LINKING LEVELS TO UNDERSTAND GRADUATE STUDENT ATTRITION

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CANADA

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Abstract

This dissertation takes a multi-level approach to studying attrition and time-to-completion (TTC) in Canadian graduate programs. I draw on three distinct data sources to provide macro, meso, and micro-level analyses of the characteristics, program features, and other aspects that affect graduate student outcomes. My research is informed by existing attrition models and frameworks and takes a policy sociology approach to providing evidence-based recommendations to be implemented at government, institution, and department levels.

My meso-level analysis presented in chapter two uses logistic regression and discrete-time survival analysis with time-varying covariates to analyze data from the Youth in Transition Survey, Cohort B. The pre-entry attributes identified in Tinto's (1993) model of attrition are examined to help to uncover the type of student most likely to dropout of graduate school. Certain demographic and background characteristics, such as being married and having children, are shown to reduce the likelihood of graduating, while academic performance and experiences tend to be most relevant for entry to graduate school.

My third chapter presents my meso-level analysis of TTC and completion rates for thirteen doctoral programs at Carleton University using publically available data for six cohorts. In an effort to deepen our understanding of the variation that exists, program requirements, obtained from archived graduate calendars, are coded and included in my analysis. The results show that at the faculty level, Science reports the lowest average TTC, only slightly lower than Engineering, and Social Sciences have substantially longer

average TTC. Completion rates are also shown to vary by discipline and faculty, with Science again reporting the highest completion rates and Social Sciences the lowest. In addition to differences by faculty and disciplines, certain program requirements are found to be negatively associated with successfully completing a doctoral degree.

The fourth chapter contains my micro-level analysis of two Sociology departments in two Ontario research intensive universities. My research was informed by interviews with completers, non-completers, and faculty I shed light on the process of attrition and barriers to timely completion. This chapter highlights how aspirations differ between groups of students, and how a department's climate can have indirect effects on student outcomes. Faculty and students are shown to have some different perceptions of factors that lead to non-completion and the importance of supervisory relationships is found to be paramount to both student experiences and outcomes. Students face many challenges throughout their journey in the doctoral program, but many can be overcome through a department's recognition of challenges faced as well as a commitment to improve them. Additionally, this paper highlights barriers to timely completion and reasons for withdrawal.

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Chapter 1

Introduction: The Need for Research on Graduate Student Attrition in Canada

Failure to complete a postsecondary program in the expected amount of time, or to finish the program at all, can be thought to represent inefficiencies and a lack of productivity in higher education. Attrition is a problem of wasted resources, time, and energy as students continue to be admitted to graduate programs but many do not finish in the expected amount of time, or at all. At the macro-level resources are being wasted by government through the funding of graduate programs, at the meso-level both time and money are wasted by institutions offering graduate programs, and at the micro-level, supervisors and students may waste years of their time and effort with little to show for it.

Some Canadian institutions have made it a priority to improve graduate student outcomes. Queen's University for example has put forth the agenda of reducing graduate time-to-completion (TTC) and imposing annual mandatory progress updates to help improve graduate and faculty experiences and progress[1]. Those involved in public policy are also aware of the problem of attrition. While postsecondary funding formulas vary across Canada, certain provinces offer small proportions of funding to performance

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[1] http://www.psac901.org/2013/03/psac-901-exec-responds-to-proposed-changes-to-ma-and-phd-completion-times/; http://www.queensu.ca/connect/principal/2013/03/13/time-to-completion-and-extensions-for-graduate-students/

measures, such as graduation rates (Snowdon, 2005[2]). Recently the Higher Education Quality Council of Ontario (HEQCO), a government agency tasked with providing policy recommendations to the Ministry of Training, Colleges and Universities (MTCU), has devoted funding to research on national and international postsecondary sectors that fund on the basis of outcomes, including graduation. Graduation rates is also one of the five key performance indicators that Ontario colleges have been mandated to collect by the Ontario government.

While on the radar of government and institutions, postsecondary TTC and attrition are not well-understood in the Canadian context, especially at the graduate level. Frameworks that exist for studying attrition focus on the American context and tend to be geared toward the undergraduate student population (e.g. Tinto, 1993), and in some instances focus on special populations such as non-traditional students (e.g. Bean & Metzner, 1985). Lovitts' (2001) mixed methods approach to studying attrition in doctoral programs is one of the few examples of well-rounded attrition research at the graduate level. While this work is incredibly unique and informative, it is based on PhD students in the American higher education sector. There is a certain degree of similarity between the American and Canadian higher education systems; however, a handful of comprehensive studies do not suffice to provide a thorough understanding of attrition in doctoral programs, and especially for Canadian doctoral programs. Research on attrition from Canadian graduate programs is needed.

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[2] Snowdon, K. (2005). *Without a Road Map: Government Funding and Regulation of Canada's Universities and Colleges*. Canadian Policy Research Networks Inc., Ottawa, Ontario.

The Importance of Graduate Programs

Having a highly educated labour force is thought to be a vital part to Canada's sustainability. We live in a knowledge economy where education and skills are highly valued. In fact, it has been claimed[3] that we will have a shortage of postsecondary educated workers to fill future labour market demands. While the work of Miner and others touches on postsecondary education (PSE) as a whole, the importance of graduate education has not gone unnoticed. In the 2005 *Reaching Higher* plan, graduate school expansion was a noted priority and required new investments of $220 million annually between 2007-008 and 2009-10. The Ontario government has since committed to increasing graduate student spaces by another 6,000 as of 2016[4]. Given these large financial investments, it is clear that the government places significant value on graduate education. However, to reap the full benefits it is necessary for students not only to enrol, but to complete their program.

This research recognizes the importance of graduate education, but also that completion rates are not as strong as they could be. In order to improve student outcomes it is necessary to understand the barriers that exist to (timely) completion. Through three different research papers, a better understanding of graduate student outcomes is reached and policy recommendations for improved outcomes are made.

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[3] http://www.collegesontario.org/policy-positions/MinerReport.pdf;
http://www.minerandminer.ca/data/Jobs_of_the_Future_Final.pdf

[4] http://www.cou.on.ca/publications/reports/pdfs/graduate-education-in-ontario---position-paper-(1)

Canadian Postsecondary Education

It has already been noted that the majority of research on attrition has centered on American institutions and while this research is informative, it is insufficient for understanding attrition in Canadian universities. This is a result of the differences between the Canadian and American postsecondary systems. Two differences are especially relevant to attrition and TTC: tuition fees and student expenditures (Grayson & Grayson, 2003[5]; Davies & Hammack, 2005[6]). Finances have been shown to play a role in students decisions of departure, but it is likely the case that these matter more in American universities where tuition fees tend to be much higher. Expenditure per student is also relevant as universities that spend more on students likely offer greater funding packages, allowing for more time to be devoted to studies and less time to be devoted to employment.

In the United States there is significant variation in tuition fees between institutions while in Canada we are less likely to see such variation. Canadian tuition fees vary more between programs rather than between institutions, especially within provinces. Some of the more expensive undergraduate programs such as Engineering are likely to attract students from more affluent backgrounds because of the significantly higher costs. If certain programs attract more affluent students, it may be the case that graduate students in programs such as Engineering have better financial support systems

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[5] Grayson, J.P. & Grayson, K. (2003). *Research on Retention and Attrition*. Canadian Millennium Scholarship Foundation

[6] Davies, S. & Hammack, F.M. (2005). The Channeling of Student Competition in Higher Education: Comparing Canada and the U.S. *The Journal of Higher Education 76*(1), pp. 89-106.

(e.g. family) that allow them to concentrate solely on their studies and not on paid employment. The second dissertation paper demonstrates that Engineering does in fact have better outcomes than more traditionally inexpensive programs such as those in the Social Sciences and Humanities. While not the sole cause for program differences in attrition and TTC, it could be an underlying factor.

Related to differences in tuition fees and expenditure per student is the diverse quality of postsecondary institutions in the United States, creating a much taller institutional hierarchy than in Canada (Grayson & Grayson, 2003; Davies & Hammack, 2005). Contributing to this tall hierarchy is the prevalence of private postsecondary institutions. Given that there is more differentiation in the quality of universities there are likely larger differences in the calibre of students between institutions in the United States than in Canada.

A final difference worth noting is the greater prevalence of residential colleges in the United States and that Canadians are more likely to attend local universities (Grayson & Grayson, 2003). While likely more relevant at the undergraduate level, engagement tends to be greater at residential colleges as students are more fully immersed in their postsecondary institution. Further, attending a local university allows students to remain more involved in their family life which may include family obligations. Studying at a local university may reduce social engagement as students may choose to live at home, thereby decreasing their exposure to social life on campus. For these reasons it is pertinent that research on Canadian institutions be undertaken.

The Orientation of the Dissertation

Policy Focus

This dissertation takes a policy sociology approach to better understand attrition and

TTC in Canadian graduate programs. In his 2004 American Sociological Associations

Presidential address, Michael Burawoy maps out the division of sociological labour, and

in doing so discusses four types of sociology: critical, professional, policy, and public.

"Policy sociology's *raison d'etre* is to provide solutions to problems that are presented to

us, or to legitimate solutions that have already been reached" (pp. 266-267[7]). According

to Burawoy, each type of sociology has different forms of knowledge, truths,

legitimacies, accountabilities, and politics. Policy sociology is pragmatic, concrete, aims

to be effective, and provides policy interventions (Burawoy, 2005). Through taking a

policy sociology approach, the goal of my dissertation is not to develop sociological

theory per se, but to produce policy-oriented research papers that can contribute

recommendations for real world practice of departments, institutions, and provincial

governing bodies. I generate empirically informed policy recommendations at each of

these levels.

    My research also contributes to the growing body of evidence-based policy

making (EBPM) literature. Internationally there has been an increased effort to create

evidence-based policy, whereby empirical research is drawn on to inform policy debates,

program and policy evaluations, and to create successful outcomes and practices (Copper,

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[7] Burawoy, M. (2005*). 2004 American Sociological Association Presidential address: For public sociology*. *The British Journal of Sociology,* 56 (2), pp.260-290.

Levin, & Campbell, 2009[8]; Australian Productivity Commission, 2010[9]). While EBPM

has its strongest roots in health, there has been growing interest in academia and

education policy and practice (Copper et al., 2009). A National level Canadian example is

the creation of the Canadian Council on Learning which focuses on three key areas:

"research and knowledge mobilization, monitoring and reporting on progress and

learning, and exchange of knowledge about effective learning practices among learning

stakeholders" (http://www.ccl-cca.ca/CCL/AboutCCL/WhatWeDo.html). At the

provincial level we have HEQCO which was a result of the *Ontario: A Leader in*

Learning report. The arm's length government agency was created to provide evidence-

based research and policy recommendations to continually improve the provincial

postsecondary sector.

There are also skeptics of EBPM, some who believe that the government does not

have the "policy analytical capacity" necessary to undertake such research (e.g. Howlett,

2009), but they do not necessarily disagree with the underlying ideas of EBPM. Across

Canada, academic and government advocates can be found. There are calls for rigorous

research and some are providing avenues to ensure good evidence is being used in EBPM

(e.g. Smith & Sweetman in Australian Productivity Commission, 2010).

