure	9.85	93	Strong	10	88	Strong	9.70	86	Strong
4. Topic	8.33	83	Strong	10	88	Strong	6.72	78	Strong
(b.) *Social*									
1. Advising	5.68	68	Moder	7.69	73	Moder	3.73	34	Moder
2. Accountability	5.30	63	Moder	6.15	65	Moder	4.48	39	Moder
3. Cohort/Peer	3.79	35	Moder	3.85	55	Moder	3.73	34	Moder
4. Committee	13.3	98	Strong	8.46	76	Strong	19.4	97	Strong
5. Proximity	0.75	3	Minim	1.54	13	Minim	-	-	-
(c.) *Economic*									
1. Work	4.17	48	Moder	3.08	38	Moder	5.22	53	Moder
2. Finances	4.17	48	Moder	3.85	55	Moder	4.48	39	Moder
(d.) *Personal*									
1. Goal-oriented	6.82	73	Moder	3.08	38	Moder	10.4	92	Strong
2. Health	1.89	23	Minim	1.54	13	Minim	2.24	22	Minim
3. Motivation	8.71	88	Strong	10.8	98	Strong	6.72	78	Strong
4. Perfectionism	1.14	10	Minim	1.54	13	Minim	0.74	6	Minim
5. Self-efficacy	1.14	10	Minim	1.54	13	Minim	0.74	6	Minim
6. Stress	1.52	18	Minim	3.08	38	Moder	-	-	-
II: External									
1. Family	4.55	58	Moder	3.08	38	Moder	5.98	64	Moder
2. Life events	2.27	28	Moder	3.08	38	Moder	1.49	14	Minim
3. Social support	3.79	35	Moder	1.54	13	Minim	5.98	64	Moder

Note

- Meta-themes are italicized; "-" indicates a theme was not cited by the group/subgroup
- IES =Intensity Effect Size (expressed as %); pR = Percentile Rank (expressed as %)
- Assoc = Strength of association between a theme and TTD, which may be strong ("Strong," pR≥75%), moderate ("Moder," 25 %<pR<75%) or weak ("Minim," pR < 25%).
- Intensity Effect Size (IES) = $\left[\frac{\#\text{ of statements referring to a particular theme}}{\text{Total number of statements cited for all themes)}}\right] X 100$
- Percentile Rank (pR) = $\left[\frac{f_b + \frac{1}{2} f_w}{N}\right] X\ 100$ where:

  f_b = # of themes whose effect sizes are less than the effect size of the theme in question

  f_w = # of themes that have the same effect size as the theme in question (including the theme in question)

  N = Total number of themes cited by the group (case) being analyzed

Student Individual Interviews

Twenty themes emerged from the student focus groups. Among the themes perceived to have strong associations with the TTD based on the magnitude of either FES or IES or both from the combined LTTD and STTD student cases included three academic factors ("Communication," "Structure," and "Topic"), one social factor ("Committee"), and one personal attribute ("Motivation"). As a follow up, four individual student interviews were conducted to gain deeper understanding of specific aspects of these themes and any others perceived to be associated with TTD. Discussed next are the results of four individual interviews, two representing students from programs with the longest TTD (i.e., the LTTD case) and two representing the STTD case.

Interviewee 1: Venus (pseudonym)

Venus was an African American female aged 27 at the time of admission to P20, a program classified under the STTD cluster. Her master's GPA, GRE verbal, and GRE quantitative scores at admission were 3.60, 450, and 430, respectively. Her means of financial support during doctoral studies included loans, family support, and graduate assistantships. Her goal for pursuing the doctorate was classified as personal, "just for self-satisfaction." At the time of the interview, she was in the ABD stage, having been in the program for seven years without stopping out.

Communication. Venus expressed satisfaction with the way the curriculum expectations were communicated to her. She attended a four-day orientation that involved various activities including a tour of the campus and faculty-student luncheon. The orientation provided her an opportunity to meet new students and others who were at various stages in the program and to mingle with faculty to get to know the nature of

research studies in which they were engaged. She received a handbook, which "pretty much outlined what had been stated at the orientation," for instance, a list of courses to take, when to take them, and which professors would be teaching them. Because "there were no unexpected assignments or things that popped up during coursework," Venus was able to complete the coursework phase in a timely fashion.

Structure. Venus viewed the doctoral program in terms of stages. She expressed satisfaction with the structure of the curriculum, particularly the coursework phase, which she reported, was not only relevant to her professional goals but also challenged her critical thinking: "I have grown professionally in terms of writing skills, the way I view things and think about things have expanded." Venus viewed the coursework in her program as being very heavy, 18 credit hours during the first semester without summer breaks: "the first two years determines whether you are going to stay or not." Venus's weakness and dislike of statistics and research design courses forced her to put extra effort in order to succeed in these courses: "…methodology to me is like Greek so I have to work to understand and process it… I just don't like the stats [statistics] so it takes me a little longer to process that." The cohort system in Venus's program enabled her to take the courses as scheduled thus facilitating her progress. However, the departure of two faculty members from the department affected her progress in that the remaining faculty members had limited time to assist her. She noted also that involvement in many grant projects limited the time faculty members allocate to help, especially, dissertating students: "they are working on grants and their availability is limited."

Topic. Having had a broad idea of what she wanted to study for her dissertation, Venus conducted an Internet search, and contacted the university library and other

students to help her narrow down her topic. In contrast to students who get involved with other professors' research projects with the intention to ultimately use the data set from such projects for their dissertation works, Venus was very passionate about her topic: "I wanted to do something that I'm proud of and say is a representation of my work, not doing something because it is the quickest way to get out of the program." Because her topic was not reliant on data obtained from any professor's research projects, Venus felt that she "almost *had* to sell it to them" and "they *had* to be interested in it." Noting that "minority students tend to do so much to prove themselves," she, however, sought help from a resource center established by the college to help students and faculty with research design. She was very satisfied with the help she received from this center.

Committee. Apart from taking classes that her dissertation committee chair taught, Venus did not get a chance to work with him closely during her coursework phase. She contrasted him with her thesis committee chairperson who was very prompt with "turnaround time." Despite several attempts to initiate communication with her chair, for instance, by sending email messages, she was not able to "pin him down for a time to meet." The effect of this state of affairs to Venus was traumatizing:

> I was just brushed aside…it was almost personal because it was just so much. Maybe this was a way of saying my time is up! I didn't know how to take that. I just didn't expect that. It was almost as if I was invisible and I don't like feeling like that especially if I'm initiating contact. I wasn't just getting anything!

Venus was very emotional as she shared about her experiences with the chair. On learning that other students had had similar experiences with the chair, she was a little relieved that the chair was not against her personally. She learned from other students

how to relate to the chair and in addition to the pieces of advice she got from two other faculty members, her relationship with him improved: "we are now able to meet and we have an understanding and so we gonna move from there and see how it works out."

Motivation. During the thesis phase, Venus was very motivated to attain the doctorate in a timely fashion. She attributed the motivation to the support she got from her thesis advisor: "I had somebody who was pushing me." However, her motivation went down after the qualifying exams: "my confidence level dropped when I found out that I didn't pass the qualifying exams—fear kicked in and I was afraid to even try." However, she was determined and willing to learn and improve: "I don't mind feedback at all because I wanna know how to change it and improve it." Despite these mishaps, Venus was determined to finish her program: "I know I'm still going to do it [the exams] and so I have to erase those beliefs like maybe I can't do it. I have been moving forward."

Goal-oriented. Venus remarked that "staying goal-oriented" positively impacted her progress in the program. Prior to taking the qualifying exams, she had the habit of always setting deadlines for herself, however, "now I'm iffy and questioning myself." She intends to adopt the habit again: "I have to stick with the plans that I have made—I am creating an outline for myself, chapter 1 will be done at a certain time."

External factors. According to Venus, social support, that is, "having somebody being your cheerleader," influenced her progress because "it is not an easy process." Her sources of support included a faculty member, family members, and friends who had gone through the doctoral education process. Because her father had leukemia, Venus spent time taking care of him, however, she asserted that her father's medical condition was "not really a deterrent but an occasional distraction."

Interviewee 2: Pluto (Pseudonym)

Pluto was a White male aged 49 when admitted into P03, a program classified under the STTD cluster. His master's GPA, GRE verbal, and GRE quantitative scores at admission were 3.40, 500, and 600, respectively. His means of financial support was through personal sources. He had academic and economic goals for pursuing the doctorate: "I'm in the business of educating people… to allow me to learn better skills of how to teach adults." At the time of the interview, Pluto had attained the doctorate, had published his first book, and had a thriving counseling business.

Communication. Pluto learned about his program through casual interaction with students in a computer lab located in the college: "I was taking a class just for the purpose of transferring to another university and it is there [in the computer lab] that I got involved in the program." Pluto did not attend any orientation, rather, he learned of the program expectations by reading the university catalogue. He was comfortable with this mode of communication of the program's information.

Structure. Pluto expressed concern over the way the curriculum was structured, especially the instruction component. He noted that some professors were "interested in saying this is how you do it and less involved in making it [learning] an enjoyable experience—too involved in the product than the process." Pluto pointed out that whereas some of the professors were very knowledgeable of the subject matter, they had problems passing the knowledge to students. He noted that because the coursework material is important to students especially at the dissertation stage, students' progress is impeded in that they spent a lot of time relearning the material through other means if they did not during coursework. Noting that "the Ph. D. program is stuck in so much structure," he

suggested that the curriculum be tailored to accommodate students' academic background. For instance, he had three masters degree at the time of admission and "there was a certain amount of redundancy" in the courses that he took that he felt could have been avoided had someone taken the time to review his academic background.

Topic. Pluto was very passionate about his dissertation topic especially its applicability to real life: "I designed a real classical design with pre-, post- and follow-up testing—a real experiment with real people." Compared to his cohort, Pluto rated highly his dissertation topic: "… some of my colleagues, their topics were awful! There was a measurement tool that had been used and every person would pick a different part of the same measurement tool. I mean, what contribution is that?"

Committee. In constituting his dissertation committee, Pluto chose individuals who were conversant with his topic, individuals who could "look at *his* research design and make valid comments, if not corrections." Because he overlooked the personality make-up of his committee members, Pluto encountered some problems that delayed his progress. First, one member of Pluto's committee deliberately refused to give feedback despite his frequent attempts to contact her: "I could send her email.. go by her office but she wasn't there. I never got feedback!" Pluto discussed the problem with the committee chair who in turn tried to talk to this faculty but this yielded no fruits: "nasty comments were made back to me." Having exhausted all avenues, Pluto attempted to remove the faculty from the committee but she refused alleging that it was Pluto's fault: "she said that I never sent her anything [but] I went back to my email and proved that I was trying to talk to her." Pluto's second episode involved the whole committee: " I was supposed to defend but the committee had an argument… my proposal was pushed off by a

semester… it ultimately pushed me back to starting my research nine months late!" Pluto's asserted that he could have finished earlier than four years "if the committee didn't have these issues."

Motivation. Part of Pluto's motivation to attain the doctorate stemmed from his passion for the dissertation topic: "… it was such a pleasure. I got a lot of satisfaction from it. I would say that there were a lot of obstacles but I was determined." Pluto noted only three of the eleven students in his cohort were able to graduate in four years.

Goal-oriented. Despite the obstacles that Pluto encountered in his pursuit of the doctorate, he was determined to complete in a timely manner: "to look at the next class and get it done, quit arguing about what is wrong with the teachers [or] with the university." He cited many challenges that the university faced during his time including budget cuts, department mergers, faculty reassignments, events that "sent shockwaves to students" but by staying focused, he was able to attain the doctorate in four years.

Interviewee 3: Mars (Pseudonym)

Mars was a White male aged 39 when admitted into P10, a program classified under the LTTD cluster. His master's GPA, GRE verbal, and GRE quantitative scores at admission were 3.50, 500, and 600, respectively. His primary means of financial support during doctoral studies were graduate assistantships. His goal for pursuing the doctorate was classified as academic, "I saw that P10 was something useful in education—in teaching, it offers some way to analyze, to evaluate learning." At the time of the interview, Mars was at the ABD stage, having taken eight years nonstop.

Communication. Mars was satisfied with the way the curriculum expectations were communicated to him. His advisor helped him pick courses: "Dr. B laid out a

program of study so pretty much I followed that." Interested in learning more, he took more courses than was required: "I tried to go above…I wanted to learn more."

Structure. Although Mars expressed satisfaction with the way the curriculum information was communicated to him, the interview revealed that he encountered a problem with the way the curriculum was structured, particularly course sequencing. He had "three incomplete [courses]" including one design course that he took prematurely: "I realized I wasn't ready for it." Describing P10 as being primarily based on coursework, he was not as enthusiastic taking the required courses in P10 as he was with the courses in his cognate: "I had no practical hands-on experience with any technology. It was much more technology-based where we did web design, using software and becoming exposed to different programs." Mars doubted if he would ever use the knowledge gained from courses in P10. He preferred gaining practical experience alongside coursework to completing the degree: "When I took a course, the next semester I forgot what I did the previous semester so hands-on experience is what I wanted." The courses in his cognate provided him the opportunity to gain "hands-on experience" by participating in various research projects.

Topic. Although at the time of the interview Mars did not have a solid idea of what he would do for his dissertation, he thought that it would involve surveys. Mars cited three factors that he would consider in selecting a dissertation topic. First, his choice would be based on familiarity with the technique to be used in conducting the study: "My experience here has been heavily related to survey so that would be a good way to do a dissertation because I have experience [with surveys]." Secondly, he thought that he could use, as part of his dissertation, the data from the surveys that he conducted: "They

[the employer] get the survey and I get a dissertation out of it." Finally, he emphasized that the topic must be something that interested him.

Committee. Some of Mars's committee members were chosen without him being consulted: "They [my department] didn't tell me when I started that I had co-chairs… in my conversation with them it was brought up that I already had co-chairs! So [one] half of my committee was already chosen!" It was, however, explained to him "they were trying to get students spread out across faculty in the department." Luckily, the faculty chosen for Mars were professors he was already thinking of requesting to be on his committee. Mars's committee comprised faculty who were not making efforts to "push" him to stay on track: "They are there when I need them—you know, asking me how things are going but I don't have anybody saying, we need to talk, we need to meet every month or anything like that." The other member of his committee was a professor who taught a course that he took and he worked with him on a project.

Commenting on factors he considered in choosing the other committee members, Mars said, "I had no intention of going for the Ph. D. program, all I wanted was to go teach but she encouraged me to go the direction I had never thought so I owe her something." Mars chose the other member because "he *was* laid back" but he will be replaced because he had retired.

Motivation. Mars was cognizant of the fact that he had taken an unusually long time pursuing the doctorate: "I've been here a long time." Despite efforts to finish, he was sidetracked and made little progress: "I try by cutting my hours to make time [to work on my dissertation] but I still find things to do to keep me from getting done." Mars, however, accepted full responsibility for the unusually long time he had taken

pursuing the doctorate: "I can't say that it is anybody's fault but my own… it has been more of my procrastinating that has slowed me." He valued hands-on experience to finishing the program: "The reason why I have taken long has been my choice primarily—I'm focused on doing hands-on. I just let schoolwork stall." He admitted that the more time he took away from schoolwork, the harder it became to stay focused: "…it is becoming too long, it is really hard to get back into the mode to work to complete." Asked what he would do differently were he to start the program again, Mars said he would "not allow incomplete [courses] –it becomes very difficult to get rid of them."

Goal-oriented. Whereas Mars demonstrated goal-orientedness in his work, he lacked the same in schoolwork. "I do set for myself deadlines for [work related] projects but not for schoolwork." Asked whether he had ever thought of why he was prompt with projects but not with schoolwork, Mars said "No, I haven't, not really, until you [the researcher] said you were coming to talk to me [interview me] yesterday. He's coming to ask me why I'm still here" amidst smiles. He attributed his strictness with work deadlines to the relevance of the tasks he undertook at work.

Interviewee 4: Mercury (Pseudonym)

Mercury was a White female aged 54 when admitted into P10, a program classified under the LTTD cluster. Her master's GPA, GRE verbal, and GRE quantitative scores at admission were 3.50, 500, and 500, respectively. Her means of financial support was primarily graduate assistantships. Mercury's decision to join the doctoral program "came in pieces." First, she took a one-year sabbatical from her job. The sabbatical required undertaking course totaling 18 credit hours in a specific field but she was uncertain of the institution from where to take the courses. Her Internet searches led her

to a Center that was carrying some research that interested her: “It was really a neat Center. I liked the materials that they were making. I said, I’d really like to get involved in this.” That the university housing this Center was located in the same neighborhood where Mercury’s parents lived motivated her to visit. Learning that the 18 credit hours could be “rolled over to the Ph. D. program” and fulfill her residency requirements, Mercury begun to consider pursuing the doctoral program: “That wasn’t my original intent but it sounded good.” The second piece involved taking one distance-learning course “to have a feel of the program” as she weighed her decision. Mercury’s goal for pursuing the doctorate was described as academic: “My original goal was not to do research, rather to teach teachers because my background was special education...but I changed because I found that I really liked research.” At the time of the interview, Mercury was at the ABD stage, having been in the program for four years nonstop.

Communication. In the early stages of her program, Mercury relied on the Internet for information about the curriculum expectations: “They had a website listing courses, a program of study form, and in the course catalog they had the program spelled out so I could predict when to take the courses.” Later, as a GA she was in a position to be in contact with people she could ask for advice. Mercury supplemented the information that she obtained from the Internet with her advisor’s suggestions: “I’d look at this [website] and go to the advisor, these are the courses I’m thinking of taking, what do you suggest?”

Mercury did not experience an orientation program at the department level (“There was no orientation. I don’t think or remember anybody talking about orientation, only graduate school orientation”). According to Mercury, the information provided at orientation may be overwhelming especially “when you hear that much information all at

once" thus she preferred a mentor program whereby students are matched. She cited two examples of mentoring. Her first example concerned how her advisor matched [introduced] her to an older student who had gone through the program. Second, she cited the importance of having a student organization She singled out the professional aspect of engaging in research that a student organization in one department within the college included as being very helpful: "You learn a lot of potential things to do in future and what other students are doing. You get advice [too]."

Structure. Apart from the requirement that students must co-teach with a professor, Mercury described the structure of her program as involving three stages: "There was no work requirement, just take courses, pass the quals and do your dissertation." Mercury saw some room for improvement in the program's curriculum structure: "I don't think they have a requirement that you do research but I think that they should. I think working in a research project with somebody is really a good way to learn and be mentored but I don't think that they [*my program*] have that formally."

Like Mars, Mercury encountered a problem with course sequencing: "I took a course [online] and I didn't feel I was ready for it." Mercury attributed her progress in the doctoral program to involvement in the student organization and engagement in collaborative research: "Getting involved in research and the student organization made the journey interesting. If was all by my own—I don't think I would have made it."

Topic. Mercury abandoned her first two dissertation topics due to inability to access data: "when it got to the point that I needed a proposal, I didn't feel like I had enough control because I could not access data to implement the research" and "I wrote a proposal that was going to rely on data that was just about to be released but they

stopped." Her third topic was based on a project she did collaboratively with a fellow doctoral student and one of her committee members. She followed the professor's suggestion to use the data from the project for her dissertation. Except for its breadth, Mercury expressed satisfaction with her third topic: "I have ownership of the topic except that it is taking a long time to accomplish all the tasks that have to be done." She thought that she picked "something too big" but was not sure "which part to leave out." Mercury cited several factors that students should consider in developing a topic: "Pick something that you are interested in [and] have a certain amount of control of your dissertation. You need a data source that you can count on."

Committee. Similar to Mars, Mercury's first committee member was assigned to her without her knowledge. However, she was very satisfied with the advising she received: "I didn't know anyone but I know that she really gave me good advice." Mercury elaborated on what she considered "good advice":

> Like the path I was treading –rolling over from an Ed. S. program to Ph. D. program—her advice was that if I planned I could do it. Second, she understood that I was not sure if I had the time and capability to fulfill that and she assured me that this *was* something that I *could* do. Third, I had to pick a cognate and I asked her, what do you suggest? Now my background was special education and *the university* has [an] online gifted program. I picked that for my cognate.

Mercury described the second committee member as "an extremely open-giving woman." She met her the first time she visited the university to inquire about the program and the professor generously gave Mercury her contacts and later introduced Mercury to another student who had gone through the same program that Mercury was intending to

join. Mercury's third committee member was a professor with whom she had taken many courses. Because Mercury was interested in undertaking the dissertation as a distance learner, it took a long time before she got a fourth committee member.

Similar to Mars, Mercury was forced to replace her second committee member who left the university. Because the professor who replaced the committee member was younger than Mercury, it took awhile before the two were able to interact comfortably: "I think she had just graduated—a wonderful teacher but young. I felt she was uncomfortable at first with advising...I had some difficulty with the transition, not with her as a person." However, Mercury was satisfied with this professor being on her committee: "By the end of that semester I was happy. I *didn't* want *her* to step down." Mercury committee was "very supportive" although she did not think she selected them "intellectually like probably how younger students should be doing it—who's gonna mentor them and such kind of thing." She considered herself lucky: "It just happened that people I got were people who should be on my committee."

Work. Mercury strongly cited work (i.e., fulltime employment) as a crucial factor perceived to influence the time that she took pursuing the doctorate: "The year that I had to do coursework, work fulltime and [had a] GA was extremely difficult. It was overwhelming." However, the situation was different when Mercury quit outside employment: "When I was able to eliminate that aspect so that my work was GA and revolved around the study that I was doing, it was much easier to be focused." In order to alleviate the difficulties posed by work, Mercury pointed out that both the student and the institution must be involved: "I had to take the risk to quit the job and the institution helped with the GA to pay the tuition and stipend to support my living." Mercury

emphasized that doctoral students must be willing to sacrifice their jobs: "Although we are working for cheap, the jobs really revolve around what we are learning. If they [the university] didn't do that more students would leave."

Summary of Factors that Students Perceive Influence TTD

Table 25 summarizes the findings on the factors students perceive were associated with TTD based on the magnitude of both the frequency effect size (FES) and intensity effect size (IES) of emergent themes from student focus groups. Based on the FES and IES, students' (LTTD and STTD cases combined) perception was that three academic factors ("Communication," "Topic," and "Structure"), one social factor ("Committee") and one personal factor ("Motivation") had a strong association with TTD. One academic factor ("Preparation"), three social factors ("Advising," "Cohort/Peer," and "Accountability"), one personal factor ("Goal-orientedness"), all economic factors ("Work" and "Finance"), and all external factors ("Family," "Life events," and "Social support") were perceived to have moderate association with TTD. Finally, one social factor ("Proximity") and four personal factors ("Health," "Perfectionism," "Self-efficacy" and "Stress") were perceived to have minimal association with TTD.

Table 25

Summary of Association of Emergent Themes and TTD from Student Focus Groups

Themes	Frequency Effect Size (FES)			Intensity Effect Size (IES)		
I: Institutional	Combined (n = 18)	LTTD (n =10)	STTD (n = 8)	Combined (264)*[s]	LTTD (130)*[s]	STTD (134)*[s]
(a.) *Academic*						
1. Communication	Strong	Moder	Moder	Strong	Strong	Moder
2. Structure	Strong	Strong	Strong	Strong	Strong	Strong
3. Preparation	Moder	Moder	Minim	Moder	Moder	Minim
4. Topic	Strong	Moder	Moder	Strong	Strong	Strong
(b.) *Social*						
1. Advising	Moder	Moder	Minim	Moder	Moder	Moder
2. Cohort/Peer	Moder	Moder	Moder	Moder	Moder	Moder
3. Accountability	Moder	Moder	Moder	Moder	Moder	Moder
4. Committee	Strong	Strong	Strong	Strong	Strong	Strong
5. Proximity	Minim	Minim	-	Minim	Minim	-
(c.) *Economic*						
1. Work	Moder	Moder	Moder	Moder	Moder	Moder
2. Finances	Moder	Moder	Moder	Moder	Moder	Moder
(d.) *Personal*						
1. Goal-oriented	Moder	-	Strong	Moder	Moder	Strong
2. Health	Minim	Minim	Minim	Minim	Minim	Minim
3. Motivation	Strong	Strong	Moder	Strong	Strong	Strong
4. Perfectionism	Minim	Minim	Minim	Minim	Minim	Minim
5. Self-efficacy	Minim	Minim	-	Minim	Minim	Minim
6. Stress	Minim	Moder	-	Minim	Moder	-
II: External						
1. Family	Moder	Moder	Minim	Moder	Moder	Moder
2. Life events	Moder	Moder	Minim	Moder	Moder	Minim
3. Social support	Moder	Moder	Moder	Moder	Minim	Moder

Note- "*[s]" indicate the number of statements cited, not number of participants
- Meta-themes are italicized; "-" indicates a theme was not cited by the group/subgroup
- "Strong" indicates that a theme is strongly associated with TTD
- "Moder" indicates a theme is moderately associated with TTD
- "Minim" indicates that a theme is weakly/minimally associated with TTD

Research Question 2: Factors that Faculty Members Perceive Influence TTD

Factors that faculty members perceive were associated with TTD were obtained by conducting both *within-case* analysis (i.e., describing in detail each case and themes within the case to establish patterns) whereby data from the two faculty focus groups constituted a single case, and *cross-case* analysis (i.e., conducting thematic analysis

across the cases) whereby data from the faculty focus groups were organized into long TTD (LTTD) and short TTD (STTD) faculty cases. Descriptions of the composition of the two faculty cases are provided next.

Description of the Case: Long TTD (LTTD) Faculty

The first faculty focus groups consisted of three White males and one White female. Three were full professors and one was an associate professor. They had been in their respective departments for between 18 to 39 years and had taught at least six different graduate level courses. They had served as members of between 30 to 100 dissertation committees and chaired or co-chaired at least 20 of those committees. On average, they spent approximately 50%, 20%, 15%, and 16% of their time on teaching, research, advising, and administrative duties, respectively. When asked what they perceived motivate most students to pursue a doctorate in Education (see Question 1 in Appendix G), three-quarters cited reasons classified as economic goals, one half cited personal goals, and a quarter cited academic goals. No faculty cited a reason classified as a social goal. Examples of statements classified as economic goals included "job opportunities in terms of the field," "financial impact of earning a doctoral degree," "professional development and growth of opportunities to be promoted into more advanced positions," and "career-ladder—doing additional things for additional money." Statements such as "for many of them, it is just their accomplishment of a degree" and "it is of significance to them, within themselves" were classified as personal goals, whereas "a lot of students are just interested in growing as educators" was an example of an academic goal. In terms of classifying as institutional or personal the factors perceived to

influence time to attainment of the doctorate, one half of the faculty participants cited personal goals, 25% cited institutional goals, and 25% said the two were interlinked.

Description of the Case: Short TTD (STTD) Faculty

The second faculty focus groups consisted of three White males and one White female: two full professors and two associate professors. They had been in their respective departments for between 8 and 15 years and had taught at least two different graduate level courses. They had served as members of 13 to 100 dissertation committees and chaired or co-chaired 12 and 35 of those committees. On average, they reported that they spent 25%, 23%, 23%, and 29% of their time on teaching, research, advising, and administrative duties, respectively. Regarding goals for pursuing the doctorate, every faculty cited a reason classified as economic goal (100%), three-quarters cited personal goals, with nobody citing either academic or social goal. Classifying as either institutional or personal the factors they perceived influence TTD, three-quarters cited personal factors, 25% said it was "fifty-fifty," whereas none cited institutional factors.

Every faculty member provided at least 10 statements that were related to time to attainment of the doctorate in the Education. In total, 239 significant statements (83 cited by the LTTD case and 156 cited by the STTD case) with a mean of approximately 30 statements per faculty member were given. Table 26 presents a description of each of the 27 emergent themes from faculty focus groups and two examples of statements categorized under each emergent theme. Eighteen of these themes were similar to those that emerged from student focus groups. Nine additional themes (i.e., "Age," "Attitude," "Bureaucracy," "Enrollment," "Faculty Involvement," "Mismatch," "Goal Pre-achievement," "Sex," and "Remuneration") were unique to the faculty focus groups.

Table 26

Description and Examples of Emergent Themes from Faculty Focus Groups

Emergent Theme	Description of the Theme (D) and Examples of Statements (E1 and E2)
(a) *Academic Integration*	
1.Communication	D: The clarity and timeliness of program expectations and requirements E1: "We run a one-week orientation" E2: "We do a good job in describing what the program expectations are"
2. Preparation	D: The amount and quality of academic preparation a student receives E1: "Some people have anxiety about writing, that slows them down" E2: "They work with faculty on projects, to co-teach courses"
3. Structure	D: The nature and/or arrangement of curriculum tasks and resources E1: "It is really quite structured in terms of 3 years of coursework study" E2: "We collect feedback from students and constantly revise program"
4. Enrollment	D: Whether a student enrolls fulltime (FT) or part-time (PT) E1: "The whole idea of PT/FT, to me, is a major difference in length" E2: "Part-time [enrollment] slows them down"
5. Topic	D: The characteristics of dissertation topic a student chooses E1: "The ability to conceive of a good dissertation topic" E2: "A good topic, research questions that can be answered"
(b) *Social Integration*	
6. Accountability	D: Responsibility by a student for his/her actions E1: "Some people are very dependent, some need a lot of support..." E2: "… everybody is working on their dissertation together…"
7. Advising	D: Academic guidance, mentoring and supervising of students E1: "We meet monthly with cohort [*slow paced*] members" E2: "There are faculty members who are unwilling to work with students"
8. Attitude	D: Students' attitude toward coursework and/or dissertation E1: "They don't even wanna think about it [*statistics courses*]" E2: "An attitude of seeing dissertation as a way to fulfill a requirement..."
9. Bureaucracy	D: Formal paperwork that students are required to comply with E1: "Bureaucratic hoops that we put to students that drive people out" E2: "Bureaucratic hurdles that plague our students and faculty"
10. Cohort/ Peer	D: The impact of peers or belonging to a student cohort E1: "The program is formally committed to a cohort" E2: "The cohort model, I think, helps in motivating students to finish"
11. Committee	D: The characteristics of the dissertation committee a student forms E1: "When they put their committee together they know who to go to" E2: "Over time there is students' grapevine [faculty member]"
12. Faculty Involvement	D: The extent the faculty is involved in the decision-making process E1: "I don't see that [faculty discussions] at college level" E2: "...to have faculty discussion about what it means to be a research I..."
13. Mismatch	D: Difference in students' and faculty view of enrollment pattern E1: "Most of us came from fulltime studies and that is our model…" E2: "Compatibility between students and faculty..."

(table continues)

Table 26 (continued)

Emergent Theme	Description of the Theme (D) and Examples of Statements (E1 and E2)
14. Goal pre-achievement	D: The impact of achieving goal(s) before doctorate attainment E1: "The goals are achieved earlier in the process *before* graduation" E2: "They have achieved it [goal] before they get to the doctorate"
15. Proximity	D: How far geographically a student resides from the institution E1: "… so not being here [*geographically*], I can tell you, is a factor" E2: "...they move away for internships, they tend to lose the peer pressure"
16. Remuneration	D: The degree of support and/or reward faculty members receive E1: "We need to find ways to support the faculty role in the summer" E2: "Even those on grants, we would teach at least one class a year"
(c) *Economic Integration*	
17. Work	D: The impact of employment while pursuing the doctorate E1: "When they get that job, it is more difficult for them to finish…" E2: "Beginning to work before completing their dissertation [slows them]"
18. Finances	D: Type and amount of financial support students receive E1: "Everyone of our students has a form of assistantship offered" E2: "Financial support is the number one issue for everybody"
(d) *Personal Attributes*	
19. Age	D: The impact of a student's age at admission E1: "The average age at coming in is probably mid twenties" E2: "Can we get younger students? I don't know."
20. Sex	D: The impact of being a female or a male doctoral student E1: "Women who are part-time have more difficulties …caregivers" E2: "But just the easy answer is male/female [influence time to degree]..."
21. Goal-oriented	D: Setting goals and timelines within which to achieve the goals E1: "They are able to manage their time and work independently" E2: "They have firm career goals—they know where they want to be"
22. Health	D: The impact of a student's physical and emotional wellbeing E1: "Illness of self" E2: "You can get sick"
23. Motivation	D: Desire to work and attain set goals despite obstacles encountered E1: "Students' attributes in terms of drive and discipline" E2: "Students' personal attribute in terms of drive"
24. Perfectionism	D: The belief in achieving highest standards of performance always E1: "Some people are perfectionist about writing so that slows them"
25. Self-efficacy	D: Degree of confidence to succeed in academic activity E1: "They perceive that they are going to do badly in Stats I and II" E2: "... are not scared of conducting a large research study"
External Factors	
26. Family	D: The restrictions that occur due to family responsibilities or obligations E1: "Issues such as family, children sometime affect one's priorities" E2: "We have family tied to these reasons, you can't leave family behind"
27. Life events	D: The impact of major events in one's life (e.g., divorce) E1: "Life events that get in their way" E2: "Life changes"

Frequency Effect Sizes of Themes from Faculty

Table 27 presents the frequency effect sizes (FES) and the corresponding percentile rank (pR) and perceived strength of association with TTD (Assoc) of each of the emergent themes from the faculty focus groups. Based on the magnitude of the FES, faculty (LTTD and STTD cases combined) perception was that three academic factors ("Enrollment," "Structure," and "Preparation"), one social factor ("Advising"), and one external factor ("Family") had a strong association with TTD. Two academic factors ("Communication" and "Topic"), five social factors ("Accountability," "Attitude," "Bureaucracy," "Proximity," and "Remuneration"), five personal factors ("Age," "Sex," "Goal-orientedness," "Motivation," and "Self-efficacy"), all economic factors ("Work" and "Finance"), and one external factor ("Life events") were perceived to have a moderate association with TTD. Finally, five social factors ("Cohort/Peer," "Committee," "Involvement," "Mismatch," and "Goal pre-achievement") and two personal factors ("Health" and "Perfectionism") were perceived to have minimal association with TTD.