While unclear whether previous efforts have been guided by rigorous empirical

research, strategies have been implemented to improve graduate student outcomes within

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[8] Cooper, A., Levin, B., & Campbell, C. (2009). The growing (but still limited) importance of evidence in education policy and practice. *Educational Change 10*(2-3), 159-171.
[9] Australian Productivity Commission (2010). *Strengthening Evidence-based Policy in the Australian Federation*, Volume 1: Proceedings, (Australian) Productivity Commission, Canberra, 59-101.

Canada but have proven to be insufficient. For example, at the provincial level, there is the "10 hour rule" governing graduate student employment. The Ontario Council on Graduate Studies (OCGS), an affiliate of the Council of Ontario Universities (COU), has been committed to this rule since 1994 which states that "full-time graduate students should not be permitted to work more than an average of 10 hours per week on campus, and should be encouraged to limit their time spent on employment either inside or outside the university to an average of no more than ten hours per week[10]". What drives this rule is the belief that full-time graduate students devote too much time to employment which delays completion. There is a lack of evidence that this has been a useful tactic to decrease TTC, and hence the need for more research to guide policy on this concrete issue.

There is evidence that while efforts have been made to improve graduate student outcomes, Canadian institutions tend to fall short in their efforts relative to other nations. According to Elgar (2003)[11], 100% of the deans he interviewed reported that their university had taken steps to help improve timely completion of the PhD. While Canadian universities tended to respond to this problem by increasing funding and establishing supervisor guidelines, they were less likely than American universities to establish thesis-writing workshops for students. They were also less likely than British universities to establish thesis-supervision workshops for professors, and were less likely than both American and British universities to report having thesis support groups. It is also made

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[10] http://www.cou.on.ca/policy-advocacy/graduate-education/policy
[11] http://careerchem.com/CAREER-INFO-ACADEMIC/Frank-Elgar.pdf

clear through my interviews with faculty that while efforts have been made at the department level to improve accountability, the protocols in place are often not followed or enforced.

My research provides policy recommendations that can be applied at multiple levels. At the macro-level, policies aimed to reduce attrition can be implemented by provincial governing bodies such as the MTCU or the COU. At the meso-level, policies can be implemented by institutions. And at the micro-level, policies can be implemented by departments. While the reasons and factors that lead students to withdraw prior to completion are vast and barriers to timely completion are plentiful, they are problems that can be addressed from multiple angles and in some respects changes may be relatively easy to implement. A summary of the policy recommendations provided in each paper are discussed in the concluding section of my dissertation.

A Multi-Level Approach

This dissertation takes a multi-level approach to understanding the problem of attrition in graduate programs, often with a specific focus on doctoral programs. It is comprised of three components, one for each of macro, meso and micro-levels. Taking a multi-level approach to studying attrition allows for focus to be placed on different aspects thought to be relevant to better understanding why students withdraw prior to completion and why some take to longer to complete. Individual, discipline, and department characteristics are the focus of these dissertation papers. In addition to shedding light on how these types of characteristics can impact TTC and attrition, each dissertation paper provides additional aspects to be considered when trying to understand and address these outcome issues.

Said to be "one of the most important developments over the past decade" is the growth of scholars committed to developing and promoting mixed methods research (Small, 2011, p. 60). My research on attrition and TTC not only contributes to the EBPM literature, but also to the growing body of mixed methods research. There are multiple reasons why I took this approach, but the primary factor is that taking a multi-level approach to study attrition requires that methods be adapted for each level. Macro-level phenomena are uncovered through analyzing large-scale national data sets. At the meso-level, disciplinary differences are highlighted by drawing on administrative data and qualitative case studies allow for a deeper understanding of micro-level processes.

Guiding Conceptual Models and Variables

There are a limited number of theories in the discipline of sociology for explaining attrition, particularly at the graduate level. Tinto's (1993) theoretical framework for studying attrition focuses on undergraduate students. Nettles and Millett's (2006) conceptual model for studying doctoral student experiences does not seem to have any overarching theory, but rather, is informed by other research on graduate school experiences and attrition more generally as the "definitions, intention, and meaning of these concepts at the doctoral level are unique" (p. 27[12]).

My research follows a similar approach to that used by Nettles and Millett (2006) by drawing on previous empirical research and frameworks/models for studying attrition and graduate school experiences. More specifically, this dissertation research draws on

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[12] Nettles, M.T. & Millett, C.M. (2006). *Three magic letters: getting to Ph.D.* Baltimore, MD.: Johns Hopkins University Press.

aspects highlighted in three frameworks/models for studying attrition –Tinto (1993), Lovitts (2001), and Nettles and Millet (2006). These frameworks inform my selection of variables and topics for this dissertation. The selection of, and focus on, background characteristics that are relevant to attrition are informed by all three bodies of work.

Student aspirations have been said to be fluid and to play a role in students' decisions of withdrawal (Tinto, 1993), and so, when possible, aspirations are examined in this dissertation. The extent to which students are academically and socially integrated was highlighted by all three frameworks and is also focused upon in each dissertation paper. Additional postsecondary variables such as academic performance and the supervisor/supervisee relationship were also highlighted in the frameworks of interest and thus are addressed in relevant dissertation papers.

The first paper takes a macro-level perspective to better understanding entry to and attrition from graduate programs as well as time-to-withdrawal. This is done using the Youth in Transition Survey, Cohort B (YITS-B), a Statistics Canada national level data set. A significant benefit of using such a data set is any results obtained from it are generalizable to the Canadian population.

In the first paper, pre-entry attributes, such as those identified in Tinto's (1993) model of attrition, are examined to help uncover their role in getting to and succeeding in graduate school. More specifically, demographic, background, high school, and postsecondary variables are examined. These variables are used in a logistic regression model to help determine the types of students most likely to enroll in a graduate program, conditional on having attained a bachelor's degree. Discrete-time survival analysis with

time-varying covariates is used to better understand which of these variables are associated with completion and withdrawal from a Canadian graduate program. Life tables are also produced to better understand at which points students are most likely to withdraw. Policy recommendations at the department and institution level are developed based on the findings from each model.

The second paper examines meso-level factors using an institution-level approach to understanding attrition and TTC at a single Canadian research university. This paper examines TTC and completion rates for thirteen doctoral programs at Carleton University using publically available data for six cohorts –1994-1999. This analysis allows for both the institution and the rules associated with the institution, such as mandatory withdrawal after six years in a PhD program, to be held constant. It is important that factors such as mandatory withdrawal be held constant as there are obvious implications on TTC such as artificially reducing average TTC.

In an effort to deepen our understanding of the variation that exists between different disciplines, program requirements listed in archived graduate calendars are coded and combined with Carleton University administrative data. Discrete-time survival analysis is used to analyze the relationship between program requirements and student outcomes, namely completion and withdrawal. Faculty is also controlled for, since outcomes are thought to be partly attributable to the faculty that one's discipline falls under. Similar to the first paper, policy recommendations, informed by the findings presented in this paper, are made.

The third paper uses a micro-level approach. It consists of a case study of two Sociology departments in two Ontario research-intensive universities. A micro-level approach to the study of attrition and TTC complements macro and meso-level analyses by allowing for deeper insight into student and faculty experiences on the 'ground floor.' While broad trends can be gained from institutional and national level analyses, lived experiences are equally important. The third chapter examines how graduate students and faculty perceive the impact of a variety of departmental arrangements on experiences and outcomes, including climate and quality of relationships. Interview methods allow for further probing into the intricacies of graduate student attrition.

Three groups are interviewed for this study: 1) completers, comprised of those who completed in less than five years (short completers) and those who took five years or more (long completers); 2) non-completers; and 3) current faculty members. Each group brings unique and valuable insights about their experiences in the doctoral program. Interviewing these three distinct groups allows for the identification of common themes or mismatches in their experiences and perceptions. Overall, this case study approach helps create a more thorough understanding of the problem of attrition and TTC at the department level.

The broad question guiding this paper is: how do students and faculty make sense of, attribute, and understand the variation in their department's PhD completion time and completion rates? I am interested in uncovering the rationales used to explain why some students withdraw prior to completion or have longer than expected TTC, and why some students successfully complete the PhD. Ideas about how TTC and retention can be

improved are also discussed with study participants. Similar to the other two papers in this sandwich dissertation, the third paper concludes with recommendations for change that can be implemented at the level of the department.

Each of the approaches used in this multi-level analyses provide a unique perspective to understanding the problem and complexity of attrition and TTC in Canadian graduate programs. It would have been insufficient to focus solely on individual variables associated with completion and withdrawal as this would have not controlled for the uniqueness of institutions and departments. Similarly, the insight gained from a case study of two departments would not have permitted a broader level understanding graduate level attrition and TTC. The three approaches outlined above complement each other and provide a more holistic understanding than any single approach is capable of providing as it facilitates the uncovering of the processes and mechanisms that affect TTC and completion.

Closing Statement

My start point for studying attrition from graduate programs was to understand which characteristics and resources contribute to enrolment in and completion of a graduate degree, and to average time-to-withdrawal. To investigate these issues, the next paper analyzes a national level dataset in order to reveal the prevalence of the problem of non-completion and what variables predict it.

Chapter 2

Who Stays and for How Long: Examining Attrition in Canadian Graduate Programs

Abstract

Attrition from Canadian graduate programs is a point of concern on a societal, institutional, and individual level. To improve retention in graduate school a better understanding of what leads to withdrawal out needs to be reached. This paper uses logistic regression and discrete-time survival analysis with time-varying covariates to analyze data from the Youth in Transition Survey. The pre-entry attributes identified in Tinto's (1993) model of attrition are examined to help to uncover who is most likely to withdraw from graduate school. Certain demographic and background characteristics, such as being married and having children, are shown to reduce the likelihood of graduating, and that academic performance and experiences tend to be most relevant for entry to graduate school. Policy recommendations at the department and institution level are provided as well as directions for future research.

Introduction

Attrition in Canadian graduate programs has received little attention in sociological

research. It is unclear which types of students are most likely to enroll in graduate school

and which are most likely to dropout prior to completion. There are competing theories in

American research. Some contend that the effects of socioeconomic background, for

instance, are weak at higher educational transitions (e.g., Mare, 1980), but some find that

gender and socioeconomic status (SES) affects graduate school entry (e.g. Mullen,

Goyette and Soares, 2003). Looking at the baccalaureate level, Canadian research finds

that there is mixed and a somewhat weak association between student background and

persistence in college and undergraduate university programs, noting the likelihood of

positive selection (Finnie and Qiu, 2008). Positive selection refers to the idea that students who attend postsecondary education (PSE) tend to have already overcome barriers, indicating that many of these students are driven to successfully complete PSE. It needs to be understood if this same pattern is present in Canadian graduate level programs. Factors thought to be relevant and worthy of further exploration in this context include measures of parental education, socio-demographic characteristics, academic performance and engagement, and social engagement, as these have been found to be relevant in previous American research (Lovitts, 2001; Tinto, 1993).

This study has three primary goals: (1) to better understand which types of students are most likely to attend graduate school, after completing a bachelor's degree; (2) to identify student characteristics associated with dropping out of graduate programs; and (3) to determine when graduate students are most at risk for dropping out of their programs. Data for this research comes from the Youth in Transition Survey, cohort B (YITS-B), a longitudinal Statistics Canada survey. Binomial logistic regression and discrete-time survival analysis with time-varying covariates are used to uncover the variables associated with enrollment, attrition, and time-to-withdrawal. This longitudinal study provides the opportunity to look at a ten year period of time, and to uncover not only which students enroll and dropout of graduate school, but when they are most likely to do so. The advantage of this type of research is that analysis is not limited to a cross-section of time; rather, the experiences of graduate students can be followed from the onset of their graduate program and in many cases to its completion.

Policy makers are increasingly touting the need to be globally competitive, including the need to increase the educational attainment level of Canadians. Graduate program expansion is a means to drive economic growth in the emerging knowledge economy and to provide an avenue for social mobility. Attrition from graduate programs has an adverse impact at three main levels: 1) societal; failure to complete a graduate degree results in forgone productivity and wealth generation, 2) institutional; investments made in students who fail to complete their program represent lost investments, and 3) individual; the career opportunities and potential income are reduced with lower levels of educational attainment. It is recognized that for some, the decision to withdraw is in their best interest; for example, when there is a lack of fit, or when personal circumstances do not lend themselves to the graduate student lifestyle. However, if the expectations of graduate school are communicated effectively prior to entry the frequency with which students withdraw could be reduced, leading to not only lower attrition rates but fewer instances of lost investments.

Canadian research on education at the bachelor's level is more prevalent than at the graduate level, and far more research is done on access than on completion and retention. Further, much of the research on graduate school retention stems from the U.S. (e.g. Espenshade & Rodríguez, 1997 and Lovitts, 2001) and is not adequate to understanding what is happening in the Canadian context. Through comparing the social and academic profiles of students who enter, dropout, and complete graduate degree programs, a better understanding of the graduate student population can be reached. This

can facilitate the development of policies and programs that aim to reduce graduate school attrition.

This research is guided by previous empirical work and a theoretical framework developed for studying attrition. Tinto's (1993) theoretical framework for studying attrition, which focuses on the undergraduate level, is drawn on in this research and serves as a guide for variable selection. Literature and theoretical concepts relevant to this research will be briefly highlighted prior to describing in further detail the samples, the models and methods used for analysis, a review of results, and a discussion of the relevant findings and their relation to the research questions under investigation.

Literature Review

Tinto's (1993) work on attrition in undergraduate programs provides the framework for this research. His model "seeks to explain how interactions among different individuals within the academic and social systems of the institution and the communities which comprise them lead individuals of different characteristics to withdraw from that institution prior to degree completion" (Tinto, 1993, p.113). Tinto's (1993) work highlights the following aspects as relevant to attrition: pre-entry attributes (e.g., family and community backgrounds, personal attributes, skills, financial resources, dispositions, and educational achievements and experiences) goals/commitments (e.g., external commitments, educational and occupational goals), institutional experiences (e.g., with peers, faculty, and staff), and integration (e.g., academic and social). Tinto (1993) recognizes that measures of these aspects, such as external commitments, are not static

over time, and often change throughout one's university career. See Appendix B for a reproduction of Tinto's (1993) schema.

The context of the following literature needs to be kept in mind, that is, there are differences not only between undergraduate and graduate level programs, but also between Canadian and American PSE institutions and the societies in which they operate. Thus, there may be some aspects which have been found to be relevant at the undergraduate level and/or in the American context that may not apply to Canadian PSE students who enrol in graduate programs.

The Relevance of Socio-demographics

Socio-demographic characteristics have been shown to be relevant to attrition in undergraduate programs in Canadian institutions. In particular, males, students with children (parents), and married students are more likely to withdraw from school prior to completion when compared to their counterparts (Lambert et al, 2004; Lehmann & Tenkorang, 2010; Shaienks et al, 2008). First-generation students –referring to PSE students whose parents have not completed postsecondary education –are also less likely to graduate when compared to non-first generation students.

Canadian and American research has shown that first-generation students and those from lower socioeconomic status (SES) backgrounds –these two groups often overlap –have higher likelihoods of withdrawing prior to completion (Bowen et al, 2009; Ishitani, 2006; Lambert et al, 2004). These students are thought to have lower educational expectations and/or aspirations as a result of the educational attainment of their parents. Further, Lehmann (2007) reports that many first-generation students received support for

leaving school prior to completion. Raftery and Hout's (1993) concept of 'maximally maintained inequality' may also help to explain differences in enrolling in and completing graduate school between first-generation and non first-generation students.

Maximally maintained inequality refers to the process whereby privileged groups pursue higher levels of education once lower levels have become saturated. Thus, given the massive expansion of higher education, and the influx of students from all socioeconomic backgrounds, bachelor degrees are no longer a level of education that sets apart those from privileged and non-privileged backgrounds. In an effort for those from privileged backgrounds to maintain their upper-class standing, it is believed that they will actively pursue graduate degrees –among other more prestigious degrees. While the current study does not include measures of the income or the occupation of students' parents (commonly used measures of SES), parental education will act as a loose proxy for SES.

The racial background of a student has also been shown to be significantly related to attrition, specifically, students with Asian backgrounds have high rates of completion, while Hispanics and blacks have among the lowest (Espenshade & Radford, 2009; Grayson & Grayson, 2003). Thus, a variable measuring visible minority status will be included in the models to see if any significant relationship between enrolling in and dropping out of a graduate program can be found. A closely related concept to racial background is immigrant status as this group often includes a high proportion of visible minorities. Unlike the differential effects of being a visible minority, immigrant students in the U.S. not only have higher completion rates than their American counterparts but are

also more likely to have shorter times-to-completion (Espenshade & Rodriguez, 1997). Immigrant students may have higher educational expectations and aspirations which can result in better educational outcomes. Previous Canadian research shows that students with origins in other regions of the world display some of the highest levels of educational attainment in the population (Boyd, 2009).

Attending PSE involves significant financial costs, including both forgone wages and incurred costs. From a rational choice perspective, financial aid can be a significant predictor of enrolment and withdrawal, particularly for students from less affluent backgrounds as the cost impact of attending PSE is greater than for those who come from affluent backgrounds where financial support can be provided by one's family (Breen & Goldthorpe, 1997). Attrition from American institutions has been found to be affected by both financial aid variables and other pre-college attributes (Lovitts, 2001; Strauss & Volkwein, 2004). American institutions are known to have exceptionally large tuition fees relative to Canada, thus, the impact of financial aid may prove to be more relevant to American rather than Canadian PSE students.

School Experiences

Prior schooling, including both academic performance and engagement within the school has been found to be relevant to dropping out of PSE. For example, students in Canadian PSE with lower grades in high school are more likely to prematurely depart from PSE (Lambert et al, 2004). The impact of grades both in high school and postsecondary school seem obvious. If students struggle academically they will likely enjoy PSE to a lesser degree than those who do not struggle academically, which may lead to dropping out for

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some. In addition, students who fear academic probation or dismissal from their program may voluntary elect to dropout before such a situation materializes.

Engagement, a concept thought to be relevant to the study of attrition (Lovitts, 2001; Tinto, 1993) has been continuously shown to be a relevant predictor of dropping out. Engagement can be both academic and social and represents to what extent students are involved within their academic settings. Engagement at both the high school and postsecondary level are relevant as students with lower levels of social and academic engagement in both high school and postsecondary school are less likely to graduate than those with higher levels of engagement (Barr-Telford et al, 2003; Lambert et al, 2004; Shaienks & Gluszynski, 2007). When students are more engaged it is likely that they will have more reasons to stay in their program. If students have high levels of social engagement, having a strong social group may help to offset the academic difficulties students are experiencing, conversely, having high academic engagement may offset the lack of social engagement students have.

This review of literature highlights both Canadian and American research on PSE attrition, bringing to light significant contributors. In most cases the research focuses on attrition from undergraduate programs and since this cannot be assumed to represent the experiences of graduate level students, the pre-entry attributes discussed above serve as a good starting point in assessing the types of students most likely to enrol in, graduate from, and dropout of graduate school.

Research Questions

Three research questions aimed at understanding the relationship between individual characteristics and graduate school outcomes are addressed in this chapter. First, which types of students are most likely to enroll in graduate school? Second, which student characteristics tend to be associated with withdrawing from a graduate program prior to completion? Third, during which year of graduate school are students most likely to withdraw? These research questions will help illuminate if certain students are more at risk of dropping out than others.

Dataset

This research draws on the YITS-B, a biennial, longitudinal Statistics Canada Survey with a total of five cycles. Broadly speaking, the purpose of this survey is to better understand Canadian youth's transition into and experiences in the labour market and postsecondary school. Youth in this survey were first interviewed in April 2000 and were between the ages of 18 and 20 as of December 31, 1999. A stratified multi-stage sample design has been used and is based on the Labour Force Survey sample (see Gambino et al, 1998, for a detailed account of the methodology). The YITS-B has been conducted under the Statistics Canada Act, indicating that consent and ethical standards have been met.

The response rate for cycle one is 76.7% and includes 22,378 respondents, over time however, the number of respondents drops off significantly. Looking at the longitudinal response rates, cycle two retained 64.4% of respondents from cycle one,

cycle 3, 50.7%, cycle 4, 42.5%, and the final cycle includes 34.1% of the original sample, indicating a significant amount of attrition over time.

Samples

For the purposes of this study not all 22,378 respondents included in the survey are included in the analyses as the goal of this research is to better understand the types of students who enroll in, complete, or dropout from graduate school. Eligible for this study are respondents who have obtained a bachelor's degree (sample 1); and a subset of this group, respondents who attended graduate school (sample 2). All five cycles of the YITS-B were scanned to identify eligible respondents. There were 3635 meeting the first criterion and 852 meeting the second.

Measures

Data collection took place by telephone and information was provided by the population of interest, that is, by individuals born between 1979 and 1981.

Independent Variables

Demographic and Background Variables

Female is dummy coded, with '0' representing 'males' and '1' representing 'females'.

Marital status is dummy coded from its original state with six categories (single, married, living with a partner/common-law, separated but still legally married, divorced, and widowed). Respondents who reported being married, common-law, and separated but still legally married are recoded to '1' indicating a marital status equivalent to

'married/common-law' and all others are coded '0' representing a marital status of 'single'. This is a time-varying covariate, indicating that the value of this variable may change over time. All subsequent time-varying covariates will be identified by the acronym TV.

Child status (TV) is dummy coded from the number of children a respondent has (ranging from 1-6), to '0' representing 'no children' and '1' indicating 'at least one child'.

Visible minority represents respondents who are non-Caucasian in race or non-white in colour. Aboriginal persons are not considered to be members of visible minority groups. This variable was not recoded and retains its original coding from Statistics Canada, with '1' representing 'visible minority status' and '0' capturing 'all others'.