Table 27

Frequency Effect Sizes of Emergent Themes from Faculty Focus Groups

I: Institutional	Combined (n = 8)			LTTD Case (n = 4)			STTD Case (n = 4)		
	FES	pR	Assoc	FES	pR	Assoc	FES	pR	Assoc
(a.) *Academic*									
1. Communication	38	50	Moder	25	29	Moder	50	54	Moder
2. Enrollment	63	83	Strong	75	84	Strong	50	54	Moder
3. Structure	88	98	Strong	75	84	Strong	100	96	Strong
4. Preparation	75	91	Strong	100	97	Strong	50	54	Moder
5. Topic	50	72	Moder	75	84	Strong	25	16	Minim
(b.) *Social*									
1. Accountability	38	50	Moder	25	29	Moder	50	54	Moder
2. Advising	75	91	Strong	50	67	Moder	100	96	Strong
3. Attitude	25	30	Moder	25	29	Moder	25	16	Minim
4. Bureaucracy	38	50	Moder	25	29	Moder	50	54	Moder
5. Cohort/Peer	13	13	Minim	25	29	Moder	25	16	Minim
6. Committee	13	13	Minim	-	-	-	25	16	Minim
7. Involvement	13	13	Minim	-	-	-	25	16	Minim
8. Mismatch	13	13	Minim	-	-	-	25	16	Minim
9. Goal pre-achieve	13	13	Minim	-	-	-	25	16	Minim
10. Proximity	38	50	Moder	-	-	-	75	84	Strong
11. Remuneration	38	50	Moder	-	-	-	75	84	Strong
(c.) *Economic*									
1. Work	38	50	Moder	25	29	Moder	50	54	Moder
2. Finances	50	72	Moder	50	67	Moder	50	54	Moder
(d.) *Personal*									
1. Age	50	72	Moder	25	29	Moder	75	84	Strong
2. Sex	25	31	Moder	-	-	-	50	54	Moder
3. Goal-oriented	38	50	Moder	25	29	Moder	50	54	Moder
4. Health	13	13	Minim	25	29	Moder	-	-	-
5. Motivation	50	72	Moder	50	67	Moder	50	54	Moder
6. Perfectionism	13	13	Minim	25	29	Moder	-	-	-
7. Self-efficacy	25	31	Moder	25	29	Moder	25	16	Minim
II: External									
1. Family	75	91	Strong	75	84	Strong	75	84	Strong
2. Life events	50	72	Moder	-	-	-	50	54	Moder

Note- Meta-themes are italicized; "-" indicates a theme was not cited by the group/subgroup

- FES =Frequency Effect Size (expressed as %); pR = Percentile Rank (expressed as %)
- Assoc = Strength of association between a theme and TTD, which may be strong ("Strong," pR≥75%), moderate ("Moder," 25 %<pR<75%) or weak ("Minim," pR < 25%).
- Frequency Effect Size (FES) = $\left[\frac{\text{Number of participants who mentioned a particular theme}}{\text{Total number of participants in the group}}\right] X100$
- Percentile Rank (pR) = $\left[\frac{f_b + \frac{1}{2} f_w}{N}\right] X\ 100$ where

f_b = # of themes whose effect sizes are less than the effect size of the theme in question

f_w = # of themes which have the same effect size as the theme in question (including the theme in question); N = Total number of themes cited by the group (case)

Intensity Effect Sizes of Themes from Faculty

Table 28 presents the intensity effect sizes (IES) and the corresponding percentile rank (pR) and perceived strength of association with TTD (Assoc) of each of the emergent themes from the faculty focus groups. Based on the magnitude of the IES, faculty (LTTD and STTD cases combined) perceived that three academic factors ("Enrollment," "Structure," and "Preparation"), two social factors ("Advising" and "Proximity") and two personal attributes ("Goal-orientedness" and "Motivation") had strong association with TTD. Two academic factors ("Communication" and "Topic"), five social factors ("Attitude," "Cohort/Peer," "Involvement," "Mismatch," and "Remuneration"), two economic factors ("Work" and "Finance"), one personal factor ("Age"), and two external factors ("Family" and "Life events") were perceived to have moderate associations with TTD whereas the associations of four social factors ("Accountability," "Committee," "Bureaucracy," and "Goal pre-achievement") and four personal factors ("Sex," "Health," "Perfectionism," and "Self-efficacy") were perceived to be minimal.

Table 28

Intensity Effect Sizes of Emergent Themes from Faculty Focus Groups

I: Institutional	Combined (239 statements)			LTTD Case (83 statements)			STTD Case (156 statements)		
	IES	pR	Assoc	IES	pR	Assoc	IES	pR	Assoc
(a.) *Academic*									
1. Communication	2.93	48	Moder	2.41	37	Moder	3.21	63	Moder
2. Enrollment	7.95	87	Strong	6.02	74	Moder	8.97	94	Strong
3. Structure	17.6	98	Strong	16.7	97	Strong	17.9	98	Strong
4. Preparation	8.79	91	Strong	13.3	87	Strong	6.41	81	Strong
5. Topic	2.93	48	Moder	6.02	74	Moder	1.28	5	Minim
(b.) *Social*									
1. Accountability	0.84	9	Minim	1.20	16	Minim	0.64	2	Minim
2. Advising	10.0	94	Strong	14.5	92	Strong	7.69	91	Strong
3. Attitude	2.93	48	Moder	7.23	82	Strong	0.64	2	Minim
4. Bureaucracy	1.26	22	Minim	1.20	16	Minim	1.28	22	Minim
5. Cohort/Peer	3.35	63	Moder	4.82	55	Moder	2.56	48	Moder
6. Committee	0.84	9	Minim	-	-	-	1.28	22	Minim
7. Involvement	1.67	33	Moder	-	-	-	2.56	48	Moder
8. Mismatch	1.67	33	Moder	-	-	-	2.56	48	Moder
9. Goal pre-achieve	1.26	22	Minim	-	-	-	1.92	33	Moder
10. Proximity	4.18	78	Strong	-	-	-	6.41	81	Strong
11. Remuneration	2.93	48	Moder	-	-	-	4.49	76	Strong
(c.) *Economic*									
1. Work	3.35	63	Moder	2.41	37	Moder	3.85	70	Moder
2. Finances	3.35	63	Moder	4.82	55	Moder	2.56	48	Moder
(d.) *Personal*									
1. Age	2.09	39	Moder	1.20	16	Minim	2.56	48	Moder
2. Sex	1.26	22	Minim	-	-	-	1.92	33	Moder
3. Goal-oriented	5.02	83	Strong	1.20	16	Minim	7.05	87	Strong
4. Health	0.84	9	Minim	1.20	16	Minim	0.64	2	Minim
5. Motivation	4.18	78	Strong	4.82	55	Moder	3.85	70	Moder
6. Perfectionism	0.42	2	Minim	-	-	-	0.64	2	Minim
7. Self-efficacy	1.26	22	Minim	1.20	16	Minim	1.28	22	Minim
II: External									
1. Family	3.35	63	Moder	4.82	55	Moder	2.56	48	Moder
2. Life events	3.77	72	Moder	4.82	55	Moder	3.21	63	Moder

Note- Meta-themes are italicized; "-" indicates a theme was not cited by the group/subgroup

- IES =Intensity Effect Size (expressed as %); pR = Percentile Rank (expressed as %)
- Assoc = Strength of association between a theme and TTD, which may be strong ("Strong," pR≥75%), moderate ("Moder," 25 %<pR<75%) or weak ("Minim," pR < 25%).
- Intensity Effect Size (IES) = $\left[\frac{\text{\# of statements referring to a particular theme}}{\text{Total number of statements cited for all themes)}} \right] X 100$
- Percentile Rank (pR) = $\left[\frac{f_b + \frac{1}{2} f_w}{N} \right] X\ 100$ where

N= total # of themes cited by group (case);

f_b = # of themes whose effect sizes are less than the effect size of the theme in question

f_w = # of themes with same effect size as the theme in question (including the theme)

Summary of Factors that Faculty Perceive Influence TTD

Table 29 summarizes the findings on the factors faculty perceive are associated with TTD based on both the magnitude of frequency effect size (FES) and intensity effect size (IES) from faculty focus groups. Based on the FES and IES, faculty (LTTD and STTD cases combined) perception was that three academic factors ("Enrollment," "Structure," and "Preparation"), one social factor ("advising"), and one had strong associations with TTD. "Family" (external) was perceived to have a strong association with TTD based on the FES; whereas "Proximity" (social) and "Goal-orientedness" and "Motivation" (personal) were perceived to have strong association with TTD based on the IES. Two academic factors ("Communication" and "Topic"), one social factor ("Remuneration"), all economic factors ("Work" and "Finance"), and one external factor ("Life events") were perceived to have moderate influence on TTD. Finally, two social factors ("Committee" and "Goal pre-achievement") and two personal factors ("Health" and "Perfectionism") were perceived to have minimal associations with TTD.

Table 29

Summary of Association of Emergent Themes with TTD from Faculty Focus Groups

I: Institutional	Association with TTD based on Frequency Effect Size (FES)			Association with TTD based on Intensity Effect Size (IES)		
	Combined (n = 8)	LTTD (n =4)	STTD (n = 4)	Combined (239)*[s]	LTTD (83)*[s]	STTD (156)*[s]
(a.) *Academic*						
1. Communication	Moder	Moder	Moder	Moder	Moder	Moder
2. Enrollment	Strong	Strong	Moder	Strong	Moder	Strong
3. Structure	Strong	Strong	Strong	Strong	Strong	Strong
4. Preparation	Strong	Strong	Moder	Strong	Strong	Strong
5. Topic	Moder	Strong	Minim	Moder	Moder	Minim
(b.) *Social*						
1. Accountability	Moder	Moder	Moder	Minim	Minim	Minim
2. Advising	Strong	Moder	Strong	Strong	Strong	Strong
3. Attitude	Moder	Moder	Minim	Moder	Strong	Minim
4. Bureaucracy	Moder	Moder	Moder	Minim	Minim	Minim
5. Cohort/Peer	Minim	Minim	Minim	Moder	Moder	Moder
6. Committee	Minim	-	Minim	Minim	-	Minim
7. Involvement	Minim	-	Minim	Moder	-	Moder
8. Mismatch	Minim	-	Minim	Moder	-	Moder
9. Goal pre-achieve	Minim	-	Minim	Minim	-	Moder
10. Proximity	Moder	-	Strong	Strong	-	Strong
11. Remuneration	Moder	-	Strong	Moder	-	Strong
(c.) *Economic*						
1. Work	Moder	Moder	Moder	Moder	Moder	Moder
2. Finances	Moder	Moder	Moder	Moder	Moder	Moder
(d.) *Personal*						
1. Age	Moder	Moder	Strong	Moder	Minim	Moder
2. Sex	Moder	-	Moder	Minim	-	Moder
3. Goal-oriented	Moder	Moder	Moder	Strong	Minim	Strong
4. Health	Minim	Moder	-	Minim	Minim	Minim
5. Motivation	Moder	Moder	Moder	Strong	Moder	Moder
6. Perfectionism	Minim	Minim	-	Minim	-	Minim
7. Self-efficacy	Moder	Moder	Minim	Minim	Minim	Minim
II: External						
1. Family	Strong	Strong	Strong	Moder	Moder	Moder
2. Life events	Moder	-	Moder	Moder	Moder	Moder

Note- Meta-themes are italicized; "-" indicates a theme was not cited by the group/subgroup
- "Strong" indicates a strong association of a theme with TTD
- "Moder" indicates a moderate association of a theme with TTD
- "Minim" indicates a weak/minimal association of a theme with TTD

Research Question 3: Comparison of Students' and Faculty Perceptions

To obtain the answer to the question, "*What are the similarities and differences in students' and faculty members' perceptions of factors that influence time to attainment of the doctorate in Education,*" a cross-case analysis was conducted whereby the student and faculty focus groups were considered as the two separate cases. In each case, a theme was perceived to have strong, moderate, or minimal association with TTD based on the magnitude of both the frequency effect size (FES) and intensity effect size (IES). As shown in Table 30, each theme had four possible labels, two for students and two for faculty, describing the magnitude of association with TTD. The perception on a theme was considered *similar* in both student and faculty focus groups if its association with TTD was labeled the same in at least three of the four possible labels. For instance, "Goal-orientedness" was perceived to have a moderate association with TTD in both student and faculty focus groups even though faculty perceived it to have strong association with TTD based on IES. Similarly, "Structure" was perceived to have a strong association with TTD in both cases. The perception on a theme was considered *different* if (a) its association with TTD was labeled differently in student and faculty focus groups or if (b) its association with TTD was labeled the same in either student or faculty focus groups but was absent in one of these groups (cases). For instance, "Committee" was perceived to have a strong association with TTD among students but a minimal association with TTD among faculty. Similarly, "Remuneration" had a moderate association with TTD among faculty but was absent among students.

Table 30

Comparison of Emergent Themes with TTD from Student and Faculty Focus Groups

Factor	Student Focus Groups		Faculty Focus Groups	
	FES (n = 18)	IES (264 statements)	FES (n = 8)	IES (239 statements)
Similarities				
1. Structure	Strong	Strong	Strong	Strong
2. Motivation	Strong	Strong	Moder	Strong
3. Work	Moder	Moder	Moder	Moder
4. Finances	Moder	Moder	Moder	Moder
5. Life events	Moder	Moder	Moder	Moder
6. Goal-oriented	Moder	Moder	Moder	Strong
7. Family	Moder	Moder	Strong	Moder
8. Cohort/Peer	Moder	Moder	Minim	Moder
9. Accountability	Moder	Moder	Moder	Minim
10. Perfectionism	Minim	Minim	Minim	Minim
11. Self-efficacy	Minim	Minim	Moder	Minim
12. Health	Minim	Minim	Minim	Minim
13. Stress	Minim	Minim	-	-
Differences				
1. Communication	Strong	Strong	Moder	Moder
2. Topic	Strong	Strong	Moder	Moder
3. Committee	Strong	Strong	Minim	Minim
4. Preparation	Moder	Moder	Strong	Strong
5. Advising	Moder	Moder	Strong	Strong
6. Social support	Moder	Moder	-	-
7. Enrollment	-	-	Strong	Strong
8. Attitude	-	-	Moder	Moder
9. Remuneration	-	-	Moder	Moder
10. Age	-	-	Moder	Moder
11. Goal pre-achieve	-	-	Minim	Minim
12. Proximity	Minim	Minim	Moder	Strong
13. Bureaucracy	-	-	Moder	Minim
14. Sex	-	-	Moder	Minim
15. Involvement	-	-	Minim	Moder
16. Mismatch	-	-	Minim	Moder

Note

"-" indicates a theme was not cited by the group/subgroup

- Frequency Effect Size (FES)= $\left[\frac{\text{Number of participants who mentioned a particular theme}}{\text{Total number of participants in the group (case)}}\right] X100$

- Intensity Effect Size (IES) = $\left[\frac{\#\text{ of statements referring to a particular theme}}{\text{Total number of statements cited for all themes)}}\right] X100$

- "Strong" indicates a strong association of a theme with TTD
- "Moder" indicates a moderate association of a theme with TTD
- "Minim" indicates a weak/minimal association of a theme with TTD

Similarities in Students' and Faculty Members' Perceptions

The upper part of Table 30 shows 13 factors that both students and faculty perceived were associated with TTD. One academic factor ("Structure") and one personal attribute ("Motivation") were each perceived to have strong associations with TTD. Two social factors ("Accountability" and "Cohort/Peer"), two economic factors ("Work" and "Finances"), two external factors ("Family" and "Life events"), and one personal attribute ("Goal-orientedness") were each perceived to have moderate associations with TTD. Three personal attributes ("Perfectionism," "Self-efficacy," and "Health") were perceived to have minimal associations with TTD. The association of each of these 13 factors with TTD is discussed next.

Structure. Both students and faculty perceived that the nature and/or arrangement of curriculum tasks and resources, was strongly associated with TTD. Students' comments in support of this contention included: "the structure becomes as important as anything else because we have to be [somewhere] on this day at this time," "I was on track because the time schedule forced me on track," "there really wasn't any room to deviate from that structure," "it was helpful having a structure during the writing phase," "the internship was also very structured," "there is a lot of structure in our program, it is all pretty much programmed and laid out for you," and "they have us on that fixed schedule—what you take each semester." Sentiments of faculty echoed students': "They really don't have much of a choice, they have to take the courses when they are offered," "it is really quite structured in terms of three-year coursework study," "the norm is that students really move in a pretty locked step in terms of the time sequence," and "our curriculum is very structured."

As one student aptly put it, “it is easier to follow a structure than make my own.” The longer TTD experienced in the LTTD programs might be due to the dissatisfaction with the existing curriculum structure as evidenced by students’ negative comments: “there is a disconnect between the coursework and dissertation” and “a comprehensive list or guidelines that I can follow, I still haven’t found one.” Students from LTTD programs experienced curricula and administrative changes that affected their progress: “when she left—the time between her actually being engaged in growing the program as chair of the department and leaving for [an] administrative position created a vacuum that wasn’t apparent until after she left.” Faculty statements indicated structural measures were being undertaken to remedy the situation in the LTTD programs: “we try to be pretty aggressive about making summer offerings available, we don’t shut [close] the program,” “we collect feedback from students and constantly revise the program,” “to rethink or revise the whole process of qualifying exams—the formats etc.” and “we are trying to make a better connection, a stronger tie, so that by the time they take their qualifying exams, they have a start of their dissertation already.”

Faculty revealed that most doctoral programs in the College are among the longest in the nation in terms of credit hours required, a factor they perceived contributed to the longer TTD experienced: “I hate to say this but this is one of the longest degrees in terms of hours so far in the country—it goes forever,” “so that [number of credit hours] to me is an institutional variable that contributes to some degree for people not finishing because it takes forever,” “In fact places like Vanderbilt right now are having only nine hours of dissertation credit hours towards *the* doctorate. That takes the program down in

hours," and "we have moved from *5-5 to 4-4*[13], cutting those years back but we haven't cut the credits back." Faculty suggested a reduction in the number of credit hours and mode of offering the courses to enable students to attain the doctorate in a timely fashion: "shorten the hours to 60, not 83 hours," "we need to move most of our work to blended courses where there is less seat time," and "students only have to come on campus maybe half of the time than they come now."

Motivation. The perception of both students and faculty was that the desire to work and attain goals despite obstacles encountered in the process, had a strong association with TTD. Motivated students were able to move faster even if they were in the LTTD programs: "I pushed and pushed my committee," "I was self-motivated," "I was always in my professor's face," "My committee was not the type that would be happy to meet ever! It was because of me, I wanted to be done" and "I kept working on it [*dissertation*], I was very diligent in getting back with them." Similar positive comments from students in the STTD programs also emphasized the centrality of motivation in timely completion: "I am just a driver... I put a lot of time in it," "I was just determined, I was gonna do what I had to do to get finished in the shortest amount of time," "I realized I was never gonna finish at that rate [taking one class a semester] so I had to step up," "I didn't take a break, not even summer," and "If you are motivated, pestering your committee then that's a great thing because you can go ahead [finish quickly]." Faculty comments coincided with students: "Drive of students, just to get it done," and "students' personal attributes in terms of drive and discipline."

[13] These are the time limits set by graduate school: "5-5" refers to five years of coursework and five years of dissertation whereas "4-4" refers to four years of coursework and four years of dissertation.

Work. Both students and faculty concurred that being employed while pursuing the doctorate, had a moderate association with TTD. Most students in LTTD programs tended to work full-time, thereby spending a longer time to attain the doctorate: "I worked fulltime [so that slowed me down]," and "It is tough being the principal, having the responsibilities at school and trying to finish [dissertation]." On the other hand, students in STTD programs tended to either work part-time or stopped working in order to focus on graduate studies: "Once I stopped working for the company, I had time to get a lot done" and "I was unemployed for a period as I finished my coursework. I made tremendous progress during *that time*." Faculty stated that students, who, after obtaining the Ed. S. degree, opt to start working, tend to be preoccupied with work and lose the focus to finish the doctorate in a timely manner.

In some circumstances, however, work positively influenced the completion of the doctorate: "For my current job, I had to have my Ph. D. designation so in order to meet that goal I had to complete my course requirements as well." Students sponsored by their employers were committed to finish in a timely manner before the scholarship expired. Whereas doctoral students working on campus as GAs may be "working for cheap," as Mercury[14] pointed out, the work they do "revolves around what they learn." They are equipped with skills that enable them to complete more rapidly compared to those who do not engage in on-campus work.

Finances. Both student and faculty concurred that the type and amount of financial support a student receives, had a moderate association with TTD. There were marked differences in terms of sources of finance in LTTD and STTD programs whereby

[14] Mercury was an interviewee, a White female in LTTD program

students in STTD programs tended to receive scholarships, graduate assistantships, or financial assistance: "Our program is fortunate enough—tuition is not something that we incur, "I had a scholarship when I came," "They [the employer] paid for most of my dissertation hours," and "I really only dealt with tuition during summer time," and "Everybody had a GA in the Fall and Spring." Conversely, apart from a few GAs, most students in LTTD programs relied on personal savings or loans: "Every delay cost me money. It was very expensive," "I was on governmental Stafford Loans," and "I am paying from my own sources or loans so that makes a difference."

Faculty comments coincided with students' whereby faculty from STTD programs, emphasizing the importance of finances for graduate education, stated that most of their students were funded by the program: "Everyone of our students has some form of assistantship offered," "We also have financial support," and "Financial support is the number one issue for everybody." Faculty from LTTD programs, however, decried lack of financial support to their students: "Our program has no support financially." The amount of financial assistance also matters, for instance, faculty from LTTD programs noted that students were reluctant to quit their jobs when offered a small amount of financial assistance: "We tried some years ago to pay $12,000 but there were no takers."

Family. Students and faculty perceived that the restrictions that occur due to family responsibilities or obligations had moderate association with TTD. Students with more family obligations tended to have a longer TTD than did those who had no or less family obligations. Students' comments in support of this perception included: "I had three children, two were going through high school at that time—which was kind of difficult," "I chose family as the first thing and that [coursework] took a back seat" and

"being a parent, working two jobs takes time." Faculty's comments paralleled students': "we have family tied to these reasons—you can't leave your family behind," "other issues such as family and children sometimes affect one's priorities" and "I have a student whose daughter is a drug addict, so that takes a lot of her [student's] time."

Life events. Students and faculty perceived that major events that occur in the student's life, had moderate association with the TTD: students who encountered various life events tended to take longer than did those who encountered none. Students' comments in support of this perception included: "marriage made me stop out" and "I got divorced during this timeframe and some of my colleagues went through the same thing." Faculty also singled out divorce as a common event, especially among female students, that lengthens students' TTD.

Goal-oriented. Students and faculty perceived that the ability to set goals and timelines within which to achieve them had moderate association with TTD. Goal-oriented students tended to finish faster than did those who were not. Students in the STTD programs talked about goal-orientedness: "I had to do something every week—I had a deadline of weekly meetings that was very helpful," "I really started that process very early on. I didn't have a written formal contract with my professor, it was an ongoing process whereby when I turned in something, we would set up another date we would meet," "I actually planned from the beginning that I was going for internship in my fourth year," "I set strict timelines," "Goal setting was important for me, I had a strict schedule," and "I had a written agreement that we would meet certain requirements on a certain timeline." Faculty's comments regarding the characteristics of students likely to complete in a timely manner coincided with those of the students': "they have firm career

goals—they know where they want to be," "they are able to manage time and work," "they not only know how to meet their expectations as teachers but they exceed them," and "if the student is not confident [conscious] about time it will take longer."

Cohort/Peer. Students and faculty perceived that being in a cohort was a moderately associated with TTD whereby students who belonged to a cohort or peer group were perceived to attain the doctorate faster than did those who did not. Most STTD programs were characterized by cohort/peer groups: "I had peer support," "We were able to help one another get through course after course after course till the comps," "I don't think I could have done it alone," "They [cohort] were very collaborative... the people helped one another, we got together, we studied, we met in the library, we went to people's houses, just very supportive," and "I think that the idea of cohort is an excellent idea." With the exception of one program that was committed to the cohort model, most LTTD programs lacked cohort/peer groups unless students formed their own: "I didn't have this kind of cohort" and "My department didn't have a cohort but there were select groups of women—we created our own cohort." Student-initiated cohort or peer groups, however, are difficult to maintain: "After we finished our coursework and we got done with our quals, that cohort just left me!" Faculty from STTD programs echoed students' comments: "The program is formally committed to a cohort," "Our students actually go through as a cohort... to help them built the cohesive team," "So that [cohort] is a support system for us," "Course schedule is designed according to that cohort system," "The stages are really building that cohesiveness of the cohort," "They work as a cohort," and "The cohort model, I think, really helps in motivating students to finish."

Accountability. Students and faculty concurred that the responsibility for one's actions had a moderate association with TTD. Students who held themselves accountable for tasks related to doctorate attainment tended to attain the doctorate faster than did those who either did not or held others accountable. Students from LTTD programs tended to hold others accountable for their progress: "As far as accountability in here at the university, [I had] nobody really," "I thought that I have to kind of hurry up on my own," "Nobody to push me to do the same thing...," and "I have to impose on four of my committee members and I don't have the heart to do that." Although some comments from STTD students suggested they hold others accountable for their progress ("My major professor held my feet to the fire from week to week," "I was accountable to my major advisor, my major advisor was accountable to me," and "I had peer accountability"), most of them held themselves accountable for their progress: "Holding *myself* accountable—if this dissertation doesn't get done, it's nobody's fault but my own because I didn't work on it," "*I made myself* accountable by checking things off," and "Accountability, I'd say more to self." Faculty cited peer pressure as instilling in students the accountability to one another to complete in a timely manner. For instance, knowing that everybody is engaged in "study groups" or "other students are working on their dissertation together" inspires students to work harder to complete in a timely fashion.

Perfectionism. Students and faculty perceived that the belief in always achieving the highest standards of performance had a minimal association with TTD. Perfectionist students are more likely to spend a longer time pursuing the doctorate because it takes a long time before they are convinced that their work is good enough. For instance, faculty noted, "some [students] are perfectionist about writing so that slows them down."

Similarly, statements from students indicated that perfectionism delays doctorate attainment: "I realized that this is not *my* life's work, [but] that the goal is to get that Ph.D. That other research work can be done later," "Your goal is to get finished, not to make this your life's work," and "A lot of us really wanted to go and change the world and I was told that that is not the purpose of the Ph. D."

Self-efficacy. Students and faculty perceived that the degree of confidence to succeed in an academic activity had a minimal association with TTD. Whereas self-efficacious students have confidence that they can succeed in their academic pursuit, students lacking self-efficacy tend to harbor doubts about their academic abilities and are likely to take a long time before engaging in a huge task such as the dissertation: "I could not sink my teeth around it [my first dissertation topic] so I never got anything going" and "I said oh my God, maybe I can't even finish!" Students suggested that involvement in research projects might instill self-efficacy in some students: "There is [a] need to build up a student's confidence to realize that they can succeed by being involved in research projects, presenting papers." Similarly, faculty noted that lack of self-efficacy among some students especially in coursework ("They perceive that they are going to do badly in Statistics") delays the attainment of the doctorate whereas self-efficacious students progressed faster: "They are not scared to conduct a large research study" and "they don't have that fear of this huge task [dissertation] that they have to undertake."

Health. Students and faculty perceived that as a student's physical and emotional wellbeing had minimal association with TTD. Generally health problems tend to slow students' progress. Whereas health problems may force a student to enroll part-time leading to longer TTD, a student from a STTD program stated that despite falling sick

several times, she was still ahead of many of her cohorts in terms of accomplishing various milestones in the program.

Differences in Students' and Faculty Members' Perceptions

Presented in the lower part of Table 29 are 16 themes that students and faculty perceived were associated with TTD differently. Differences in the perception of the influence of each of these 16 factors are discussed next.

Communication. Students perceived that the clarity and timeliness of information related to program expectations and requirements to students have strong association with TTD whereas faculty perceived the association to be moderate. Most statements made by students in the LTTD programs were negative indicating that communication of curriculum expectations and requirements might have been a problem in this cluster: "I didn't have a clear idea of what I need to do and still probably don't," "I didn't know of a pre-proposal requirement in our program," "I wanted to know what next and be guided in the next steps," "I would say, I did not realize that so much outside of class work would be necessary," "The information really wasn't forthcoming, they say, isn't that in the handbook?" and "I was not given anything near a true indication of what was involved."

Because curriculum expectations were not communicated in a timely manner or were communicated in an unclear fashion, students in the LTTD programs spent comparatively longer time in search of that information: "if we are more forthright and upright at all levels—department, program, whatever level, in acknowledging this is what you have ahead, I think, you will have less people enter but also less people leaving." That is, clarity regarding the "roadmap" provides students with a sense of control and ability to plan. In a stark contrast, students in the STTD programs expressed satisfaction

with the way the program expectations and requirements were communicated to them: "I experienced an orientation program when I joined. My spouse was invited to come and he did. We were given all the information about how difficult it was going to be" and "I didn't feel like I was recruited, I felt like I was given information to make a decision against, made a decision and moved on."

Topic. According to students, the characteristics of the dissertation topic a student chooses had a strong association with the TTD, whereas faculty perceived it to have a moderate association. Students' statements (e.g., "You really have to hammer out exactly what you gonna do [*topic*] because that is going to set the stage for your own project") and faculty's comments (e.g., "ability to conceive of a valid dissertation topic") showed the connection between topic and TTD. Negative comments from students in the LTTD programs suggested the uncertainty about the dissertation topic might have contributed to the long TTD: "I didn't have a clear-cut idea of what I wanted to do," "I hadn't thought of what I wanted to do for my dissertation earlier on in my coursework," "Lack of [a] clear-cut idea of what to do for my proposal made me take longer than anticipated" and "My topic involves a design-based research, I haven't covered that in my courses." Similarly, the tenor of the faculty's comments was that students struggled to construct good topics: "they like to think in as simple terms as possible—their idea of research questions reflects this." An interviewee (Pluto), a White male from STTD cluster, noted that most students had a problem conceptualizing meaningful research topics: "a lot of people are not specific enough in what they are trying to measure." Some of the students' descriptions of characteristics of a dissertation topic that led to timely completions included: "make sure it is something that your spouse, your employer that is pushing you

to finish, like," "you gonna spend a lot of time with your topic so hopefully it is something that you appreciate if not love," "you have to be married to the topic, love it, or at least like it," and "it helps a lot if the dissertation committee members know a lot in the area that you are in." One student in the LTTD cluster was able to complete in a timely manner by being cognizant of the nature of the dissertation topic: "I made sure that my topic was along the lines of what I wanted to do as my doctoral study, which was along the lines of what I was doing in my daily job." This coincided with a faculty's comment: "we encourage them to have to think of whatever they are active about—whatever they do their Ed. S. on becomes their foundation for their Ph. D. dissertation."

Committee. Whereas students perceived that the characteristics of the dissertation committee a student forms had strong association with TTD, in sharp contrast, faculty perceived the association to be minimal. As one student put it, "it is probably one of the most elemental and fundamental parts of the entire process--making sure you have a group of people you are philosophically aligned with and are compatible." These characteristics largely pertain to the personality of the members and their familiarity with a student's research topic area. Characteristics of a good dissertation committee, according to students, included faculty who are: "available and willing to let you bounce ideas off at," "supportive of the study," "willing to work together," "has expertise in the area," and "punctual with turnaround time and have a positive attitude towards students." A student noted that most students "pick up committee members by either convenience or reputation and not by actually going beyond those veneers and finding out levels of compatibility." Students in the LTTD programs tended to experience problems with their committees: "choosing professors was problematic, some say, well, sorry, we are not

going to be here so we won't be able to help you at that time [during summer]," "getting the four professors to agree on my topic took time," and "coordinating five different calendars were problematic." However, the statements made by students from STTD programs tended to be positive: "With my major professor, she and I made deadlines as I turned things in," "We didn't have a written contract but we also worked together on a personal basis," "The person that I worked with is pretty punctual, goal-oriented—our working styles complimented each other," and "With my new committee, I get drafts back within ten days so it's making a huge difference to the speed that I can progress."

Preparation. Faculty perception was that the amount and quality of academic preparation a student receives had a strong association with TTD whereas students perceived the association to be moderate. Preparation takes various forms including acquisition of writing skills and research skills. To acquire these skills, students need to engage in research besides the exposure to a gamut of courses. According to faculty, students in the LTTD programs tended to be ill-prepared: "they have a problem with their research tools" and "some people have anxiety about writing and that slows them down." These sentiments coincided with statements made by students from the LTTD programs: "I don't understand the difference between reliability and validity," "what may take time too is the writing process itself," "the three stats [statistics] classes I had didn't prepare me for that [writing my dissertation]" and "that [dissertation] really was my first time to do statistical research." To alleviate these problems, the faculty suggested that research labs be implemented whereby "students engage in research from the beginning, not just at dissertation stage," forming writing groups at the dissertation stage whereby "people writing [the] dissertation get feedback from each other," "involvement in research groups

or opportunities to interact with faculty," and setting up "a writing clinic or a place that they [students] can get some assistance" with writing their dissertation.

Advising. Faculty perceived that academic guidance, mentoring, and supervising of students, had strong association with TTD whereas students perceived the association to moderate. Faculty noted that the personality style of the faculty is crucial in advising: "some are standoff, some are not," "some see mentoring of their students as [a] critical part of their role and others see it [as] kind of a pain in the neck," and "there are faculty members who are unwilling to work with students, they will just disappear!" Faculty added that if faculty members "meet monthly with students" and "provide that kind of support [timely feedback to students]" then "those students finish at [a] much more rapid rate." A faculty member from a STTD program shared how he had been advising 11 students including some who were distance learners. He created a file [email folders] to keep track of students' progress. Each week, he ensured that he gets feedback from each of them, setting aside time to call those at long distance to find out about their progress. Negative statements by students in the LTTD programs indicated the possibility of problems with advising in this cluster: "I lost my direction [after coursework], I had to form a committee, whom do I go to?," "I experienced a sense of loss and confusion, confusion in terms of direction," "My professor and I are just trying to teach ourselves how to do this as we go along," and "a sense of loss and confusion in terms of direction."

Describing the nature of advising that would help students progress faster, an interviewee (Pluto) from a STTD program commented:

> I would like to see faculty treat Ph. D. students, then candidates, with a different attitude rather than talk and treat them like "you haven't proven

> yourself yet." Once you have been accepted in the program, "you are now a member of our family" and as such we have to switch from "prove yourself so that we can trust you." We need to have that "we trust you, you have proved yourself, come on and sit down, how are you doing" We need to shift to one of camaraderie and teamwork as opposed to teacher-student hierarchical relationship. Well, we need to get out of hierarchy and get lateral as long as the student maintains the propriety of faculty and shows respect to the person's status.

Social support. Students perceived that the support obtained from family, friends, or at the workplace, had a strong association with TTD whereas in the faculty focus groups, this factor was absent. Students in the STTD programs reported receiving strong social support: "I had social support from people who were close to me," "encouragement from people that you work with is very important," "the support from home was very helpful to me," "my boss asked me on a regular basis, how is your dissertation going?," and "support has to be very much generalized: do your kids, spouse, your extended family give you the backing you need?"

Enrollment. Faculty perceived that the enrollment status of a student had a strong association with TTD: "the whole idea of part-time or full-time, to me, is a major difference in length," "we have a few full-time students who move much more quickly than part-timers," and "part-time student [enrollment] slows them down." Faculty attributed students' timely completion to full-time enrollment: most STTD programs are full-time whereas in the LTTD programs, almost "everybody is part-time."

Attitude. Faculty perceived that students' attitude towards coursework and dissertation had a moderate association with TTD, whereas among students, this factor was absent. Faculty noted that students in the LTTD programs tended to exhibit negative attitudes toward coursework or the dissertation: "they don't even wanna think about it [statistics courses]," "they are hoping against hopes that they can substitute the quantitative research courses with qualitative research course," "they think that they can go into research methods courses and create that proposal or dissertation without stats courses" and "an attitude of seeing the dissertation itself as a way to fulfill a requirement versus the real desire to do a research study and find out something." These sentiments were confirmed by an interviewee (Venus, an ABD in her seventh year) in her view of the dissertation): "it is just an extra thing—I think of it as one extra requirement—we have to prove we can write. We do [a] thesis which proves we can write and then there is this thing [the dissertation], you know!"

Remuneration. Faculty perceived that the degree of support or reward faculty members receive due to their involvement in advising, mentoring and providing apprenticeship opportunities to students had a moderate association with TTD, whereas among students, this factor was absent. Faculty noted that the heavy workload they carried deterred them from offering adequate advising: "How much individual support [advising] can you give when you are supposed to be teaching 2-3 classes a semester and research on top of that?," and "Even those on grants, we would teach at least one class a year." They thus recommend that the College should consider seriously how to support faculty, especially during the summer, to enable them provide adequate advising:

"provide some vibrant support for faculty to provide student advisory in the summer" and "We need to find ways to support the faculty role in the summer."