Immigrant status is a Statistic Canada derived variable that measures whether a respondent who is not Canadian by birth has ever been a landed immigrant. The original coding is retained, '0' captures respondents who are 'not a landed immigrant' and '1' representing those that are 'landed immigrants'.

Parent's education This variable originally consisted of 12 education categories: less than Grade 6 (includes no schooling), completed at least Grade 6, completed at least Grade 9 (Quebec Secondary 3), high school diploma or equivalent, some college, CEGEP, or university level courses (no certificate, diploma, or degree), private business school or training institute certificate or diploma, community college, CEGEP, trade/vocational, apprenticeship, teacher's college, or nursing diploma or certificate, university undergraduate certificate or diploma (below a bachelor's degree), university bachelor's degree (e.g., B.A., B.Sc., B.Ed.,), first professional degree in medicine,

dentistry, veterinary medicine, law, optometry or divinity, master's degree (e.g., M.B.A, M.Ed., M.A., M.Sc.), doctorate degree (earned e.g., PhD, D.Sc., D.Ed.), and other education or training). This variable is dummy coded with '1' representing 'first-generation students' (parents did not complete postsecondary education) and '0' representing 'not a first-generation student'.

High School Variables

The **academic engagement** sub-scale measures engagement for respondents' last year of formal schooling (high school or less). It was constructed by Statistics Canada and is defined as the behavioural involvement and identification with academic aspects of school. Statistics Canada reports that a total of nine items are loaded on this scale, with values ranging from -5.58 to 4.78. Likert scale response options were used for these nine items, with three questions having 5 categories: never, rarely, sometimes, often, and always and the remaining six questions having four: strongly disagree, disagree, agree, and strongly agree. These include: hours a week on homework, getting along well with teachers, wanting to just get by, paying attention to the teacher, interest in what they are learning, completing homework on time, learning in class was useless, perceiving school as often being a waste of time, and the number of times they skipped classes in a month. Two reliability measures were estimated, Cronbach's alpha (0.80) and the index of reliability (0.93).

The **social engagement** sub-scale includes five items – feeling like an outsider, being treated with as much respect as others in their class, having friends at school to talk to, and people at school being interested in what they had to say – to measure engagement

for respondents' last year of formal schooling (high school or less). The response options for each item are: strongly disagree, disagree, agree, and strongly agree. Observed scale scores go from -3.91 to 2.24, and scale reliability estimates are Cronbach's alpha (0.61) and the index of reliability (0.63).

High school average in respondent's last year was provided. This variable was recoded. A value of '4' represents '90% to 100%,' '3' represents '80% to 89%,' '2' corresponds to '70% to 79%,' '1' indicates '69% and under.' Not all groups are relevant to each sample, for example, in model 2, no one with averages less than 70% attended graduate school.

Postsecondary Education Variables

Student loan (TV) measures whether a respondent received a student loan while attending PSE. The original dummy coding has been retained, '0' indicates 'no' student loan and '1' indicates 'received a loan'.

The **scholarship** (TV) variable is used to assess whether respondents received a scholarship based on outstanding academic achievement while attending PSE. Dummy coding has been retained '0' indicates 'no' scholarship and '1' indicates 'received a scholarship'.

Grant or bursary (TV) refers to whether respondents received a grant or bursary from a number of different sources (educational or charitable foundation, the government, or a corporation) while attending PSE. This variable has retained its dummy coding, '0' indicates 'no' grant or bursary and '1' indicates 'received a grant or bursary'.

First year average grade in PSE was computed from two variables, students' letter grade and students' numerical grade. These questions were mutually exclusive and thus were

combined to one variable, with certain categories being collapsed. The original coding of students' grades was: A+ (90% and higher), A- to A (80-89%), B- to B+ (70-79%), C- to C+ (60-69%), D- to D+ (50-59%), and E to F (under 50%). The recoding is as follows: 3=A (the A+ and A- to A categories were combined), 2=B, 1=C to F. Grades ranging from C to F have been combined due to the small number of cases in each of these grade levels.

Number of instructors with strong teaching abilities measures how many students in their first year of PSE studies perceived their teachers to have strong teaching abilities. Because of infrequent responses, the first two categories (none of them and very few) were combined. This variable has four ratings: '1' corresponds to 'none of them/very few', '2' to 'some', '3' to 'most' and '4' to 'all'.

Number of instructors that showed an interest in helping students succeed was also assessed by respondents for their first year of PSE. This variable, like 'number of instructors with strong teaching abilities' was also recoded to collapse the first two categories due to their infrequent response. The four ratings include: '1' corresponds to 'none of them/very few', '2' to 'some', '3' to 'most' and '4' to 'all'.

Dependent Variables

Status is the main dependent variable of interest in this study. This variable assesses whether students 'graduated' ('1') from their program, 'continued' ('2'), or 'left' ('3'). This variable originally distinguished between those that graduated and continued and those that graduated and did not continue. Because the focus is exclusively on program

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graduation and not continuation, these categories were collapsed to represent all those who have graduated.

Graduate student measures whether the respondent was a graduate student during each cycle. Graduates students have been coded 1 while all others have been coded 0.

Models and Analysis

To address the three research questions developed to better understand Canadian graduate students and attrition from graduate programs, two different models are used. To begin, determining whether females, visible minorities, immigrants, and first-generation students are less likely to enter graduate school, a binomial logistic regression model was run. The odds ratios associated with each of the independent variables and the related covariates represent the likelihood of attending graduate school. Only respondents who had attained a bachelor's degree as their highest level of education while participating in the YITS-B are included in the analysis.

The second component of this research is to develop a better understanding of the types of students that are most likely to dropout prior to completion. To understand if the same population identified above are more likely to dropout prior to completion, discrete-time survival analysis with time-varying covariates is employed which allows for the assessment of the risk of dropping out associated with each independent variable and covariate included in the model. Not all students included in this sample started graduate school at the same time, thus, all students have been set to year 1, representing their first year in a graduate program. A total of seven years are modeled as this is the longest

amount of time any one respondent remained in graduate school. Note however that this does not imply that all students have a final status for their program, some have a continue status at the end of the study, usually a result of the cycle in which they began graduate school. For example, if a student indicates that they started graduate school in the fifth cycle, they can only provide information for up to two years (the YITS-B is retrospective), which is not a sufficient amount of time for a student to start and finish a doctorate program.

Lastly, to address the third research question, which seeks to determine during which year students are most likely to dropout, life and frequency tables have been included. These will help determine if there is a particular point during students' programs that they are most likely to dropout.

Weights provided by Statistics Canada have been applied to each of the samples. The first sample uses the standardized cycle 1 weight. The second sample requires that weights from multiple cycles be applied; the application of the cycle weights depends on the cycle of observation. For example, if a respondent is was enrolled in graduate school in cycles 1-3, the weights from each cycle are applied accordingly.

Data Issues

Program Response Inconsistencies

The YITS-B data on PSE includes some "ineligible programs" which relate to inconsistencies from students across cycles. Finnie and Qiu (2008) propose three means of dealing with this data, recommending one method above all others. Prior to reviewing

the recommended method adopted in this research a brief review of "ineligible programs" is provided. Statistics Canada has included an ineligible variable for each cycle indicating if the respondent provided ineligible program information. There are three distinct groups of students: 1) students who at the end of a cycle were enrolled in a program but were no longer in the program at the beginning of the next cycle, but had actually graduated from the program, 2) students who at the end of a cycle were enrolled in a program but were no longer in the program at the beginning of the next cycle, but had dropped out rather than graduated, and 3) students who had no final status for the program identified in the previous cycle and deny the existence of the program (Finnie & Qiu, 2008). To address these ineligible program records, students that had in fact graduated and dropped out of their program were coded as such. All others with valid ineligible codes are right-hand censored at the point when they become ineligible.

A second data issue concerns respondents with duplicate cases. Respondents who were enrolled in more than one program or institution during a cycle have multiple PSE records; only the first graduate program was retained. There were 29 duplicate/problem cases which can be grouped according to similar attributes. The first group had a leave status associated with a program that took place in a cycle prior to the cycle where additional information is given (a second line of data). The cycle with the leave status was retained (n=10). The next group had ineligible codes and had multiple records of program information. In this instance, when a respondent had an ineligible code, their subsequent information was deleted (n=13). The third group had two lines of almost identical information, thus, only one line of data was retained (n=4). The final two respondents

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with multiple cases did not fall into any of these categories. One respondent had complete information for all cycles and full information for one cycle only with a different institution ID. The complete record was retained. The final case was one in which the respondent had two lines of identical data for one cycle only, the line of data that contained information for only one cycle was deleted.

Missing Values

There are three variables with fairly high proportions of missing data. During the first cycle, students in PSE were asked: (1) to provide their average grades for their first year in PSE, (2) to indicate the number of instructors they had during their first year that were interested in seeing their students succeed, and (3) the number of instructors who had strong teaching abilities. Some respondents were still in high school or had not completed their first year of university during cycle one and thus were ineligible for this question. The percents of respondents missing information on question (1) above was 19.5; and on questions (2) and (3), 18.2. Multiple imputation was used for each of these variables so that these cases could be retained and used for analysis.

Results

Table 1 and 2 provide the descriptive statistics of the variables included in models 1 and 2. Notable is the higher proportion of females who have obtained a bachelor's degree as well as attending graduate school, and the small proportion of both visible minorities and immigrants included in both samples.

Descriptive Statistics

Descriptive Statistics

Table 1 Descriptive Statistics: Bachelor Degree Holders

Variable Name	Mean/ Proportion	SD	n
Female	.57	.494	3635
Visible minority	.14	.351	3635
Academic engagement (scale)	.42	.882	3635
Social engagement (scale)	.28	.980	3635
Number of instructors with strong teaching abilities*	2.64	.840	3635
Number of instructors showed an interest in helping students succeed*	2.64	.922	3635
Parents Education	.61	.487	3635
First Year Average (letter grade)*	2.16	.722	3635
High School Grades	2.85	.721	3635
Immigrant	.08	.264	3635
Graduate Student	.21	.389	3635

*Imputed variables; multiple imputation

Table 2 Descriptive Statistics: Graduate Students

Variable Name	Mean/ Proportion	SD	n
Female	.57	.495	852
Visible minority	.08	.275	852
Academic engagement (scale)	.52	.939	852
Social engagement (scale)	.32	.982	852
Number of instructors with strong teaching abilities*	2.74	.831	852
Number of instructors showed an interest in helping students succeed*	2.75	.870	852
Parents Education	.56	.497	852
First Year Average (letter grade)*	2.37	.690	852
High School Grades	3.10	.688	852
Immigrant	.05	.217	852
Marital1	.24	.425	852
Child1	.03	.159	852
Scholarship1	.48	.500	852
Loans1	.51	.500	852
Grants1	.31	.463	852
End Status	1.68	.711	852

*Imputed variables; multiple imputation

Research Question 1

This analysis attempts to better understand which types of students are most likely to attend graduate school given that they have completed a bachelor's degree, in particular, whether females, visible minorities, and first-generation students were less likely to attend graduate school. Table 3 shows the strength of the association between graduate school enrollment and the variables selected for analysis.

Females are shown to be slightly less likely to enroll in graduate school. Having a first year average equivalent to a B or above is associated with a greater likelihood of attending graduate school, especially when a student's average falls in the A grade level rang and first-generation students are significantly less likely to enroll in graduate school after completing a bachelor's degree. High school grades appear to be a strong predictor

of enrolment in graduate school. Table 3 displays the odds ratios and the significance

levels associated with each variable included in the model.

Table 3 Enrollment in Graduate School

Variables	OR	Sig.	SE
Female	.83	.028	.087
Visible Minority	.86	.316	.148
Immigrant	.96	.821	.190
First Year Avg (A's)	2.40	.000	.153
First Year Avg (B's)	1.68	.003	.166
First Generation	.65	.000	.086
HS Grades (70-79%)	5.45	.008	.642
HS Grades (80-89%)	7.77	.001	.638
HS Grades (90-100%)	11.39	.000	.642
HS Academic Engagement	1.19	.001	.054
HS Social Engagement	.902	.025	.046
Number of Instructors with Strong Teaching Ability			
None/Very Few	1.23	.443	.263
Some	1.09	.690	.207
Most	1.09	.601	.169
Number of Instructors with an Interest in Seeing Students Succeed			
None/Very Few	1.11	.628	.207
Some	.83	.254	.163
Most	1.14	.389	.150
Constant	.02	.000	.659

*Baselines: First year average (C to F); High School Grades (69% and under); Instructor variables (all)

Research Question 2

Once students enter graduate school, who is most likely to withdraw? The results reveal

that several variables are significant for predicting both graduation and withdrawal from

graduate school.

Looking first at the types of students most likely to graduate, it can be seen in

Table 4 that females have a greater chance of graduating than males. Having higher levels

of high school social engagement scores also predict a greater likelihood of graduating

from the original graduate program a student begins. Funding is expected to increase the

likelihood of graduating, in particular, receiving grants and loans. As may be expected,

parents are significantly less likely to graduate from their graduate program, as are

married individuals.

Table 4 Graduating from Graduate School

End Status (graduate)	OR	Sig.	SE
Female	1.29	.037	.155
Visible Minority	.91	.690	.220
HS Academic Engagement	1.07	.320	.072
HS Social Engagement	1.14	.043	.072
Loans	1.46	.001	.171
Grants	1.57	.000	.194
Scholarship	1.02	.843	.123
Married	.81	.086	.101
Parent	.43	.005	.129
First-Generation	.75	.014	.087
Immigrant	.94	.839	.277
Number of Instructors with Strong Teaching Ability			
Some	1.03	.853	.184
Most	1.34	.165	.285
All	1.80	.057	.555
Number of Instructors with an Interest in Seeing Students Succeed			
Some	.74	.063	.120
Most	.87	.461	.170
All	.67	.136	.182
First Year Avg			
A's	.92	.743	.225
B's	.70	.136	.166
HS Grades			
90-100%	1.42	.076	.280
80-89%	1.02	.901	.181
Constant	1.20	.556	.369

*Baselines: First year average (C); High School Grades (79% and under); Instructor variables (none/very few)

Turning to those with withdraw (Table 5), there are fewer statistically significant

variables that serve as predictors of withdrawing from a graduate program when

compared to variables that predict graduation. Surprisingly, higher scores of high school

academic engagement are associated with an increased probability of withdrawing prior

to completion. As was seen in Table 4, sources of funding –with the exception of

scholarships– were positively associated with graduating from a graduate level program.

In this model, scholarships are the only statistically significant source of funding for

predicting withdrawal. However, the association is a protective one, that is, graduate

students with scholarships have lower odds of a withdrawing prior to completion when

compared to students who do not receive scholarships. Immigrants are also significantly

less likely to withdraw prior to completion. Table 5 also shows that parents have a lower

likelihood of withdrawing prior to completion. This finding contradicts that shown in

Table 4, indicating that parents may lie at both ends of the completion spectrum.

Table 5 Withdrawing from Graduate School

End Status (leave)	OR	Sig.	SE
Gender	1.99	.319	.218
Visible Minority	1.08	.837	.410
HS Academic Engagement	1.35	.004	.142
HS Social Engagement	.96	.694	.097
Loans	1.07	.715	.193
Grants	1.03	.890	.204
Scholarship	.62	.010	.115
Married	.96	.823	.182
Parent	.33	.026	.164
First-Generation	1.38	.076	.254
Immigrant	.164	.018	.126
Number of Instructors with Strong Teaching Ability			
Some	1.01	.969	.271
Most	.902	.750	.292
All	.601	.350	.328
Number of Instructors with an Interest in Seeing Students Succeed			
Some	1.11	.707	.296
Most	1.35	.335	.425
All	.618	.379	.338
First Year Avg			
A's	.54	.059	.176
B's	.40	.004	.126
HS Grades			
90-100%	.81	.484	.294
80-89%	1.17	.538	.249
Constant	.19	.003	.107

*Baselines: First year average (C); High School Grades (79% and under); Instructor variables (none/very few)

Research Question 3

The frequency tables below represent student status after the first three years of study. It is only possible to present the data for the first three years because subsequent cell sizes are too small to meet the requirements of Statistics Canada. There are comparable percentages of students who withdrew during the first three years. In addition to the frequency tables, a life table for students who dropout was created to better

understand at what point in graduate school students are most likely to withdraw. Table 6

shows the cumulative failure rate of those who withdrew between each year. This table

shows that the majority of students withdrew after the first two years of study, with a

greater percentage withdrawing after the first year. While it is not possible to show the

last two lines of data, the intervals have been retained so that the reader may understand

at what point all students who withdrew from graduate school did so in this sample.

Figure 1 in Appendix B provides a graphic display of these data.

Table 6 Life Table for Graduate School Leavers

Interval (Year)		Beginning Total	Dropouts	Cumulative Failure	SE
1	2	123	62	.504	.045
2	3	61	35	.789	.037
3	4	26	20	.951	.019
4	5	6	-	-	-
5	6	-	-	-	-

Table 7 Student Status after Year 1

	n	%
Graduate	59	7
Continue*	731	86
Withdraw	62	7
Total	852	100

*Note that some people with continue status were in the final year of the survey and thus will not carry over to the next year.

Table 8 Student Status after Year 2

	n	%
Graduate	155	26
Continue	404	68
Withdraw	35	6
Total	594	100

Table 9 Student Status after Year 3

	n	%
Graduate	125	41
Continue	162	53
Withdraw	20	7
Total	307	101

Discussion

Research Question 1

Females, visible minorities, and first-generation students have historically been underrepresented in graduate level programs, thus, the goal was to assess whether these trends hold true today and in the Canadian context. While females have significantly increased their educational attainment levels in the past two decades, it is found that they are less likely to attend graduate school. It was shown however (Table 2) that more females are enrolled in graduate school. Thus, conditional on obtaining a bachelor's degree, and holding all other variables constant, females are less likely to enter graduate school. However, because there are a higher proportion of female graduates with bachelor's degrees, they still are overrepresented in graduate programs.

While visible minorities and immigrants are less likely to enroll in graduate school, the coefficients associated with these variables are not statistically significant. First-generation students are less likely to enroll in graduate school. This association was expected as parents' education influences their children's future educational and occupational opportunities and aspirations. For example, if a student's parents have graduated from university it is expected that this child was raised with the same educational expectations, that is, that they too would obtain a university degree. The

negative association between first-generation students and attending graduate school may lend support to the idea that students' educational expectations and aspirations are shaped by their family and serve to impact educational attainment.

Students with stronger academic backgrounds at both the high school and postsecondary level are more likely to attend graduate school. Students with 'A' level high school and university grades are much more likely to enroll in graduate school. A closely related variable, high school academic engagement, also shows a positive association with attending graduate school while social engagement is associated with a decreased likelihood of enrolling in graduate school. These results demonstrate that past performance predicts future performance. Perception of instructors does not serve as a good predictor of graduate school enrollment, which may be a good thing given the current debate about the quality and experience of instructors in Canadian institutions. It may also be true that the two measures used are not picking up on the qualities associated with academic impact and effectiveness.

Research Question 2

Given that a better understanding of the types of students who enroll in graduate school is achieved, the status of these students after enrolling needs to be attended to. While females are found to be less likely to enroll in graduate school they are more likely than males to graduate. Immigrants have an extremely small likelihood of dropping out prior to completion, yet surprisingly, they do not have a statistically significant increased likelihood of graduating. This may be a result of when immigrants began graduate school,

that is, if they enrolled in graduate school in the latter cycles there may not have been enough time for them to complete their degrees in the time covered by the YITS-B.

Loans, grants/bursaries, and scholarships all have positive effects associated with a successful graduate school experience. That is, loans and grants/bursaries are associated with higher probabilities of graduating, while receiving a scholarship is associated with a decreased likelihood of withdrawing prior to completion.

Family responsibilities often force individuals to alter their priorities and graduate school is no exception. Being a parent is associated with a fairly dramatic reduction in the probability of graduating from a graduate program. This is expected as having a family requires a great deal of time, especially a young family, when children need the most direct supervision. A surprising finding however is that having a child is also significantly related to a decreased likelihood of dropping out of graduate school. As was previously mentioned, this may indicate that parents lie at either ends of the spectrum regarding completion status. It may also be the case that the timing of when these students began graduate school led them to be censored, not allowing for the full observation of their time in graduate school.

Academic performance is not shown to be a significant predictor of graduating from or dropping out of graduate school –with the exception of having a B level average in the first year of university. The weak and limited relationship between academic performance and graduate school outcomes likely reflect the fact that most students enrolled in graduate school are strong students academically and thus the difficulty of the educational material has little effect on decisions to dropout. In addition, high school

academic engagement is shown to be associated with increased probability of dropping out while high school social engagement is associated with increased likelihood of graduating from a graduate program.

Based on the discussion above, it appears that personal circumstances such as demographic and background characteristics as well as family responsibilities have a greater impact on the likelihood of successfully completing a degree than academic ability and engagement. Taking this a step further, if it is assumed that academic variables have a lesser impact on successful completion than social variables, it may be the case that other social aspects of graduate school, such as the climate of a department and the student-supervisor relationship, are associated with successful graduate school outcomes.

Research Question 3

The final research question seeks to understand at what point students are most likely to withdraw from graduate school. A life table showing the cumulative failure rates and frequency tables showing student status for the first three years of study are used to make an assessment of when students are most likely to withdraw. Looking at the frequencies associated with graduating, continuing, and withdrawing out, it can be seen that the relative percentages of students who withdraw during the first three years is approximately equal; however, the largest number of non-completers is found after the first year of study. This is best demonstrated in the life table which shows that 50 percent of the sample who eventually withdraw from graduate school do so prior to the second year of study. Withdrawing after one year may reflect a mismatch between the student and the program, the department, and/or the institution.

It should be mentioned that not all students who withdrew from graduate school failed to enroll in another postsecondary program. In Appendix A it is shown that of the 123 students who withdrew, 51 of them enrolled in another program, indicating that even if a student withdraws from graduate school it does not mean that they have completely withdrawn from PSE.