Age. Whereas the theme "Age" was absent in the student focus groups, faculty perceived it to have a moderate association with TTD. Younger students were perceived to complete faster than older counterparts. A faculty from a LTTD cluster remarked, "We are never going to get people in their twenties" whereas a faculty from a STTD cluster noted that "the average age at coming in was probably in the mid twenties."

Proximity. Students perceived that how far geographically a student resides from the institution was minimally associated with TTD, whereas faculty perceived it to be moderately and strongly associated with TTD based on frequency and intensity effect sizes, respectively. The faculty's perception was that students who lived further from the university took longer than did those who lived closer to campus: "students are finishing earlier because they are staying here to do their dissertation," "if they move away for internship, they tend to lose some of that peer pressure," "being part of an environment where people are doing research really keeps them going," and "when they start getting away from graduate atmosphere, it becomes difficult for them to make that [finishing] a priority." Students confirmed: "so being around [in the department] gives you a little bit of a push" and "I quit [my job] and started working here as a research assistant so I can get to people when I need to."Based on follow-up conversation with a faculty who did not participate in the study, the perception that close proximity to the institution is associated with faster progress may be wrong.

Summary

In the quantitative component of the study, discrete-time multilevel analysis revealed that: (a) the median TTD in Education was 5.8 years, (b) students in Education were most likely to attain the doctorate in the seventh year, (c) two student-level factors, sex and master's GPA score, were each statistically significantly related to the timing of doctorate attainment, (d) four student-level factors, race/ethnicity, age at admission, GRE verbal score at admission, and GRE quantitative score at admission, were each not statistically significantly related to the timing of doctorate attainment, (e) three program-level factors, percentage of female students, mean GPA score, and mean GRE quantitative score, were each significantly related to the timing of doctorate attainment, and (f) five program-level factors: program size, department size, percentage of White students, mean age at admission, and GRE verbal score at admission, were each not statistically significantly related to the timing of doctorate attainment.

In the qualitative component, student focus groups and the follow-up individual interviews revealed that two academic factors ("Communication" and "Topic") and one social factor ("Committee") were perceived to be strongly associated with TTD, whereas "Preparation" (academic), "Advising" (social) and "Social support" (external) were each perceived to be moderately associated with TTD. Faculty focus groups, on the other hand, revealed that three academic factors ("Enrollment," "Preparation," and "Advising") were perceived to be strongly associated with TTD; two academic factors ("Communication" and "Topic"), two social factors ("Remuneration" and "Attitude"), and one personal attribute ("Age") were each perceived to be moderately associated with TTD. The association between "Sex," "Bureaucracy," "Involvement," or "Mismatch" and

TTD was mixed. Finally, both students and faculty perceived "Structure" and "Motivation" to be strongly associated with TTD; "Accountability," Cohort/Peer," "Work," "Finance," "Family," "Life events," and Goal-orientedness" to be moderately associated with TTD; and "Perfectionism," "Self-efficacy," and "Health" to be minimally associated with TTD. "Stress" and "Goal pre-achievement" were perceived to be minimally associated with TTD by students and faculty, respectively.

CHAPTER V: DISCUSSION

Chapter V consists of three sections. First, the purpose of the study is restated and the framework that guided the study is summarized. Next, findings of the quantitative and qualitative components of the study are discussed in connection with the literature on time-to-degree (TTD). Major conclusions of both quantitative and qualitative components are then presented. Next, ways in which the present study informs policy and practice and recommendations to constituencies in and outside the university are presented. Finally, limitations of the study are presented alongside suggestions for future research.

Purpose and Framework

The time that students take to attain the doctorate has been increasing especially in Education. Due to the rising cost incurred in preparing doctoral students, this trend is of concern to the students, the institutions, and society. Whereas studies have been conducted that examine factors influencing TTD, in designing these studies, seldom have researchers (a) considered the nesting of students into programs, (b) included the information of students who do not attain the doctorate by the end of the observation period (censored cases), and (c) incorporated the perceptions of both students and faculty. The purpose of this mixed methods study was to understand the timing of doctorate attainment in Education and the factors related to this timing. A systems approach was employed to aid the understanding of the structures and processes that underlie the timing of doctorate attainment. Doctorate attainment was viewed as a system consisting of *inputs*, *process*, and *output* elements as shown earlier in Figure 1.

Students from diverse academic, social, and economic backgrounds constituted the *inputs* to the system. In the quantitative component of this study, discrete-time multilevel hazard analysis, that is, a combination of hazard analysis (i.e., an analytic technique that allows for inclusion of censored cases) and multilevel modeling (i.e., an analytic technique that takes into consideration the clustering of students into programs) were employed to examine how these background characteristics (level-1 factors) and their aggregates (level-2 factors) were related to the timing of doctorate attainment. The log odds, which was transformed into an odds ratio, was used to express the magnitude and direction of the relationship of each factor and the timing of doctorate attainment over a 10-year observation period.

According to Tinto (1993), these inputs determine the goals for pursuing the doctorate, which were classified as academic, social, economic, or personal. Students with varying goals for pursuing the doctorate were expected to undergo different experiences in the four domains of integration (viz., academic, social, economic, and personal), which constituted the *processes* element. The ultimate outcome, TTD, which constituted the *output* element, was hypothesized to depend on the level of integration experienced in the four domains of integration. In the qualitative component of this study, student and faculty focus groups and student individual interviews were conducted to identify factors perceived to be associated with TTD. Based on the number of participants who cited a theme (frequency effect size) and the number of statements each theme contained (intensity effect size), factors perceived to play a role in TTD were identified and categorized into academic, social, economic, and personal meta-themes (factors).

Summary of the Quantitative Findings

Median TTD and When Students are Most Likely to Attain the Doctorate

Discrete-time multilevel hazard analysis revealed that the median TTD was 5.8 years, a finding that is consonant with Civian's (1990) median TTD of 5.82 years. Both studies focused on TTD in Education. The present study established that students were most likely to attain the doctorate in the seventh year but Civian found that the likelihood of doctorate attainment was highest during the fifth, sixth, and seventh years.

Student-level Characteristics and the Timing of Doctorate Attainment

Sex and the Timing of Doctorate Attainment

When other factors were not controlled, females had statistically significantly higher odds of doctorate attainment than males in each year during the 10-year observation period. The median TTDs were 5.4 and 6.2 years for females and males, respectively. Controlling for the student's master's GPA score, sex was still statistically significantly related to the timing of doctorate attainment, however, in a multilevel model where a set of program-level covariates was controlled besides the master's GPA score, females did not experience statistically significantly higher odds of doctorate attainment than did males during the 10-year observation period.

Whereas the results of this study, except for the finding related to the multilevel model, corroborate Stiles's (2003) finding that sex is associated with TTD, it conflicts with Stiles's finding in terms of the direction of the relationship. Stiles, who also focused on Education, found that, controlling for other factors, men were more likely than were women to graduate during the first five years but the difference dissipated over time. In this study, there was no evidence indicating that the odds of doctorate attainment varied

by sex during the first the first three years, however, the diverging hazard functions suggested that females had higher odds thereafter. The disappearance of the significant sex difference when the nesting of students within programs was considered might be highlighting the importance of employing multilevel hazard analysis. The multilevel result is given more weight because it more consistent with the data. However, it should be remembered that not only were factors controlled in the two studies different, also, single level models that do not take into account the nested data have biased standard errors, and thus in more significant differences compared to multilevel models.

Race/Ethnicity and the Timing of Doctorate Attainment

When the effects of other factors were not controlled, African Americans, Hispanics, or other ethnic groups were not statistically significantly different in their likelihood to attain the doctorate compared to Whites, a finding consistent with Civian's (1990) wherein race was not statistically significantly related to TTD. It disagrees with Strayhorn's (2005) findings in which Asians were approximately one and a half times more likely to attain the doctorate than were Whites, and African Americans and Hispanics were each approximately one half as likely to attain the doctorate. Strayhorn's study, however, did not focus on the timing aspect of doctorate attainment.

Age at Admission and the Timing of Doctorate Attainment

When the effects of other factors were not controlled, there was no evidence that age at admission was statistically significantly related to the timing of doctorate attainment. This finding parallels Bair's (1999) meta-synthesis in which age was not statistically significantly related to TTD and Faghihi et al.'s (1999) study wherein none of the student background characteristics including age was statistically significantly related

to dissertation progress. Contrary to the finding that a significant interaction effect exists between age and ethnicity on the timing of doctorate attainment (Civian, 1990; Stiles, 2003), preliminary analyses in this study yielded no statistically significant interaction between race/ethnicity and any other student-level covariates including age.

Master's GPA Score and the Timing of Doctorate Attainment

Other factors controlled or not, a student's master's GPA score was statistically significantly and positively related to the odds of doctorate attainment in each year during the 10 years. Although this finding seems to contradict Bair's (1999) in which academic achievement indicators were generally not effective predictors of the TTD, not only was it unclear in Bair's meta-synthesis whether master's GPA score was one of the academic achievement indicators considered, but also, it is suspected that most of the studies in Bair's work focused on the attainment of the doctorate but ignored the timing aspect.

GREV/GREQ Scores at Admission and the Timing of Doctorate Attainment

Neither GRE verbal score at admission nor GRE quantitative scores at admission was statistically significantly related to the timing of doctorate attainment. These findings are congruent with Bair's (1999) contention that academic factors were generally not effective predictors of the timing of doctorate attainment and Strayhorn's (2005) finding that the GRE verbal score was not related to doctorate attainment. These studies, however, did not focus on the timing of doctorate attainment.

Program-level Factors and the Timing of Doctorate Attainment

Program Size and the Timing of Doctorate Attainment

Controlling for two student-level covariates (i.e., sex and master's GPA scores) and a set of program-level covariates, an increase in the program size was not associated

with a statistically significant change in the odds of doctorate attainment. This finding, which coincides with Siegfried and Stock's (2001) result, wherein the size of a doctoral program was not statistically significantly related with TTD, contradicts Bowen and Rudenstine's (1992) wherein larger programs were associated with longer TTD and Girves and Wemmerus's (1988) in which program size was related to degree progress.

Department Size and the Timing of Doctorate Attainment

Controlling for students' master's GPA score at admission and two program-level covariates (i.e., percentage of females and mean GRE quantitative score), a decrease in the size of the department housing the program was associated with a statistically significant increase in the odds of doctorate attainment in the program in each year during the 10 years. This finding agrees with the literature indicating that smaller departments are associated with shorter TTD (Bair, 1999; Bauer, 2004; Boyle & Boice, 1998; Dinham & Scott, 1999; Ferrer de Valero, 2001). It may be that, compared to larger departments, smaller departments are characterized by a low student/faculty ratio that allows most members of the faculty to become acquainted with the students and thus advise them more effectively leading to faster progress.

Program's Racial/Ethnic Diversity and the Timing of Doctorate Attainment

Controlling for two student-level covariates (i.e., sex and master's GPA scores) and a set of program-level covariates, an increase in the percentage of White students was not associated with a statistically significant change in the odds of doctorate attainment in the program. However, Girves and Wemmerus's (1988) found that departments with a larger percentage of White students were associated with faster degree progress.

Percentage of Female Students in the Program and the Timing of Doctorate Attainment

Controlling for students' master's GPA scores at admission and two program-level covariates (i.e., the size of a department housing the program and mean GRE quantitative score), the percentage of female students in the program was statistically significantly and positively associated with the odds of doctorate attainment in each year during the 10 years. Girves and Wemmerus's (1988) finding that percentage of females in a department was related to doctoral degree progress parallels the present finding.

Program's Mean Age at Admission and the Timing of Doctorate Attainment

Controlling for two student-level covariates (i.e., sex and master's GPA scores) and a set of program-level covariates, there was no statistically significant relationship between the mean age in the program and the timing of doctorate attainment. Numerous studies have examined the effect of age on TTD but none in the review examined the relationship between a program's mean age and the timing of doctorate attainment.

Program's Mean GPA Score and the Timing of Doctorate Attainment

Controlling for two student-level covariates (i.e., sex and master's GPA score) and a set of program-level covariates, the mean GPA score in the program was not statistically significantly related to the timing of doctorate attainment. The literature review did not identify a study that examined the relationship between program's mean GPA score at admission and the timing of doctorate attainment.

Program Mean GRE Verbal Score and the Timing of Doctorate Attainment

Controlling for two student-level covariates (sex and master's GPA score) and a set of program-level covariates, the mean GREV score in the program was not statistically significantly related to the timing of doctorate attainment. The literature

review did not identify a study that examined the relationship between program's mean GRE verbal score at admission and the timing of doctorate attainment.

Program Mean GRE Quantitative Score and the Timing of Doctorate Attainment

When two student-level covariates (i.e., sex and master's GPA score) and two program-level covariates (i.e., the size of a department housing the program and percentage of female students) were controlled, the mean GRE quantitative score in the program was statistically significantly and positively related to the timing of doctorate attainment in each year during the 10-year period. The literature review did not identify a study examining the relationship between program's mean GRE quantitative score at admission and the timing of doctorate attainment.

Summary of Qualitative Findings

Goals for Pursuing the Doctorate in Education

Students may have academic, social, economic, and/or personal goals for pursuing the doctorate. Whereas these goals are not mutually exclusive, in general, students tended to mention academic reasons whereas according to faculty, most students pursue the doctorate for economic reasons. Previous research supports both perceptions. Stripling (2004) established that most students' goal for pursuing the doctorate was personal development. In Dinham and Scott's (1999) study, whereas 60% of the participants cited intrinsic reasons for pursuing the doctorate (e.g., the desire to study at greater depth or improve one's skills), extrinsic reasons (e.g., promotion and career improvement) predominated and were more powerfully expressed.

Academic Integration Factors

Academic integration refers to the feeling students express about becoming part of the academic life of an institution. It may include the extent to which they are satisfied with the program's structure, academic preparation, and the dissertation topic chosen. Most of academic integration factors were perceived to be strongly associated with TTD.

Structure and TTD

Students and faculty unequivocally perceived that the nature or arrangement of program tasks and resources was strongly associated with TTD. Two aspects of program structure emerged: *components* and *relevance*. With respect to program components, some students viewed the program as comprising coursework and dissertation phases whereas others broke it into phases such as coursework, practicum, co-teaching, qualifying exams, dissertation proposal, research, and final defense. Some departments emphasize coursework by ensuring that courses required are specified; faculty are available to teach the courses as scheduled; faculty provide students with syllabi detailing course objectives, pace, performance requirements, and judgment criteria; and courses are delivered in multiple modes including online and web-enhanced. Whereas such emphasis may ensure students progress in a timely manner especially during the coursework, if for instance, the dissertation phase is not equally emphasized then students may experience a sense of loss, isolation, and confusion leading to a longer TTD. Regarding program relevance, it was perceived that students tend to attain the doctorate in a timely fashion if coursework is related to students' professional goals; takes into consideration students' academic background; and is logically connected to the dissertation by having students engage in numerous research activities.

The present finding is in agreement with Bauer's (2004) in which "program design" [structure] was related to completion of the doctorate (p. 112). Sigafus (1998) noted, "appropriate structure promotes an experience of self-control" and enables students to "connect means and ends" (p. 7). The ability to connect means and ends, the researcher suspects, saves students time leading to timely doctorate attainment.

Communication and TTD

The clarity and timeliness of information related to program expectations and requirements was perceived to be at least moderately associated with TTD. Generally, it was perceived that students tend to complete faster if program expectations and requirements are communicated in a clear and timely manner. Program information can be communicated in various ways. Some programs provide a lot of information during the department *orientation*, the period when new students meet with faculty and senior students to learn about the system's operations; others provide a *handbook*; others rely on the *Internet* to communicate the information; and others encourage new students to seek information from advisors and/or peers.

This finding suggests that for students to attain the doctorate in a timely manner, information related to research expectations and dissertation requirements should be communicated early enough (Bauer, 2004; Boyle & Boice, 1998). It agrees with the finding that students tend to complete their doctoral degree programs faster if the requirements of the program are clearly communicated (Bowen & Rudenstine, 1992; Stolzenberg, 2006). It somewhat disagrees with Kitell-Limerick's (2005) in which communication of departmental [program] processes to students was perceived to be weakly associated with doctorate completion.

Dissertation Topic and TTD

The characteristic of the dissertation topic a student chooses was perceived to be at least moderately associated with TTD. Students identified several characteristics including one in which: (a) the student has a clear-cut idea of what to accomplish by the topic, (b) the student thinks about the topic early, (c) the student is passionate about the topic and has a strong desire to learn from it, (d) the student's spouse, employer, or advisors have interest in the topic, (e) the dissertation committee members are conversant with the topic, (f) the student is familiar with the analytic technique to be used (g) the data are readily accessible, and (h) the student has a sense of ownership of the topic. These findings are congruent with the result that identifying a stimulating but manageable topic, beginning working on the topic early, and having a sense of efficacy and passion for the topic were among the factors related to shorter TTD (Bauer, 2004; Bowen & Rudenstine, 1992; Lenz, 1995; Maher et al., 2004; Seagram et al., 1998).

Preparation and TTD

The amount and quality of academic preparation a student receives was perceived to be at least moderately associated with TTD. Aspects of academic preparation identified included style of instruction and acquisition of writing and research skills. This finding agrees with Kitell-Limerick's (2005) study in which lack of solid academic foundation, inability to conduct independent research, and poor writing skills were perceived as significant barriers toward doctorate completion.

Enrollment Status and TTD

Whether a student enrolls part-time or full-time, faculty perceived, was strongly associated with TTD. Generally, students in programs where full-time enrollment is

mandatory were perceived to experience shorter TTD than those in programs where it was optional. As with previous studies (Bair, 1999; Bowen & Rudenstine, 1992; Seagram et al., 1998; Stiles, 2003), full-time enrollment was perceived to be associated with shorter TTD in the present study.