Scope and Limitations

While this research has provided new evidence and insight into students background and how it affects their likelihood of enrolling in and completing graduate school there are limitations regarding the extent to which certain aspects thought to impact attrition could be measured in this research. One pre-entry attribute that is thought to be highly relevant to this research is the socioeconomic backgrounds of students. As has been previously noted, parental education can be conceived of as a loose proxy for SES, however, a more complete measure would have included parental occupation and income. Having a larger age range of students and a longer follow-up period would have also been beneficial to this research. Age was not included in this analysis as the age range of students is only three years. While it is true that people complete an undergraduate degree and enter graduate school at different points in their lives, this data set does not lend itself to capturing these differences very well.

Turning to the theoretical framework guiding this research, Tinto's (1993) model also includes goals/commitments, institutional experiences, and integration, yet these aspects cannot be measured with the available data. Lovitts (2001), another researcher

working in the area of attrition, specifically doctoral attrition, outlines many factors that can help students succeed or fail as a graduate student. For example, she notes that students should have a good relationship with their supervisors and that they need to be provided with good conceptual maps of their department and the program requirements. Again, these aspects cannot be measured with the available data.

Despite the inability of the YITS-B to address all aspects considered to be relevant to the study of attrition, it does provide good coverage of the concepts seeking to be addressed with this research. In addition, the sample sizes and the total duration of time covered by the YITS-B provide enough respondents and time so that students can be followed from the start and in many cases to the completion of their graduate degree.

Policy Recommendations

While the policy recommendations provided are primarily based on pre-entry attributes, they do serve as a good starting point for addressing the issue of attrition in graduate programs. A notable point of concern is the behavior associated with first-generation students. These students are less likely to enroll in graduate school and to have a successful graduate school experience. Intervention with these students may help to improve both their rates of enrollment in and completion of graduate school. If the costs associated with attending graduate school are thought to lead to decreased likelihood of attending, the fact that much of graduate school is fully funded by departments needs to be communicated to students. Differences in SES are commonly known as being relevant to future educational and occupational goals and attainment, yet, differences between low

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and high SES students still remain. Intervention likely needs to begin at a much younger age so that more students have access to PSE, including the grades and funding needed to pursue this level of education.

Given the positive student outcomes associated with scholarships, loans, and grants, the government should not only continue to provide funding for graduate students to universities, but should increase the amount of funding. Providing funding packages is a good way to recruit students from all backgrounds, such as first-generation students. Further, access of underrepresented groups is an ongoing priority of the Ontario government.

Family responsibilities are difficult to control or intervene; however, it may be possible to design programs in such a way as to allow more time to be devoted to one's personal life. For example, it is rare that students are enrolled in graduate programs on a part-time basis. It seems that departments are often unwilling to accept part-time students. If departments were to change this, it may in fact lead to lower levels of attrition for students with family responsibilities, in particular, for parents. In addition, tuition rates are lower for part-time students, thus, if the financial responsibilities associated with raising a family are also associated with withdrawing from graduate school, having a part-time student status would aid in this respect as well.

The gender gap is something that cannot be overlooked. While historically women had lower educational attainment rates, the trend is being reversed, with men tending to lag behind females. This issue needs to be addressed as the goal should be equal representation by gender, dependent of course on academic performance. If males are

underperforming at the high school level then appropriate measures need to be taken to increase their level of performance. This may require testing multiple intervention programs or different pedagogical approaches. These programs and pedagogical approaches should be coupled with research to uncover if there are any underlying issues that are leading males to underperform, such as lack of motivation. If intervention takes place at the high school level, it may be the case that little to no changes need to be made at the postsecondary level.

While at this point the recommendations are rather limited, as the next two components of the larger research project (discussed below) are undertaken, a more thorough and complete list of recommendations can be provided. Prior to discussing future research a couple comments regarding some of the more positive findings should be noted. First, the lack of effects between visible minorities and immigrant status in each model demonstrates that these students are likely increasing their educational attainment. The only significant association was found for immigrants and it was for a decreased likelihood of dropping out of graduate school. It is also notable that loans, scholarships, and grants all have positive associations with graduating, or not dropping out, indicating that this is a good investment for departments and institutions for retaining students.

Conclusion and Future Research

This research is the first part of a larger project designed to better understand graduate school attrition. It serves as a good national perspective regarding the socio-demographic characteristics associated with entry to and completion of graduate school. The second

component of this research will provide an institutional analysis of faculties and disciplines and their rates of attrition and times-to-completion. The third component is a qualitative examination of a department belonging to a discipline typically associated with long completion times and high rates of attrition. With these two additional components, a much more complete picture of the process of attrition from graduate programs in Canadian postsecondary institutions can be reached.

Again, this study is a good starting point for understanding graduate student experiences in Canadian postsecondary institutions. It has uncovered which demographic and background characteristics are relevant for enrollment in and graduation from graduate programs. It has also demonstrated that past educational performance predicts future performance for enrollment in a graduate program, but that upon enrollment past performance has almost no effect. Lastly, engagement is relevant for both enrolling in and successfully completing graduate school. While this research does support some previous findings at the undergraduate level as well as American research, it does demonstrate the unique experiences of students in Canadian graduate programs, and that further work needs to be done if a better understanding of graduate school attrition is to be reached.

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Appendix 2A

Frequencies

Table 2A-1 End Status: Graduate Students

	n	%
Graduate	394	46
Continue	335	39
Withdraw	123	14
Total	852	99

Table 2A-2 End Status: Graduate Students

	n	%
Graduate	394	46
Continue	335	39
Withdraw	72	9
Switch	51	6
Total	852	100
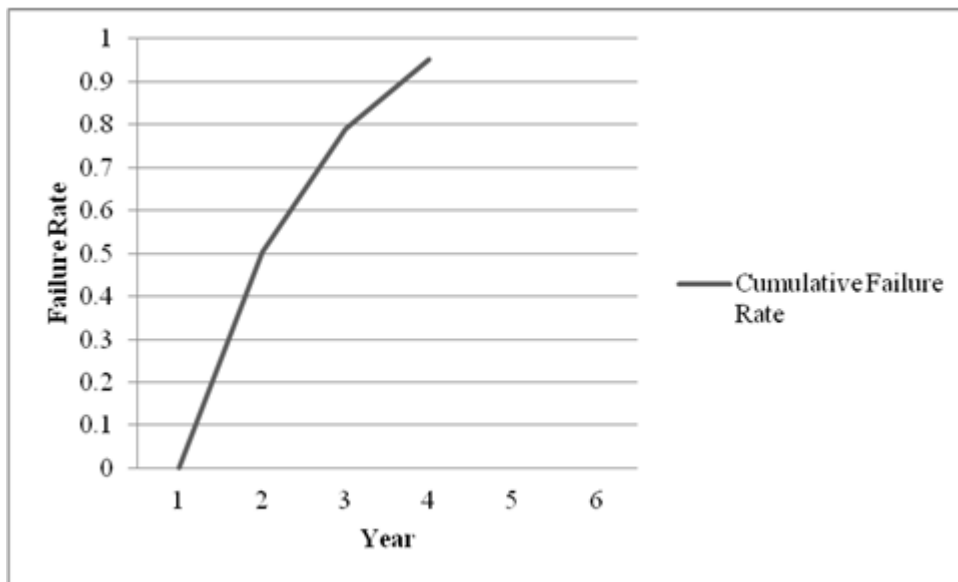
Figure 2A-1 Cumulative Failure Rate of Graduate School Leavers

Appendix 2B

Recreation of Tinto's (1993) longitudinal model of institutional departure.

Pre-Entry Attributes   **Goals/Commitments**   **Institutional Experiences**   **Integration**   **Goals/Commitments**

Outcome

Academic System

Formal

FAMILY BACKGROUND	INTENTIONS	ACADEMIC PERFORMANCE		INTENTIONS

GOAL and INSTITUTIONAL COMMITMENTS

FACULTY/STAFF INTERACTIONS

Informal

ACADEMIC INTEGRATION

SKILLS and ABILITIES

GOAL and INSTITUTIONAL COMMITMENTS

DEPARTURE DECISION

Formal

PRIOR SCHOOLING

EXTRACURRICULAR ACTIVITIES

SOCIAL INTEGRATION

EXTERNAL COMMITMENTS

PEER GROUP INTERACTIONS

EXTERNAL COMMITMENTS

Informal

Social System

External Community

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Chapter 3

Graduate Attrition by Discipline: Analyzing Administrative Data from an Ontario Research University

Abstract

Graduate time-to-completion (TTC) and completion rates have been shown to vary by faculty, but the extent to which these aspects vary by disciplines within faculties is not sufficiently understood, nor are the program level factors that lead to longer TTC and lower completion rates. This research examines TTC and completion rates for thirteen doctoral programs at Carleton University using publically available data for six cohorts – 1994-1999. In an effort to deepen our understanding of the variation that exists, program requirements, obtained from archived graduate calendars, were coded and included in the analysis. The results show that at the faculty level, Science reports the lowest average TTC, only slightly lower than Engineering, and Social Sciences have substantially longer average TTC. Completion rates also vary by discipline and faculty, with Science again reporting the highest completion rates and Social Sciences the lowest. Certain program requirements were found to be negatively associated with successfully completing a doctoral degree. For example, when controlling for faculty, requiring that students orally defend their research proposal, the number of comprehensive examinations required, and having longer departmental expected TTC were all found to be negatively associated with positive graduate school outcomes. Policy recommendations, informed by the findings presented in this paper, are also presented.

Introduction

An in-depth and recent understanding of time-to-completion (TTC) and completion rates

in Canadian institutions is lacking outside of individual institutions and the U15[13].

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[13] The U15 is a group of Canadian Research Universities that operates under the direction of university executives and consists of four committees: academic affairs, research, the data exchange network, and a data exchange steering committee (Wikipedia, 2013).

Building on my previous research on broad national level macro trends, including individual characteristics associated with enrollment in graduate school, graduate outcomes, and average time-to-withdrawal, this project seeks to identify variations within a single institution. This second paper will illuminate and allow for a better understanding of the differences in TTC and completion rates across disciplines.

Universities across Canada are provided with government grants to help to produce quality graduates. The amount of funding provided at the provincial level to universities varies across the country, with Ontario consistently receiving among the lowest amount of funding per full-time equivalent student (Higher Education Quality Council of Ontario, 2012). Given the relatively limited amount of money Ontario universities have to work with and the additional costs associated with providing graduate degree programs, it is essential for Ontario universities to be productive institutions.

Two measures of productivity that are increasingly permeating policy discussions in higher education are the amount of time students are taking to finish their credentials (TTC) and completion rates. Universities that are able to produce a fairly high proportion of graduates, relative to the number enrolled, within the expected degree time, can be said to be productive institutions. However, a comprehensive understanding of average TTC and completion rates for Canadian graduate programs is lacking. For example, a common trend in Ontario is to measure doctoral graduation rates at two time points, seven and nine years from commencement (e.g. University of Toronto's 2011 Performance Indicators for Governance; University of Waterloo Annual Performance Indicators 2012). A similar trend of measuring completion at seven years is used at the undergraduate level. These

cut-offs of seven and nine years are problematic and should be cause for concern. Taking Carleton University as an example, during the years under review (1994-1999) the majority of domestic students were offered three years of scholarship funding and five years of funding in the form of a teaching assistantship/research assistantship. This funding structure and the expected TTC by department –ranging from three to six years – raises the question of why measures of seven and nine years are being used to assess completion rates for doctoral degrees.

There appears to be a misalignment between funding, TTC, and measurements of success and efficiency. That is, students tend to be funded for four to five years, most students take more than four years to complete and many take more than five years, yet institutions measure graduate student success, or institutional efficiency, at seven and nine years. This research will explore differences in time to and rates of completion, and attrition for Carleton doctoral programs at the program and faculty level and will provide a clear and concrete example of the misalignment between the funding, TTC, and typical measures of graduate student success. The analysis will inform recommendations at both the disciplinary and institutional level.

Doctoral degrees have numerous degree requirements that vary by program, yet expectations of degree completion time, thought to be reflected in funding packages, tend to be invariant within institutions. Additional years of funding are thought to have a positive impact on TTC and completion rates, since students are presumed to need financial support when their funding runs out and this is often obtained through employment, resulting in less time to devote to their schooling. It is true that some

institutions, such as Carleton, may provide funding in the form of a teaching assistantship (TA) or research assistantship (RA) for an additional year after scholarship funding ends, but the amount is so minimal that it is unrealistic to assume students could support themselves solely with a TA or RA. Further, in Ontario, the Ontario Council on Graduate Studies (OCGS) has publicly confirmed for over a decade its support for the "10 rule"[14]. The 10 rule is based on the idea that graduate students should not be permitted to work more than ten hours on campus (this is monitored by universities) and that institutions should encourage the same type of off-campus work schedule. These funding arrangements appear to signal a disconnect between institutional expectations and the realities of student financial pressures.

A review of previous research on TTC and completion rates in graduate programs will help illuminate aspects of socialization, integration, and disciplinary differences that are thought to be associated with the timely and successful completion of graduate degrees.

Literature Review

There is a clear dearth of literature in the area of TTC, completion, and attrition in graduate programs, especially with respect to theory and Canadian content. Previous research has shown that certain faculties tend to be associated with low completion rates and longer TTC, notably those in the Humanities and Social Sciences (Baird, 1990; Bowen & Rudenstein, 1992; King, Eisl-Culkin, & Desjardins, 2008) and that more

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[14] See http://www.cou.on.ca/policy-advocacy/graduate-education/policy for additional information.

science based disciplines tend to have shorter TTC (Seagram, Gould, & Pyke, 1998; King et al., 2008). But prior research has not fully understood whether these differences are a result of different program requirements, different compositions of students, or differences in the nature of fields of study.

Particular interest lies in whether disciplines with high attrition rates and long completion times tend to lack good alignments between their requirements and expectations. That is, are degree requirements and disciplinary expectations more extensive in programs with longer TTC and weaker completion rates, or do different outcomes result from the nature of each program, as suggested by Lovitts (2001)? She highlights how not only the department but the discipline and its orientation to training graduate students can affect attrition, particularly how disciplinary norms, values, and beliefs "form a social current that impinges on all members of the disciplinary community" (Lovitts, 2001, p. 260). She compares and contrasts Science and Social Science disciplines with a laboratory-base to the Humanities and non-laboratory-based Social Science disciplines, providing evidence that differences in attrition between disciplines may be a function of their structural and cultural organization (Lovitts, 2001).

The same type of pattern is seen for Canadian universities. For example, a recent analysis of U15 data—only eight institutions are included in the analysis –shows that Humanities and Social Sciences consistently have the lowest completion rates after nine years but that completion rates have been improving over time (Tamuburri, 2013). According this analysis, of those students who entered a PhD program in 2001, 70.6 percent successfully completed after nine years. There is however variation by discipline.

Humanities programs have the lowest completion rates sitting at 55.8 percent after nine years, while Health Sciences reported the strongest completion rates for the same cohort of students with 78.3 percent of students completing at the end of nine years (Tamuburri, 2013).

It is also possible that the socialization of students varies by discipline. Keith and Moore's (1995) work highlights how socialization can affect students' integration into their program. Using Sociology as an example, they examined how individual and departmental factors affect the professional socialization of graduate students. While it is expected that departments will differ in the extent to which they stress the socialization of their students, it may also be the case that the structure of certain disciplines naturally focus on socialization. A brief comparison of Sociology and Chemistry will help illuminate this point. In Sociology, once students are finished their course requirements, their work tends to be very solitary and can be isolating as students rarely work as part of a team and their research often is not the same as their supervisor. Isolation represents a lack of integration and something that can be detrimental to student success (Tinto, 1993). Chemistry, on the other hand, often requires that students work as part of a team under the lead of their supervisor. Frequent contact with faculty has been shown to be a significant element in decisions to depart graduate programs (Pascarella and Terenzini, 1979; Terenzini and Pascarella, 1980). This fundamental difference between disciplines can have a significant impact on the socialization of students.

Socialization is essentially another way of discussing integration, something highlighted in both Tinto's (1993) and Lovitts's (2001) frameworks for studying attrition

in higher education. The importance of integration was also highlighted by Terenzini and Pascarella (1977). Their work, while at the undergraduate level, highlights how both social and academic integration are important predictors of voluntary freshman attrition, and that each are given approximately equal weight in freshmen's decision to withdraw. It cannot be substantively stated that the same pattern would be found at the graduate level, but it seems reasonable to assume that integration would play a role in decisions to continue or withdraw, even if the role is minimal. Returning to disciplinary differences, it is obvious that some disciplines are naturally better able to integrate students both academically and socially than others.

Within laboratory-based disciplines students are integrated academically because they tend to spend much of their time working in laboratories with their supervisor and other graduate students, likely resulting in joint publications and conference presentations. Working in such teams also provides students with the opportunity to become socially integrated with other students. On the other hand, non-laboratory-based disciplines do not require that students and faculty work in teams, students and their supervisor rarely work on the same project, but rather, tend to have common broad research interests. To become academically integrated in these types of disciplines requires greater initiative and likely a greater knowledge of the disciplinary landscape, for example, knowing which journals should be subscribed to or which conferences to attend. Social integration is much the same, as students are not required to be physically present at the university for much of their graduate program, nor are they required work with

other students or faculty. Thus, greater onus is placed on students (and faculty) to ensure integration in non-laboratory-based disciplines.

It is not uncommon for policy makers and administrators to expect doctoral programs to be completed in four to five years, even though requirements and expectations differ across programs. The expectation that doctoral degrees be obtained in this amount of time is reflected in the typical funding package provided by institutions which tend to fund students for four to five years. This expectation is illustrated in Ontario, where universities receive provincial government grants to support PhD students for four years.

The data used for this analysis can be used to help assess whether these expectations are realistic in light of disciplinary and faculty differences, whether periods of funding provided are sufficient given the average TTC, and whether program requirements and expectations should be re-considered in order to improve completion rates.

This research draws on Carleton University's publically available data on withdrawal and completion in PhD programs. Complete and comparable data are available for thirteen programs, for six cohorts (1994-1999), and for a ten year span of time. Graduate student status was measured at each term. Given that these data are from a single institution they are limited in terms of their generalizability to the larger population of Canadian doctoral students. However, they do allow for controlling institutional-level confounders, and also remove problems that plague some surveys, such as sampling and design effects. For example, surveys run the risk of a bias sample,

whereby certain populations are overrepresented or underrepresented. In the case at hand, it is plausible that students who did not successfully complete their degree would be less likely to participate because of their failure to complete. In addition, these longitudinal data can detect possible cohort effects that may be present in other datasets.

Research Questions

Carleton University's institution-level data on TTC and completion rates for selected doctoral programs is used to address four research questions: 1) In which year of their programs are doctoral students most likely to complete or withdraw? 2) Are there disciplinary and faculty level differences in these completion and attrition rates, and are there any clear outliers? 3) Are there disciplinary and faculty level differences in TTC and are there any clear outliers? 4) Do program requirements or faculty account for disciplinary differences in completion and attrition rates? To address these research questions a variety of methods are used, including: descriptive statistics, life tables, discrete-time survival analysis, and two-sided tests of equality.

Dataset

Two broad sources of data are used for this analysis. First, administrative data from Carleton University are used to compare TTC, completion, and attrition rates in thirteen selected doctoral programs (see variables section for a list of programs and faculties). These data were obtained from the university website. These data allow only for the tracking of TTC, completion, and withdrawal, but do not include any demographic information. The data include students' commencement time and their student status –

whether or not they complete or withdraw at a point in their program –for each academic

term thereafter. Student status is traced for 30 terms over ten years following enrollment.

This data was aggregated but has been formatted to represent an individual level dataset.

That is, if there were five students enrolled in a cohort, five different records were

produced, each representing a different student. Changing the format allowed for survival

analysis to be undertaken as running this model requires person level data be transformed

to a person-period dataset. A person-period dataset results in a respondent having a line of

data for each year they are included in the sample. For example, if a student was enrolled

in a doctoral program for five years they would have five rows of data, or if they were

still continuing at the end of their tenth year, they would have ten rows of data.

Administrative data is supplemented with program requirement measures that are

created by coding material from graduate calendars from 1994 to 1999. Because

department requirements change over time, program information provided in graduate

calendars are analyzed for each cohort and program, leading to the review of 78 different

sources of information. In instances where information is missing from the graduate

calendars, graduate administrators in the respective departments were contacted. There

were some instances where graduate administrators refused to respond to my queries,

despite multiple attempts. In most of these instances the most recent program

requirements are used as proxies[15]. Variables coded from graduate calendars include:

number of courses, number of oral comprehensive exams, number of written

comprehensive exams, oral defence of thesis proposal, language requirement, and

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[15]See Appendix A for additional details.

expected completion time. For details about the coding of these variables see Appendix A. After program requirement data were coded the dataset was merged with the person level dataset derived from Carleton's aggregated data. Upon merging the two sources the data were re-shaped to person-period format.

Sample

The sample used for this research includes all students who enrolled in a doctoral program at Carleton University between 1994 and 1999 in the thirteen programs with complete data. The thirteen programs represent between 62% and 76% of all doctoral programs, depending on year. The reason that 100% of programs are not included in the sample is either because some did not have or provide complete data, or because some were introduced after 1994, e.g. Management. The total sample size for six cohorts and thirteen disciplines is 605, with the largest number of doctoral students enrolled in electrical engineering (n=90), followed closely by psychology (n=88). See the descriptive statistics section for additional information about the sample.

Models and Analysis

Data are analyzed using descriptive statistics, two-sided tests of equality, and discrete-time survival analysis. Using these methods completion times and rates over time are calculated to determine whether substantive differences exists between disciplines and faculties, and to assess the extent to which program requirements influence completion and attrition. Due to small sample sizes, cohort data are aggregated by discipline and faculty but when feasible, data have been broken down by discipline and faculty.