Social Integration Factors

Social integration refers to the nature and extent of interaction students experience with peers and faculty. It includes satisfaction with the dissertation committee formed, advising received, cohort/peer support, and so on. Most of the social integration factors were perceived to be moderately associated with TTD.

Committee and TTD

An interesting finding was that, whereas students perceived that the characteristic of the dissertation committee (including the major professor) formed to be strongly associated with TTD, faculty perceived it to be minimally associated with TTD. Students suggest the following when constituting a dissertation committee: (a) rather than focusing on convenience, consult widely who to request to serve on the committee, (b) include faculty with varying strengths—a methodologist, a careful editor, and one versed in knowledge of theory or literature in the field, (c) ensure the chair is philosophically compatible with members of the committee, (d) ascertain the availability of the faculty during the advisement period. Personality attributes to look for include a faculty member who is flexible, punctual in providing feedback, willing to let the student bounce ideas off, and willing to work collaboratively with others.

The present finding concurs with Bauer's (2004) results in which the nature of the dissertation committee formed was associated with the completion of the doctorate and

Dedrick's (1988) finding wherein the support function, which included a faculty acting as sounding board to the student, was one of the principal functions of the chair. In contrast, Schwarz (1997) found that there was no difference in how short TTD and long TTD students regarded the interaction with committee members as influencing their TTD.

Advising and TTD

Academic guidance, mentoring, and supervising of students were perceived to be at least moderately associated with TTD. Four aspects of advising emerged. First, the *value* attached to advising: some advisors view mentoring as a critical part of their roles whereas to others it is a "pain in the neck." Second, feedback *to students*: some advisors provide timely feedback but others take a long time or provide none. Third, feedback *from students*: some advisors insist on getting feedback from the advisee whereas others wait for the advisee to contact them. Fourth, *attitude* towards the advisee: some advisors treat doctoral students as colleagues, whereas others view advisees as untrustworthy unless they "prove" otherwise. Generally, advising characterized by timely feedback and collegial relationships was associated with timely doctorate attainment.

Consistent with the present finding, Dedrick (1988) identified dissertation management, which includes helping the student to define reasonable goals and deadlines and adherence to the goals, providing feedback to the students and insisting on receiving feedback from the student, as a principal function of the chairperson. Previous research has shown that doctoral students who are not provided adequate advising experience difficulties, especially at the dissertation phase, which results in longer TTD (Bowen & Rudenstine, 1992; Nerad & Cerny, 1993).

Cohort/Peer and TTD

Whether a student belonged to cohort/peer group or not was perceived to be moderately associated with TTD. Students who belonged to a cohort or peer group were perceived to attain the doctorate faster than did those who did not belong to a cohort or peer group. The following explanations were provided by students as to why this occurs: (a) students tend to work as a cohesive team with a common goal of finishing, (b) students tend to motivate one another to finish in a timely manner, and (c) cohort ensures students take the courses together, and thus no time is wasted. Faculty noted that cohort/peer group acts as a support system for the students. A cohort thus instills a sense of "healthy competition" on its members to work together to finish in a timely fashion. It is used as a way to enhance peer support, which in turn, is associated with shorter TTD (Bauer, 2004; Ferrer de Valero, 2001). Stolzenberg (2006) noted that problems might arise if peer support replaces rather than supplements faculty mentoring.

Accountability and TTD

The responsibility for one's actions was perceived to be moderately associated with TTD. A student may hold oneself accountable for tasks or activities related to attainment the doctorate; may hold others accountable, for instance, the advisor or committee; or may hold both self and others accountable. It was not clear whether students who tend to hold themselves accountable were perceived to attain the doctorate faster than did those who do not. The finding that completers of the doctorate were independent (Kluever, 1997) and took more personal responsibility (Kitell-Limerick, 2005) than did non-completers highlights the centrality of accountability in timely doctorate attainment

Attitude and TTD

Students' attitude towards coursework and/or dissertation was perceived to be at least moderately associated with TTD. A student may have a *negative attitude* towards the dissertation (e.g., viewing the dissertation as an extra requirement to be fulfilled, a means to an end) or a *positive attitude* (e.g., viewing the dissertation as an opportunity to find answers to questions of interest). Faculty perceived that students who have a positive attitude tend to progress faster than did those with negative attitudes, a finding congruent with Nerad and Cerny's (1993) in which students who perceived coursework, qualifying exams, and dissertation writing stages as hurdles rather than steps leading to the completion of the doctorate, experienced a longer TTD.

Proximity and TTD

Whereas students perceived that how far geographically a student resides from the institution was minimally associated with TTD, faculty perceived it to be at least moderately associated with TTD. The general perception was that students who lived closer to the university tended to progress faster because they had close access to the advisor and other resources compared to those who lived further from campus. This finding seems to be consistent with Wilson's (1965) results wherein writing a dissertation off-campus was associated with longer TTD and Stripling's (2004) finding in which geography, defined as distance from campus, was related to TTD.

Economic Integration Factors

Economic integration refers to the degree to which students' financial needs are met while pursuing the doctorate. Finances may be secured in the form of financial aid,

loans, personal saving, work, assistantships, fellowships, and so forth. Generally, economic factors were perceived be moderately associated with TTD.

Work and TTD

Being employed while pursuing the doctorate was perceived to be moderately associated with TTD. Students, who, after attaining the candidacy, accept job offers, tend to be preoccupied with work and lose the focus to finish in a timely manner, especially if the work schedule is not flexible and involves frequent traveling. On the other hand, work may facilitate timely doctorate attainment. If the doctorate is required for job promotion, students tend to strive to finish in order to secure the promotion. Whereas graduate assistants may earn less than they would if employed outside the university, the skills they acquire by engaging in various research projects pay back: they tend to go through the dissertation faster than did those who do not engage in such projects.

Crayton's (2005) study established that work was related to TTD in interesting ways: whereas a reduction in the number of hours of work or stopping working altogether was associated with short TTD, maintaining the number of hours of work was associated with the shortest TTD. Crayton postulated that the feeling of stability and security explains why students maintaining their hours of work experience the shortest TTD.

Finances and TTD

The type and amount of financial support a student receives was perceived to be moderately associated with TTD. The perception was that students on scholarship tend to stay focused to finish before the expiration of the scholarship period whereas self-sponsored students, who may not have such urgency, tend to take longer to complete. It may be that most scholarships require students to enroll full-time, which as revealed

earlier, was perceived to be associated with timely doctorate attainment. Previous research indicates that type, amount, and the timing of financial support received are associated with TTD (Nerad & Cerny, 1993; Tinto, 1993).

Personal Attributes

Personal attributes refer to psychological traits that students possess and which are related to their goals and commitments while pursuing the doctorate. Apart from "Motivation," most of these factors were perceived to be minimally associated with TTD.

Motivation and TTD

The desire to work and attain goals despite obstacles encountered was perceived to be strongly associated with TTD. Characteristics of a motivated student may include self-discipline and diligence in task performance. Students who are motivated were perceived to attain the doctorate faster than did those who lacked motivation. Congruent with this finding is Bauer's (2004) result in which students' internal motivation was associated with shorter TTD and Bair's (1999) finding wherein the determination to complete the degree against all odds was strongly related to doctorate attainment.

Goal-orientedness and TTD

The ability to set goals and timelines within which to achieve them was perceived to be moderately associated with TTD. Goal-oriented students set deadlines (e.g., bi-weekly meeting with advisors and when to complete various chapters of the dissertation) and work to meet them rather than looking for excuses. The general perception was that goal-oriented students tend to finish faster than those who are not goal-oriented. Consistent with the present findings, Maher et al. (2004) established that early-finishing women (i.e., those who completed in less than 4¼ years) were committed to timely

degree completion and described themselves as goal-oriented whereas late-finishing women (i.e., those who completed in 6¾ years or more) were less clear about their goals and lacked the urgency to complete the doctorate.

External Factors

External factors refer to situations or events that occur outside the institution such as family obligations, divorce, and marriage, which may affect TTD. Generally, external factors were perceived to be moderately associated with TTD.

Family and TTD

The restrictions that occur due to family obligations was perceived to be moderately associated with TTD. Family responsibilities such as spending time with children or spouse, taking care a sick child, spouse or parent, and so on, require time and energy that would otherwise be dedicated to the pursuit of the doctorate. The general perception was that students with more family responsibilities tended to have a longer TTD than did those who had no or less family obligations.

Consistent with the present finding, in Bauer's (2004) study, participants in the 31-40 years age bracket advised against starting a family while pursuing graduate studies, arguing that doctoral study leaves little room to meet effectively one's family obligations. Similarly, Girves and Wemmerus (1988) established that getting married or becoming a parent while pursuing the doctorate affects students' progress. In Maher et al.'s (2004) study, late-finishing women were more likely to attribute their slow pace to child-care responsibilities and marital problems compared to early-finishers.

Life Events and TTD

The major events that occur in a student's life were perceived to be moderately associated with TTD. Divorce and marriage were frequently cited life events. Divorce may be distractive as it drains a student emotionally. Marriage may force a student to stop out thus slowing the progress. It was perceived that students who encounter these life events tend to experience longer TTD than those who do not. Maher et al.'s (2004) study focusing on women revealed that many late-finishing women experienced divorce, which slowed their progress compared to early-finishing women.

Social Support and TTD

The support obtained outside the institution (e.g., from family, friends, employer or the workplace) was perceived by students to be strongly associated with TTD. The general perception was that students who have a social support network tend to attain the doctorate faster than do those who lack the same level of support. Support may include rewarding the attainment for attaining a milestone (e.g., passing the qualifying exam) or offering emotional support when a student feels discouraged for failing the qualifying exam. Consistent with this finding, Lenz (1995) found that lack of an active support network delayed the completion of the doctorate and Schwarz (1997) established that a partner's emotional support and help with childcare were associated with shorter TTD.

Personal Versus Institutional Factors Perceived to be Associated with TTD

In sum, factors perceived to be associated with TTD were broadly classified as personal or institutional. Personal factors refer to characteristics specific to a student's situation and are not directly controlled by the institution whereas institutional factors are those over which the institution has direct control. Students and faculty concurred that

factors associated with TTD were predominantly personal, a finding that agrees with Boydstun's (1996) in which personal factors (e.g., being focused, diligent, and motivated) were cited most often as "what the student could have changed" to shorten TTD (p. 322). Kitell-Limerick (2005) established that psychological (personal) factors such as poor self-confidence, lack of motivation, and the tendency to procrastinate, were perceived by both students and faculty to have the most significant influence on doctoral completion.

Complementary Findings

Age. Whereas students' age at admission was not statistically significantly related to the odds of doctorate attainment (quantitative finding), faculty perceived it to be moderately associated with TTD (qualitative finding): most students admitted into the STTD programs were in their 20s whereas most students admitted into the LTTD programs were in late 30s or early 40s. Perhaps TTD differs, in part, by age.

Academic achievement. Although academic achievement variables such as student's GRE scores were not statistically significantly related to the timing of doctorate attainment, master's GPA score was (quantitative). This was supported by the qualitative finding that both students and faculty noted that "brightness" or "intellectual capacity to do the work" was important in students' progress.

Conclusions

Based on the findings from the quantitative component of the study, the following conclusions were made: (a) female students had statistically significantly higher odds of doctorate attainment in each year during the 10 years compared to male students only when the nesting of students into programs was not considered, otherwise the significant relationship disappeared; (b) students with high master's GPA scores were statistically

significantly more likely to attain the doctorate in each year during the 10-year observation period; (c) a decrease in the size of the department housing the program was associated with a statistically significant increase in the odds of doctorate attainment in the program in each year during the 10-years; (d) programs with a larger percentage of female students had greater odds of doctorate attainment in each year during the 10 years; and (e) a higher mean GRE quantitative score in the program was statistically significantly related to higher odds of doctorate attainment in each of the 10 years.

Similarly, based on the findings from the qualitative component, the following conclusions were drawn: (a) *students* perceived that three academic integration factors ("Communication," "Topic" and "Committee") were strongly associated with TTD and one social integration factor ("Advising") and one external factor ("Social support") were moderately associated with TTD; (b) *faculty* perceived that two academic integration factors ("Enrollment" and "Preparation") and one social factor ("Advising") were strongly associated with TTD, whereas two academic integration factors ("Communication" and "Topic") and two social integration factors ("Attitude" and "Remuneration") were moderately associated with TTD; and (c) *both students and faculty* perceived that one academic integration factor ("Structure") and one personal attribute ("Motivation") were strongly associated with TTD, whereas three social integration factors ("Accountability," Cohort/Peer," and "Goal-orientedness"), two economic integration factors ("Work" and "Finance"), and two external factors ("Family" and "Life events") were moderately associated with TTD.

Recommendations for Policy and Practice

This institution-specific study has yielded useful findings to constituencies in and out of the college. How these findings inform policy and practice are discussed next.

TTD Expectations

Apart from the expectation that coursework and dissertation be completed within a certain set duration, at this college, the median TTD is not spelt out. Departmental websites communicates only information about semester hours required. The finding that median TTD in this college was 5.8 years and that students were likely to attain the doctorate in the seventh year may be useful information, for instance, to current students in determining the extent to which their progress is timely or to potential students in deciding, in part, whether the expected duration will be worthwhile. Faculty perceived that "most programs in the college are among the longest in the nation" and suggest that the number of credit hours be reduced. Implementing this suggestion may lead to time reduction in terms of required coursework credits, however, it may have little impact in the dissertation phase, the period when students tend to spend the longest amount of time. Using the methods described in the quantitative component, median TTD could be computed for programs within and across departments and the information used as a guide in setting reasonable expectations on TTD.

Median TTD as a Performance Indicator

There is a continued decrease in state funding for higher education (Selingo, 2003). At the same time, there is an increase in the emphasis on accountability and performance assessment of institution's performance (Burke et al., 2002; Layzell, 1999). The median TTD may be used as one of the indices to determine the performance of

various programs in the college. The computation of median TTD, unlike in previous studies, is accurate as it considers information on censored cases and the nesting of students into programs (multilevel structure).

Application/Admission Decisions

The finding that the master's GPA score at admission was positively related to the timing of doctorate attainment whereas GRE quantitative or verbal scores at admission were not statistically significantly related to the timing of doctorate attainment may be useful to potential applicants in determining their chances of completing in a timely fashion. Admission committee may also find this information useful as part of the factors to consider in making admission decisions. However, these suggestions should be viewed cautiously because a host of factors, besides academic performance, may come into play.

Department Size and Program's Gender Composition

The finding that programs housed in smaller departments or have higher percentage of female students are associated with higher odds of doctorate attainment needs to be explored in a systematic study. Although these results may seem to favor reducing the number of programs housed in the department or increasing the percentage of female students in the program, before such measures are taken, the particularities of each program should be considered. It may be that, reducing the number of programs housed in the department leads to a low student/faculty ratio that allows for effective advising, which, in turn, leads to faster progress. In other words, there may be other mediating factors that the present study was not able to identify due to limited number of variables in the secondary data used.

Re-structuring of Coursework and Dissertation

An overwhelming finding was that both students and faculty perceived that the nature and arrangement of program tasks and resources was strongly associated with TTD. It may be that the college, by undertaking certain structural changes its programs, may increase the odds of doctorate attainment. According to students, such changes include ensuring that (a) faculty are available to teach courses as scheduled; (b) the instruction is offered in multiple modes and flexible schedules that accommodate varying students' needs; (c) the coursework incorporates practical hands-on activities; and (d) both phases of the program (i.e., coursework and dissertation) are emphasized.

Student Enrollment Status

The finding that fulltime enrollment was strongly and positively associated with short TTD may prompt administrators to encourage students to enroll fulltime preferably including summer semesters in an attempt to increase their odds of timely completion. This may seem a worthwhile effort, however, it should be noted that the "effect" of fulltime enrollment might hold only during the coursework phase. Students in candidacy (ABD), the period when the longest time is spent based on the literature, may not differ in their enrollment status. For instance, in this college, students in candidacy are required to enroll for at least two credit hours, which is technically considered "full-time."

Timely and Diverse Modes of Communicating Program Information

Clear and timely communication of program expectations and requirements was perceived to be at least moderately associated with TTD. Perhaps, diversifying modes of communication of program expectations and requirements may increase the odds of timely completion. According to students, this may include providing a *handbook*,

institutionalizing the *orientation*, using the Internet, and encouraging students to enquire from peers and faculty. Also, providing the information in multiple modes may help to meet students' varying preferences.

Research and Writing Skills

The amount and quality of academic preparation students receive were perceived to be at least moderately associated with TTD. Inherent in students' perception was the expectation that faculty should play a major role, whereas faculty expected the students to take the initiative. Students suggested that the instruction should emphasize real-life application of materials learned. According to faculty, dissertating students should form writing groups that critique and provide feedback to one another's work.

Whereas in some programs students have opportunities to participate in various research projects, in others, the first exposure to actual research is when they conduct the dissertation! Besides the exposure to a gamut of courses, this researcher recommends that student engagement in research be formalized. Engagement in practical hands-on research activities affords students the opportunity to practice and hone skills necessary to undertake successfully the dissertation. Writing also was identified as being a problem among students whereby a good number of students lack strong writing skills. Whereas tremendous efforts have been made in organizing workshops where faculty present topics of wide applications to fill the gaps on what might not have been covered during coursework, topics related to dissertation issues also should be included. Although a support center has been established at the study institution to help doctoral students with dissertation-related issues, help with writing should be included as an integral function of this center.

Nature of the Dissertation Topic

The nature of the dissertation topic was perceived to be at least moderately associated with TTD. It may be that keen consideration of the nature of the dissertation topic chosen may increase the chances of timely completion. Apart from beginning working on the topic early, suggestions by participants in this study include choosing a topic that: one is passionate about, one has ownership of, allows one to solve a problem or to learn something of interest, and one in which one's committee has expertise.

Advising, Mentoring and Supervision

Advising was perceived to be at least moderately associated with TTD, a result that was not surprising based on the literature. However, some interesting findings were uncovered. First, students viewed advising broadly and expected advice from assigned advisors as well as from other faculty with whom they interact prior to and during the dissertation stage. Second, faculty acknowledged that their attitudes towards advisees as well as the value they attach to advising is pivotal for students' progress. Among the recommendations they cited include establishing collegial relationship with advisees, finding out what problems they encounter, helping them define reasonable goals and prodding them to attain the goals, and generally creating an atmosphere where students feel safe to discuss issues that affect their progress. Third, both students and faculty were passionate about the timeliness of feedback, a finding that might suggest that chances of completing in a timely fashion may increase if faculty members make efforts to provide quality and timely feedback to advisees and insist on receiving timely feedback from advisees. Some students encounter advising problems especially with new faculty. To augment learning by doing, it is recommended that, prior to assuming an advising role,

such faculty members should undergo formal training about procedures, key dates, and best advising practices. This may be achieved by having senior faculty conduct workshops where they share such information with new members of faculty.

Dissertation Committee Dynamics

An unexpected finding was that whereas students perceived the dissertation committee to be strongly associated with TTD, on the contrary, faculty perceived it to be minimally associated with TTD. What this result may be suggesting is not that faculty do not value the dissertation committee, rather, their comments revolved around individual interaction with students as is evidenced by their perception that advising had a strong association with TTD. Students' comments, however, included both one-to-one interaction (advising) and one-to-many interaction (committee). Given that both faculty–student and faculty-faculty interactions are crucial for students' progress, committee members should work collaboratively to ensure the student completes in a timely manner.

Whereas the pre-dissertation advisor is normally assigned with minimal student input, student, in consultation with the department chair, should consult widely in selecting the dissertation committee. Philosophical compatibility, personality, and expertise of the members should be considered to avoid future conflicts that may delay students' progress. According to students, desirable attributes to consider include a faculty member who: provides timely feedback, is flexible with meeting times, is interested in the student's progress, and is willing to let the student bounce ideas off him or her. Whereas a faculty may possess these attributes, with many advisees, it may be difficult to offer effective advising. It is incumbent upon students to find out if a faculty's workload and future commitments will affect timely completion of their doctorate.

Student Motivation

Motivation was perceived to be strongly associated with TTD. Students who have the capacity to work hard despite obstacles encountered tend to attain the doctorate faster than do those who only put minimal efforts in their academic work. Whereas this finding was not surprising, it was interesting to note that faculty tended to view motivation as being intrinsic whereas students viewed it as being extrinsic. Faculty expect students to be self-disciplined and ready to invest time in order to attain the doctorate, expectations which are congruent with the notion that timely doctorate attainment is largely a student's responsibility. Conversely, students expect external reinforcement or some form of recognition from faculty. Student should note that rewarding themselves for attaining the milestone may be a form of extrinsic motivation besides faculty recognition.

Given the centrality of motivation on timely doctorate attainment, the college may devise ways to motivate students at various stages in the program. For instance, recent graduates from the program who faced various drawbacks (e.g., change in marital status, lack of child care, sickness, switching and/or replacement of committee members, change of dissertation topics) while pursuing their studies may be invited to share their experiences with incoming students during orientation or with students in the ABD stage regarding the strategies that they employed to overcome these obstacles.

Formal or Informal Cohorts?

Belonging to a cohort was perceived to be moderately associated with TTD, a finding that may prompt departments currently experiencing relatively longer TTD to consider formalizing a cohort system with a view to increase the odds of timely doctorate attainment. However, cognizance should be taken of the fact that formalizing a cohort

system might hinder some subgroups of students from pursuing the doctorate. Perhaps, encouraging students to develop informal cohorts in the form of study groups, research groups, and so on, might meet diverse student enrollment needs. In fact, an informal cohort may be the source of peer support and interaction in programs that are designed for working professionals and are part-time by nature (e.g., Higher Education).

Family Obligations and Social Support

Restriction that occurs due to family responsibilities was perceived to be moderately associated with TTD. Spouse, family members and friends are reminded that helping with various duties such as baby-sitting, caring for a sick child or parent and so on, may afford the student more time to focus on schoolwork, thereby increasing the odds of completing in a timely manner. At times, spouse, children, and friends should be ready to forego spending time with the student especially when the latter has deadlines to meet.

Given the amount of time, energy, and stress sometimes associated with successful doctorate completion, individuals interested in the student's progress should consider providing socio-emotional support, for instance, words of encouragement when a student's internal motivation wanes for failing the qualifying exams or praise to bolster a student's motivation after attaining an important milestone such as attaining candidacy.

Limitations and Directions for Future Research

Although this study enhances our understanding of the factors associated with TTD, a lot remains to be uncovered. Both quantitative and qualitative results indicate that certain factors have stronger associations with TTD than do others but no single factor explains conclusively the timing of doctorate attainment. The limitations of the study are reviewed and suggestions for overcoming them discussed.

Replication of the Study

Whereas several benefits accrue from focusing on a single institution, one College of Education at one university, the particularities of the institution prevent generalizing the findings to others. In other words, the study faces threats to both population validity and ecological validity (Onwuegbuzie & Johnson, 2006). To enhance the generalizability of the results, future researchers should replicate the study in other institutions comparing across programs and departments the median TTD and factors associated with TTD. Although the participants in the qualitative component met the selection criteria set, they were volunteers who may differ from randomly selected participants in some significant ways. Replicating the study with volunteers and randomly selected participants may help to verify the qualitative findings.

Goals for Pursuing the Doctorate

The goals for pursuing the doctorate are not mutually exclusive; however, in general, faculty perceived that most students pursue the doctorate for economic reasons, not academic reasons, as was perceived by students. This finding is inconclusive given the limited sample size, however, of merit for future inquiry is whether this difference in perception between these two groups is significant. A significant difference may imply many things. It may be that students do not communicate explicitly their goals at the beginning of the program or the goals may change while pursuing the doctorate. Suppose the goals change, could it be that the institution fails to consider students' changing goals when revising doctoral curricula? It may also be the case that goals students have are incompatible with the degree.

Time-Varying Covariates

One of the limitations of the quantitative components of the study is that all the covariates were time-constant, that is, their values remain constant throughout the observation period. This may be viewed as a threat to temporal validity. Examining the relationship between TTD and a time-varying covariate such as cumulative GPA score as opposed to a time-constant master's GPA score is a ripe topic for future research. It may be that the effects of certain time-varying covariates on doctorate attainment vary or remain constant over time or the interaction effects with other covariates are statistically significantly related to timing of doctorate attainment.

Additional Variables

While powerful analytic techniques were utilized in this study, the nature of the archival data obtained limited the analyses. Several variables were unavailable but which were worth investigating. These include student-level variables such as part-time or full-time status by semester, cumulative GPA scores, a measure of student engagement in research, and marital status while in graduate school. Rather than aggregating student-level variables to create program-level variables such as percent female, potential program-level variables that could be considered include a measure of a program's faculty productivity, faculty teaching load by semester, whether orientation is conducted, whether and when incoming students are given a handbook, and whether the program follows a cohort system.

Competing Risks Multilevel Hazard Analysis

With the exception of a few students who never officially withdraw from the program, generally, before expiration of a defined period of time, students may either

graduate or withdraw from the pursuit of the doctorate. One important avenue for future research would be to conduct a competing risks discrete-time multilevel hazard analysis whereby graduation and withdrawal are considered as *competing* events of interest. In hazard analysis parlance, two or more events are said to be competing if the occurrence of one precludes the occurrence of the other(s). Rather than examining only one event, graduation, competing risk analysis provides a more accurate picture of the timing of doctorate attainment because it takes into consideration the occurrence of withdrawal in the computation of odds of doctorate attainment.

Multiple-Spell Multilevel Hazard Analysis

Some of the students who attain the doctorate also stop out for one semester, a year, or more while pursuing the doctorate. Because stopout may occur more than once, in hazard analysis parlance, it is referred to as a repeated or multiple-spell event with "enrolled" and "not enrolled" spells. Future researchers may employ multiple-spell hazard analysis to determine when students are most at risk of stopping out, when they are likely to re-enroll after stopping out, and what factors are associated with these events. Ronco (1994) employed this strategy to study student stopout; however, her study focused on undergraduate students and was not undertaken in a multilevel context.

Examining the Milestones

Rather than examining only time to attainment of the doctorate, future researchers should consider also time to attainment of major milestones such as passing the qualifying exam, defending the proposal, and undertaking the final defense as outcomes. It may be interesting to examine when the milestone is likely to be attained, where the longest time is spent, and what factors are related to time to attainment of each milestone.

Civian (1990) attempted to pursue this strategy of examining multiple outcomes, however, in her analysis, the nesting of students within programs was not considered.

Measurable Impact of the Dissertation Topic

Whereas studies have been conducted that examine the relationship of the dissertation topic and persistence, little is known about the measurable impact of the dissertation topic on TTD. How do the candidates go about identifying the topic? To what extent do they perceive they have a sense of ownership of the topic? How do the changes suggested by the dissertation committee alter students' interest, motivation, and passion for the topic? Does it matter if the topic originates from a faculty member's research project or from the student? These are ripe topics for future research in an attempt to delve into the relationship between the dissertation topic and the TTD.

Measurable Impact of Advising

Whereas advising was perceived to be at least moderately associated with TTD, more questions emerged that future researchers should consider. Are there standard procedures regarding how advising should be conducted? How are advisors selected and matched with advisees? Does it matter whether the student or the institution initiates the relationship? Does replacing the advisor affect TTD? If so, does the effect vary by the timing of replacement? Do programs differ in students' tendency to replace advisors? How does same-sex or opposite-sex advisee-advisor pairing relate to TTD? Answers to these questions provide nuances of the relationship between advising and TTD.

Data Collection and Improved Surveys

A concomitant finding of this study was that the college seldom collects systematic information about students' experiences particularly regarding TTD. If the

college is to enact policies that encourage timely completion, systematic and timely information needs to be collected both from students and faculty. Such information should be collected at regular intervals both before and after graduation. Information collected longitudinally track students and is amenable to multilevel discrete-time analysis. The set of themes that emerged from the qualitative component can be operationalized to generate items in the survey to be used in collecting such information.

Experimental Studies

A correlational research design and multiple case study design were employed in the quantitative and qualitative components, respectively. Whereas these designs are appropriate for identifying relationships, given that factors were identified that were strongly associated with the timing of doctorate attainment, the next step would be to attempt to employ an experimental research design. This would involve identifying the factors to manipulate, for instance, cohort versus non-cohort system, and then randomly assigning programs to the conditions of the manipulated factors (independent variables). If this is undertaken over a specified number of years, say five years, the extent to which the odds of doctorate attainment differ in the two groups can then be examined.

An overarching finding of this study is that factors related to TTD are complex. Many factors are at play but none explains conclusively the timing of doctorate attainment. The foregone earnings and unnecessary expenses is costly to students. As universities increasingly face budget cuts, financial considerations related to the preparation of doctoral students continue to be of concern to these institutions. This study will hopefully stimulate more research so as to increase our understanding of factors related to the timing of doctorate attainment, particularly in Education.

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APPENDICES

Appendix A: Informed Consent Form for Student Focus Groups

INFORMED CONSENT FORM FOR TIME TO DOCTORATE STUDY

The following information is being presented to help you decide whether or not you want to take part in a minimal risk research. Please read it carefully. If you do not understand anything, ask the researcher.

Title: A Mixed Methods Approach to Examining Factors Related to Time to Attainment of the Doctorate in Education

Researcher: Hesborn Wao **Study Location:** College of Education, X University

As you may be aware, not all students who matriculate into the doctoral programs complete their studies as scheduled. For various reasons, some students take a long time to graduate while others seem to cruise through. The purpose of this study is to understand the timing of doctorate attainment in the College of Education and the factors related to this timing. Having a better understanding of factors that influence the timing of doctorate attainment will enable the college to develop strategies that lead to timely doctorate attainment.

You are being requested to participate in this study because you are/were a doctoral student in the College. If you choose to participate, you will be asked to engage in a discussion in the form of a focus group with five other students. You will be required to share your experiences regarding what factors you perceive influenced the time you took to attain the doctorate. The focus group will be audio tapped and transcribed. No anticipated risks are associated with your participation. Should you feel uneasy discussing certain expereinces in the group, you are welcome to write them down or participate in a follow-up interview lasting not more than one hour. Arrangements have been made with the Couseling Center for counseling services to participants who may become emotional while sharing their experiences.

You will not directly benefit from participating in this study, however, by taking part you may increase our overall knowledge of what factors influence the timing of doctorate attainment in the College.

Authorized personnel, employees of the Department of Health and Human Services, and the Institutional Review Board and its staff, and any other individuals acting on behalf of X university, may inspect the records from this study. In the event of the results of this study being published, the data you provide will be combined with the data from others and the results will not include your name or any information that personally identifies you. Although absolute confidentiality cannot be guaranteed because of the group setting, I will ask that what is discussed during the session to remain within the group. The data will be destroyed after 3 years.

Your decision to participate in this study is voluntary and you are free to withdraw at any time. If you choose not to participate, or if you withdraw, there will be no penalty.

If you have any questions about your rights as a person who is taking part in a research study, you may contact the Division of Research Integrity and Compliance of the X University at (*Telephone Number*). If you have any questions about this research study contact the researcher, Hesborn Wao, at (*Telephone Number*) or via email at (*email address*). Thank you.

I have carefully explained to the participant the nature of the above research study. I hereby certify that to the best of my knowledge the participant signing this consent form understands the nature, demands, risks, and benefits involved in participating in this study.

_____ _____ _____

Signature of Investigator **Printed Name of Investigator** **Date**

I understand that I am being asked to participate in a research study described in this form. I understand the risks and benefits, and I freely give my consent to take part in this study under the conditions indicated in it. I have received a copy of this consent form to take with me.

_____ _____ _____

Signature of Participant **Printed Name of Participant** **Date**

Appendix B: Informed Consent Form for Student Follow-up Interview

INFORMED CONSENT FORM FOR TIME TO DOCTORATE STUDY

The following information is being presented to help you decide whether or not you want to take part in a minimal risk research. Please read it carefully. If you do not understand anything, ask the researcher.

Title: A Mixed Methods Approach to Examining Factors Related to Time to Attainment of the Doctorate in Education

Researcher: Hesborn Wao **Study Location:** College of Education, X University

As you may be aware, not all students who matriculate into the doctoral programs complete their studies as scheduled. For various reasons, some students take a long time to graduate while others seem to cruise through. The purpose of this study is to understand the timing of doctorate attainment in the College of Education and the factors related to this timing. Having a better understanding of factors that are associated with timing of doctorate attainment will enable the college to develop strategies that lead to timely doctorate attainment.

You are being requested to participate in this study because you are/were a doctoral student in the College of Education. If you choose to participate, you will be asked to engage in a one-to-one interview where you will be required to share your experiences regarding what factors you perceive influenced the time you took to attain the doctorate. The interview will take not more than one hour and it will be audio tapped and transcribed. No anticipated risks are associated with your participation in the interview. Arrangements have been made with the Couseling Center (*Telephone Number*) for counseling services to participants who may become emotional while sharing their experiences.

You will not directly benefit from participating in this study, however, by taking part you may increase our overall knowledge of what factors influence the timing of doctorate attainment in the College of Education.

Authorized personnel, employees of the Department of Health and Human Services, and the Institutional Review Board and its staff, and any other individuals acting on behalf of X university, may inspect the records from this study. In the event of the results of this study being published, the data you provide will be combined with the data from others and the results will not include your name or any information that personally identifies you. Although absolute confidentiality cannot be guaranteed because of the group setting, I will ask that what is discussed during the session to remain within the group. The data will be destroyed after 3 years.

Your decision to participate in this study is voluntary and you are free to withdraw at any time. If you choose not to participate, or if you withdraw, there will be no penalty.

If you have any questions about your rights as a person who is taking part in a research study, you may contact the Division of Research Integrity and Compliance of the X University at (*Telephone Number*). If you have any questions about this research study contact the researcher, Hesborn Wao, at (*Telephone Number*) or via email at (*email address*). Thank you.

I have carefully explained to the participant the nature of the above research study. I hereby certify that to the best of my knowledge the participant signing this consent form understands the nature, demands, risks, and benefits involved in participating in this study.

_____ _____ _____

Signature of Investigator **Printed Name of Investigator** **Date**

I understand that I am being asked to participate in a research study described in this form. I understand the risks and benefits, and I freely give my consent to take part in this study under the conditions indicated in it. I have received a copy of this consent form to take with me.

_____ _____ _____

Signature of Participant **Printed Name of Participant** **Date**

Appendix C: Informed Consent Form for Faculty Focus Groups

INFORMED CONSENT FORM FOR TIME TO DOCTORATE STUDY

The following information is being presented to help you decide whether or not you want to take part in a minimal risk research. Please read it carefully. If you do not understand anything, ask the researcher.

Title: A Mixed Methods Approach to Examining Factors Related to Time to Attainment of the Doctorate in Education

Researcher: Hesborn Wao **Study Location:** College of Education, X University

As you may be aware, not all students who matriculate into the doctoral programs complete their studies as scheduled. For various reasons, some students take a long time to graduate while others seem to cruise through. The purpose of this study is to understand the timing of doctorate attainment in the College of Education and the factors related to this timing. Having a better understanding of factors that influence the timing of doctorate attainment will enable the college to develop strategies that lead to timely doctorate attainment.

You are being requested to participate in this study because you are a faculty member who has had adequate experience with doctoral students in the College and the records indicate that you have served in a doctoral committee in the past. If you choose to participate, you will be asked to engage in a discussion in the form of a focus group with seven other faculty members from the college. You will be required to share your experiences regarding what factors you perceive influence the time that students take to attain the doctorate. The focus group will be audio tapped and transcribed. No anticipated risks are associated with your participation in this study. Should you feel uneasy discussing certain expereinces in the group, you are welcome to write them down or participate in a follow-up interview interview lasting not more than one hour.

You will not be paid or directly benefit from participating in this study, however, by taking part you may increase our overall knowledge of what factors influence the timing of doctorate attainment in education.

Authorized research personnel, employees of the Department of Health and Human Services, and the Institutional Review Board and its staff, and any other individuals acting on behalf of X university, may inspect the records from this research study. In the event of the results of this study being published, the data you provide will be combined with the data from others and the results will not include your name or any information that personally identifies you. Although absolute confidentiality cannot be guaranteed because of the group setting, participants will be asked not to disclose what is discussed during the session to otsiders.

Your decision to participate in this study is voluntary and you are free to withdraw at any time. If you choose not to participate, or if you withdraw, there will be no penalty.

If you have any questions about your rights as a person who is taking part in a research study, you may contact the Division of Research Integrity and Compliance of the X University at (*Telephone Number*). If you have any questions about this research study contact the researcher, Hesborn Wao, at (*Telephone Number*) or via email at (*email address*). Thank you.

I have carefully explained to the participant the nature of the above research study. I hereby certify that to the best of my knowledge the participant signing this consent form understands the nature, demands, risks, and benefits involved in participating in this study.

_____ _____ _____

Signature of Investigator **Printed Name of Investigator** **Date**

I understand that I am being asked to participate in a research study described in this form. I understand the risks and benefits, and I freely give my consent to take part in this study under the conditions indicated in it. I have received a copy of this consent form to take with me.

_____ _____ _____

Signature of Participant **Printed Name of Participant** **Date**

Appendix D: Script for Introduction of Student Focus Groups

TIME TO THE DOCTORATE STUDENT FOCUS GROUP

Good morning and welcome to this session. Thank you for agreeing to participate in this focus group. My name is Hesborn, a doctoral student in department T. With me is Y from department L. My dissertation topic involves gathering information about experiences and opinions regarding factors that you perceive influence the length of time that you took from the time you were admitted to the time you attained your doctorate. Such information will increase our overall knowledge of factors that influence time to attainment of the doctorate in education. The college, future doctoral students and other stakeholders will benefit from such information.

Your views are important to us because you represent students who have passed through various stages of the doctoral program. Some students experience longer time-to-degree (TTD), others experience shorter TTD. There is no right or wrong reason for the time taken to graduate, rather, different factors influence TTD so feel free to share your experiences even if it is different from what others experienced.

To help us manage this discussion, I request that one person speak at a time. I request that you pick your favorite name tent (*bearing pseudonyms*) and place in front of you. If you want to agree, disagree, or add something to what a member has said, feel free to do so. Throughout the discussion, please be sure to refer to a member using the pseudonyms. To avoid missing your comments, the discussion will be tape recorded. Be assured that your comments will be confidential and only pseudonyms will be included in the final report. I cannot guarantee absolute confidentiality because of the group setting, but I ask every member that what is discussed not to be disclosed to others outside of this focus group. The discussion will last about one hour without a formal break. I am here to listen, ask questions, and make sure that everyone gets a chance to contribute. Y will be taking notes.

Before we begin, I would like us to go over the informed consent form, which will give you more information about this study. (*Give each participant a copy of the informed consent form and ask them to read and sign*). Do you have any questions before we begin? (*Questions are addressed and; tape recorder is turned on and checked to make sure it is functioning*). Thank you.

Appendix E: Script for Introduction of Faculty Focus Groups

TIME TO THE DOCTORATE FACULTY FOCUS GROUP

Good morning and welcome to this session. My name is X, a professor in D Department in the College of Education. With me is Dr. Y, also from the same department. We are here to facilitate a focus group which is part of a dissertation. Thank you for agreeing to participate. This study involves gathering information about your experiences and opinions regarding factors that you perceive influence the length of time that doctoral students take from the time they are admitted to the time they attain the doctorate. Such information will increase our overall knowledge of factors that influence time to attainment of the doctorate. The college, future doctoral students and other stakeholders will benefit from such information.

Your views are important to us because you represent College faculty who have had adequate experience with doctoral students. Some students take a long time to graduate while others seem to cruise through. There is no right duration to attain the doctorate, rather, different factors influence the timing of doctorate attainment so feel free to share your experiences even if it is different from what others experienced.

To help us manage this discussion, I request that one person speak at a time. We request that you pick your favorite name tent (*bearing pseudonyms*) and place in front of you. If you want to agree, disagree, or add something to what a member has said, feel free to do so. Throughout the discussion, please be sure to refer to a member using the pseudonyms. To avoid missing your comments, the discussion will be audio recorded. Be assured that your comments will be confidential and only pseudonyms will be included in the final report. I ask every member that what is discussed should not be disclosed to others outside of this focus group.The discussion will last about one hour without a formal break. I am here to listen, ask questions, and ensure that everyone gets a chance to contribute. Dr. Y will be taking notes.

Before we begin, I would like us to go over the informed consent form, which will give you more information about this study. (*Give each participant a copy of the informed consent form and ask them to read and sign*). Do you have any questions before we begin? (*Questions are addressed and; tape recorder is turned on and checked to make sure it is functioning*). Thank you.

Appendix F: Student Focus Group Questioning Route

TIME TO THE DOCTORATE STUDENT FOCUS GROUP

Opening Question:
Let us begin by everyone saying their pseudonym and the doctoral degree program of study as we go round the table.

Introductory Question:

1. When do you first remember being interested in that program and what motivated you to pursue that program it?
2. To what extent have/did you achieve what you expected?

Transition Questions:

3. What are the major stages of your doctoral degree program?
4. How long did you take you to reach each of these stages?
5. How long did you spend at each stage?

Key Questions:

6. Think back to each of the stages, make a list of important factors that made you take short/long time in each stage. *In a moment, we will share these with each other.*

7. For each of the stages, pick three factors that contributed most to you spending short/long time.

8. If we were to classify the factors influencing time to attainment of the doctorate into "institutional" and "personal," which of the two contribute most? (*Let each participant give their opinion on this*)

9. If there were four major things that can be done to shorten TTD, what would those things be?

Ending Questions:

10. The purpose of today's discussion was to help us understand the factors that influence time to attainment of the doctorate. Is there anything that we have missed or anything that you would like to add?

----------The End ----------

Appendix G: Faculty Focus Group Questioning Route

TIME TO THE DOCTORATE STUDENT FOCUS GROUP

Opening Question:

Let us begin by everyone saying their pseudonym and department you belong to as we go round the table.

Introductory Question:

1. Based on interactions with students, what do you perceive motivate most students to pursue doctoral studies in your department?
   (*What are their goals for pursuing the doctorate?*)
2. To what extent do students achieve the goals stated in (1) above?

Transition Questions:

3. What are the major stages of the doctoral degree program(s) in your department?
4. How long, in average, do students in your department spend in the various stages of the programs?

Key Questions:

5. Think back to your experiences with students, make a list of important factors that you perceive make students take short/long time. *In a moment, we will share these with each other.*
   (*Provide participants with papers and remember to collect them after the session*; *Have every participant read out his/her list and take note of the factors they cite*)
6. Of the factors that you identified, pick three factors that you perceive contribute **most** to students spending short/long time to the doctorate. (Note: *We are interested more in long time to degree*)
7. If we were to classify the factors influencing time to attainment of the doctorate into "institutional" and "personal," which of the two contribute most? (*Let each participant give their opinion on this*)
8. If there were four **major** things that can be done to shorten time to attainment of the doctorate, what would those things be?

Ending Questions:

9. The purpose of today's discussion was to help us understand the factors that influence time to attainment of the doctorate. Is there anything that we have missed or anything that you would like to add?

----------The End ----------

Appendix H: Student Follow-up Interview Protocol

TIME TO THE DOCTORATE STUDENT INTERVIEW

Opening Questions:

1. Tell me what motivated you to pursue the doctorate in this program?
2. I would like you to talk about the length of time it took you to attain the doctorate. What types of expectations did you have about how long it would take to complete the degree? What actually happened? (*went fast or took long)*

Transition Questions:

3. Did you stop out? If so, at what stage and for how long? Why?

Key Questions: (*Focuses on certain factors in the focus groups*)

1.) Committee:

6.) How did you go about choosing members of your dissertation committee (DC)?
7.) Did you have to replace any of your DC members? If so, why?
9.) How satisfied were you with the turnaround time of your DC members?
10.) How satisfied were you with the support you received from the DC?

2.) Curriculum Structure:

11.) Briefly describe how your program is structured in terms of coursework etc.
12.) In your program, to what extent is coursework and dissertation connected.
13.) To what extent are you satisfied with the way your program is structured?

3.) Motivation:

14.) How did you feel after completing coursework phase of your program?
15.) How determined were you to complete in a timely manner? (*what did you do?*)
16.) What was your source of motivation to continue (*despite the obstacles you met*)?
17.) What are the characteristic of a motivated doctoral student?

4.) Goal-oriented:

18.) Did you set for yourself deadlines to meet? Describe exactly what you did.
19.) To what extent did you meet the deadlines you set for yourself?
20.) Were your dissertation committee members strict about deadlines?

5.) Communication:

21.) How were the program requirements and expectation communicated to you?
22.) Did you experience orientation at admission? (*What activities occurred?*)
23.) To what extent did your understanding of program requirements change?
24.) Based on what you know now about your program, would you have joined?

6.) Topic:

25.) How did you come up with your dissertation topic?
26.) Was your choice of topic influenced by anybody? Who? How? Why?
28.) To what extent did you feel you had ownership of your topic?
29.) What factors should one consider when choosing a dissertation topic?

Closing Questions:

30.) Of the factors that we have discussed, identify THREE that influence most TTD.
31.) Conceptualizing factors influencing TTD as either "institutional" or "personal," which of the two influenced more the time that you took to attain the doctorate?
32.) The purpose of today's discussion was to help us understand the factors that influence time to attainment of the doctorate. Is there anything that you feel we missed or anything that you would like to add?

~~~~~~~~~~~~~~~~~~~~~~~~**THANK YOU**~~~~~~~~~~~~~~~~~~~~~~~~~~~~
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Appendix I: Script for Introduction of a Student Follow-up Interview

TIME TO THE DOCTORATE STUDENT FOLLOW-UP INTERVIEW

Good morning and welcome. Thank you for agreeing to participate in this follow-up interview. During the focus groups, some issues arose that I would like to seek your help to understand better. Your views are important to me because you represent students who have _____ (*mention the reason why the participant was singled out for follow-up, for example, she/he represents minority students taking shortest time to degree*). There is no right or wrong reason for the timing of your doctorate attainment, rather, different factors influence TTD so feel free to share your experiences even if it is different from what others experienced.

First, I request that you pick a favorite name tent (*bearing pseudonyms*) and place in front of you. This is the 'name' I will refer to during the interview. Throughout the interview, please feel free to ask me to repeat and/or clarify a question that you find unclear. To avoid missing your comments, I request that you allow me to tape record the interview. Be assured that your comments will be confidential and only pseudonyms will be included in the final report. The interview will last about one hour without a formal break. I am here to listen, ask questions, and take some notes during the interview.

Before we begin, I would like us to go over the informed consent form, which will give you more information about this study. (*I will give the participant a copy of the informed consent form and asked her/him to read and sign. A copy of the signed form is given to the participant is she/he requests for one*). Do you have any questions before we begin? (*Questions are addressed and; tape recorder is turned on and checked to make sure it is functioning*). Thank you.

Appendix J: Email Announcement to Student Participants

TIME TO DOCTORATE IN THE COLLEGE OF EDUCATION

To: _____ (*Participant's first Name*) **From**: Hesborn Wao
Subject: Request for Participation in a Research Study

Dear _____(*Full Name of Participant*),
I am a doctoral student in the X department. My program of study is called P. I defended successfully my dissertation proposal on December 6, 2006 and I am in the process of preparing to conduct the research study. I would like to put forward a request: I need participants for a focus group which is going to be part of the qualitative component of my study. Here is a brief description of the study:

My dissertation is titled, "A Mixed Methods Approach to Examining Factors Related to Time to Attainment of the Doctorate in Education." As you may be aware, not all students who matriculate into the doctoral programs complete their studies as scheduled. For various reasons, some students take a long time to graduate while others seem to cruise through. The purpose of my study is to understand the timing of doctorate attainment in the College and the factors related to this timing.

In order to understand the factors that are related to the timing of doctorate attainment both students' and faculty members' perceptions are important. Besides faculty focus group, the qualitative component of the study will involve students participating in a focus group to discuss factors that they perceive contribute to the length of time they took to attain a doctorate in the College.

By taking part in this study you may increase our overall knowledge of what factors influence the timing of doctorate attainment in education. Having a better understanding of factors that influence the timing of doctorate attainment will enable the college to develop strategies that lead to timely doctorate attainment.

I have already received IRB approval to undertake the study and those who volunteer to participate will be furnished with more details of the study. The focus group will last between 50 minutes to one hour. I intend to conduct the focus group on the following dates: _____ (*list of date and time are provided*).

Please, email or call me back to let me know if you could be able to participate. Also, let me know which days and times would be convenient for you. I hope to hear from you whenever you get a chance. Thank you.

Hesborn Wao
Doctoral Candidate
Name of the Department
Telephone and Email Contact

Appendix K: Email Announcement to Faculty Participants

TIME TO DOCTORATE IN THE COLLEGE OF EDUCATION

To: All Faculty Members in the College of Education at X University
From: Hesborn Wao
Subject: Request for Faculty Participation in a Research Study

Dear Faculty Member,

I am a doctoral student in X department. My program of study is called *P*. I defended successfully my dissertation proposal on December 6, 2006 and I am in the process of preparing to conduct the research study.

My dissertation is titled, "A Mixed Methods Approach to Examining Factors Related to Time to Attainment of the Doctorate in Education." As you may be aware, not all students who matriculate into the doctoral programs complete their studies as scheduled. For various reasons, some students take a long time to graduate while others seem to cruise through. The purpose of my study is to understand the timing of doctorate attainment in the College of Education and the factors related to the timing.

In order to understand the factors that are related to the timing of doctorate attainment both students' and faculty members' perceptions are important. Owing to your interactions with doctoral students, for instance, serving as an advisor, a teacher, a dissertation committee member, chair of a dissertation committee, and so on, you may have some insights regarding what factors you perceive influence the time that students take to attain the doctorate.

In about two week's time, some of you will be requested to participate in the qualitative component of the study. The selected faculty members will be asked to engage in a discussion in the form of a focus group comprising of seven faculty members all from the College of Education. For those who will be selected, please note that your participation is pivotal for the success of this study.

By taking part in this study you may increase our overall knowledge of what factors influence the timing of doctorate attainment in education. Having a better understanding of factors that are associated with timing of doctorate attainment will enable the college to develop strategies that lead to timely doctorate attainment.

If you have any questions about this study, please contact Hesborn Wao at (*Telephone Number*) or via email at (*Email address*). Thank you.
Sincerely,
Hesborn Wao
Doctoral Candidate
Name of the Department
Telephone Contact and Email Contact

Appendix L: Student Background Information

TIME TO DOCTORATE STUDY

STUDENT PARTICIPANT INFORMATION SHEET

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1. Your pseudonym: ____

2. Your race/ethnicity and sex: ______________(*e.g., White female, Black male etc.*)

3. Your concentration: ____
   (*e.g., Special Education (Ph.D.), Adult education (Ed. D.)*)

4. Year and semester you were admitted to the program: ______________________

5. Year & semester you graduated (or, indicate your current stage in program):____

6. Your AGE at admission: ____

7. Your cumulative GPA score at admission: _______________________________

8. Your GRE Verbal Score at admission: __________________________________

9. Your GRE Quantitative Score at admission: _____________________________

10. Means of financial support during doctoral studies: ______________________
   (e.g., loans, GA/TA, scholarship, employment, savings, spouse/family, etc.)

11. You had a masters degree before admission to your program? Yes_____ No___

12. Your parent(s) have a college degree or higher? Yes__________ No_________
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Appendix M: Faculty Background Information

TIME TO DOCTORATE STUDY

FACULTY PARTICIPANT INFORMATION SHEET

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1. Your Pseudonym: ____

2. Your race/ethnicity and sex: ______________ (e.g., White Female, Asian Male etc.)

3. Your Department: ____
   (*e.g., Secondary Education, Special Education, etc*.)

4. Your Current Rank: ____
   (*e.g., Assistant Professor, Associate Professor, Professor, etc.*)

5. Year and semester you joined that Department: _____________________________

6. Number of graduate level courses you have taught while in that department: ______
   (*Do not count a course more than once*)

7. Number of dissertation committees that you have chaired or co-chaired: __________

8. Number of dissertation committees that you have served in as a member: _________

9. Approximately what percent of your time do you engage in the following activities?
   (a) Teaching_______________ (b) Research ___________________
   (c) Advising _______________ (d) Administrative tasks _________

   Note: Make sure that (a) + (b) + (c) + (d) = 100%.
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ABOUT THE AUTHOR

Hesborn Wao received a Bachelor's degree in Education from the University of Nairobi (Kenya) and a Masters in Education in Curriculum and Instruction with emphasis in Measurement and Evaluation from the University of South Florida (USA). He also holds Certified Public Accountants certificate.

While pursuing the Master's and Ph. D. programs at the University of South Florida, Mr. Wao gained a wealth of experience working in test scoring at the Institute for Instructional Research and Practice (IIRP), as a Research Associate in the Center for Research, Evaluation, Assessment, and Measurement (CREAM), and currently as a data analyst in the Alliance for Applied Research in Education and Anthropology (AAREA). Mr. Wao has been actively involved in collaborative research with peers and faculty, which have yielded several presentations at regional and national meetings besides publications that are under review by various journals.