The first research question asks, of those who complete and or withdraw, at what point in their studies are they most likely to do so? To provide a valid assessment of this research question two life tables are created, one for completers and one for students who withdrew prior to completion. Data have not been broken down by discipline or faculty.

To assess whether significant differences in completion and attrition rates by discipline and faculty exist for the cohorts under review, two-sided tests of equality for column proportions are run. Tests are adjusted for all pairwise comparisons within a row of each innermost subtable using the Bonferroni correction.

Average TTC, completion, and attrition rates are calculated for each discipline and faculty, with completion and attrition rates calculated annually. Performing these calculations at both the discipline and faculty level allows for the identification of any outlier cases that may be driving faculty rates upward or downward.

To assess the impact that program requirements and/or faculty have on completion and attrition, two discrete-time survival analysis models are run using multinomial logistic regression. Thus, the dependent variable, graduate student status, used in model 1 and model 2 has three possible outcomes: graduate, continue, and withdraw. For each of the models continue serves as the baseline category allowing for the assessment of the association between program requirements and both graduating and completing.

The first model includes only program requirements, while the second includes program requirements and faculty. The first model includes six independent variables: number of courses, number of written comprehensive exams, oral comprehensive exam, oral defence of research proposal, language requirement, and department expected TTC.

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Students' status at the end of their sixth year acts as the dependent variable. The end of the sixth year has been chosen because it is at this point that all full-time students are expected to complete their program[16], in addition, the proportion of students with a status of continue is sufficiently large to allow for proper analysis.

The second model uses the same independent variables as the first model in addition to two faculty variables. Because of the extremely small sample, Humanities is not included in this analysis. History is the only Humanities program included in this research and is the result of a lack of complete data for the time periods under investigation. This is a clear limitation of this research as Humanities programs are known to have long completion times (Elgar, 2003; Archambault, Bergeron, Bertrand, Campbell, Caruso, & Kishchuk, 2006; Tamuburri, 2013). While the unavoidable omission of the Humanities does reduce the amount of variation in the data as well as the insight that can be gained from this analysis, the Social Sciences also tend to have long TTC and low graduation rates, which will allow, at minimum, for variation in the data. The limitations associated with the omission of Humanities for certain analysis is further addressed in the limitations section.

Descriptive Statistics

Program requirements vary quite significantly by discipline and faculty. While the average number of courses does not vary much by faculty there are some larger

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[16] This requirement again reflects the disconnect that exists with respect to departmental and institutional expectations. That is, students remain in good standing in their sixth year by institutional standards but do not receive funding for six years. It is important to highlight that while multiple schools use six years as their cutoff, others (e.g. Queen's University) provide a cutoff of seven years. This further increases the disconnect between good standing and fuunding period.

differences between disciplines, with a low of two required courses in Biology to a high of six required courses in Mathematics and Economics. Interestingly, some departments do not require a written or oral comprehensive exam (e.g. Chemistry and Mechanical and Aerospace Engineering). However, in both of these programs an oral defence of a research proposal is deemed to be the equivalent of a comprehensive exam. I decided to code this type of comprehensive exam as an "oral defence of a research proposal", since a comprehensive exam in other disciplines are quite different program requirements.

Oral comprehensive exams are least common among the Science programs included in this analysis and most common among Engineering programs, while the opposite holds true for orally defending one's research proposal. Language requirements are not very prevalent among the doctoral programs included in this analysis, and in fact none of the Engineering programs have such a requirement.

Table 10 Descriptive statistics, independent variables

	Number of courses	Oral comp.	Written comp.	Oral defence proposal	Language	Expected TTC
Biology	2	Yes	0	Yes	No	4
Chemistry	4	No	0	Yes	No	3
CS	5	No	1	Yes	No	4
ES	2.9 (mean)[17]	No	1	Yes	No	4.9 (mean)
Mathematics	6	Yes	2	No	Yes	5
Science	**4.1**	**40% yes**	**.8**	**77% yes**	**23% yes**	**4**
CE	5.3 (mean)	Yes	1	Yes	No	5
EE	3.2 (mean)	Yes	1	No	No	6
MAE	3.5 (mean)	No	0	Yes	No	6
Engineering	**3.7**	**78% yes**	**.8**	**42% yes**	**0% yes**	**5.8**
Economics	6	No	2	Yes	No	4
Poli. Sci.	2.4	Yes	2	68% yes	43% yes	6
Psychology	3	Yes	1	No	No	6
Sociology	4.1 (mean)	40% yes	.8	77% yes	23% yes	4
Social Sciences	**3.7**	**63% yes**	**1.9**	**56% yes**	**38% yes**	**5.8**
History	5	Yes	2	No	Yes	4

Table 11 highlights the distribution of student status by the end of year 6 (the

dependent variable for survival analysis). The distribution is fairly even across statuses,

with a slightly larger percentage of completers. Table 12 shows a further breakdown of

student status by faculty. Only faculties controlled for in the second discrete-time survival

analysis model are presented.

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[17] Instances where a mean is reported reflect a change in program requirements over time.

Table 11 Student status at the end of year 6

Status	n	%
Graduated	241	39.8
Continued	177	29.3
Withdrew	187	30.9
Total	605	100.0

Table 12 Students status at the end of year 6, by faculty

Status	Science		Engineering		Social Sciences		Total
	n	%	n	%	n	%	n
Graduated	100	42.9	72	30.9	61	26.2	233
Continued	28	17.1	27	16.5	109	66.5	164
Withdrew	44	24.6	55	30.7	80	44.7	179

Research Question 1

Time-to-Completion and Time to Withdrawal

Investigating program requirements associated with graduation and attrition is central to this research but it is beneficial to first document, at the broad level, the proportion of students who completed and withdrew from their program and at what point during their studies they did so. Of the total sample and by the end of the tenth year, 218 students withdrew from their program, 360 students graduated, and 27 students were continuing their studies.

The life tables presented below highlight the proportion of students who have withdrawn (Table 13) and completed (Table 14) after each year of study. Of all students who dropped out prior to completion within a ten year span of time, approximately 20% of them did so by the end of the first year. However, the largest number of students dropped out in their second year, usually the time by which all program requirements need to be completed with the exception of the dissertation.

Table 13 Life Table, Leavers

End of Year	Total	Leavers	Cumulative Failure	SE
1	218	44	0.202	0.027
2	174	55	0.454	0.034
3	119	33	0.606	0.033
4	86	25	0.720	0.030
5	61	16	0.794	0.027
6	45	14	0.858	0.024
7	31	5	0.881	0.022
8	26	8	.917	0.019
9	18	14	0.982	0.009
10	4	4	1.00	-

Turning to those who have completed their studies, by the end of the second year two students had successfully completed their studies, one from the Math department and one from the department of Electrical Engineering. While over one-quarter of all students who graduated from their PhD program did so by the end of the fourth year, it was during the fifth year that the largest number of students graduated –approximately 23% of all students who completed their PhD did so by the end of the fifth year, bringing the cumulative graduation rate to 50%. A summary of the key findings for each research question is presented upon the completion of the initial review of data and output associated with each research question.

Table 14 Life Table, Graduates

End of Year	Total	Graduates	Cumulative Failure	SE
1	360	0	-	-
2	360	2	0.006	0.004
3	358	31	0.092	0.015
4	327	65	0.272	0.024
5	262	84	0.506	0.026
6	178	59	0.669	0.025
7	119	46	0.797	0.021
8	73	40	0.908	0.015
9	33	13	0.944	0.012
10	20	20	1.00	-

Research Question 2

Graduation and attrition rates by faculty and discipline

Differences between faculties

While it is informative to understand at what point students are most likely to either

graduate and withdraw from their doctoral program, these results do little to inform our

understanding of which faculties and disciplines have strong graduation rates, and

correspondingly, which have high attrition rates.

Figure 2 presents graduation rates for aggregated cohort data by faculty, with

the exception of Humanities for reasons already noted. A comparison of Science,

Engineering, and Social Sciences faculties reveals that Science reports the strongest

graduation rates and Social Sciences the lowest –a pattern that began at the end of year 3

and continued until the end of year 10. Figure 2 also reveals that Social Sciences tend to

have longer completion times, and it is not until the end of year 8 that the graduation rate

begins to approach that of the Engineering faculty. By the end of the fifth year, over half

of all Science students had graduated, while Engineering as a faculty did not reach this

rate until the end of the seventh year and it was not until the end of the tenth year that

Social Sciences had reached a graduation rate of at least 50% for the six cohorts under

review.
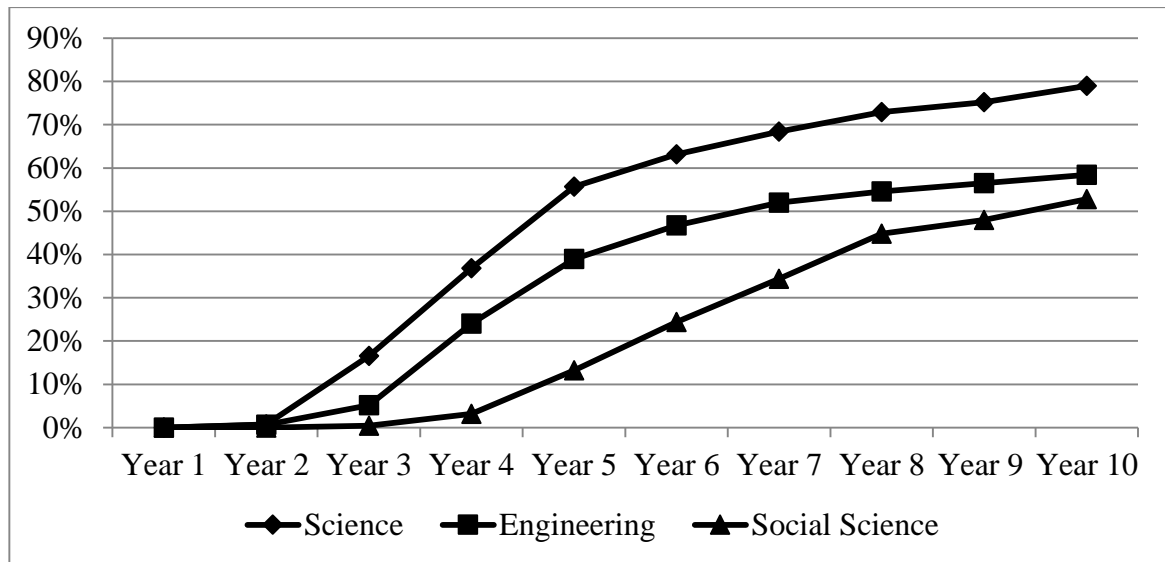
Figure 2 Cumulative graduation rates, aggregated cohorts (1994-1999)

As expected, a similar pattern to that found for the rank order of faculties by

graduation rates is found for attrition rates. All faculties report a proportion of students

dropping out by the end of their first year. By the end of the second year there was a

significant difference in attrition rates between Engineering, Science, and Social

Sciences, with Engineering pulling away from the latter two faculties. At the end of the

tenth year, both Engineering and Social Sciences reported attrition rates of 40%, while

Science was significantly lower at 26%.
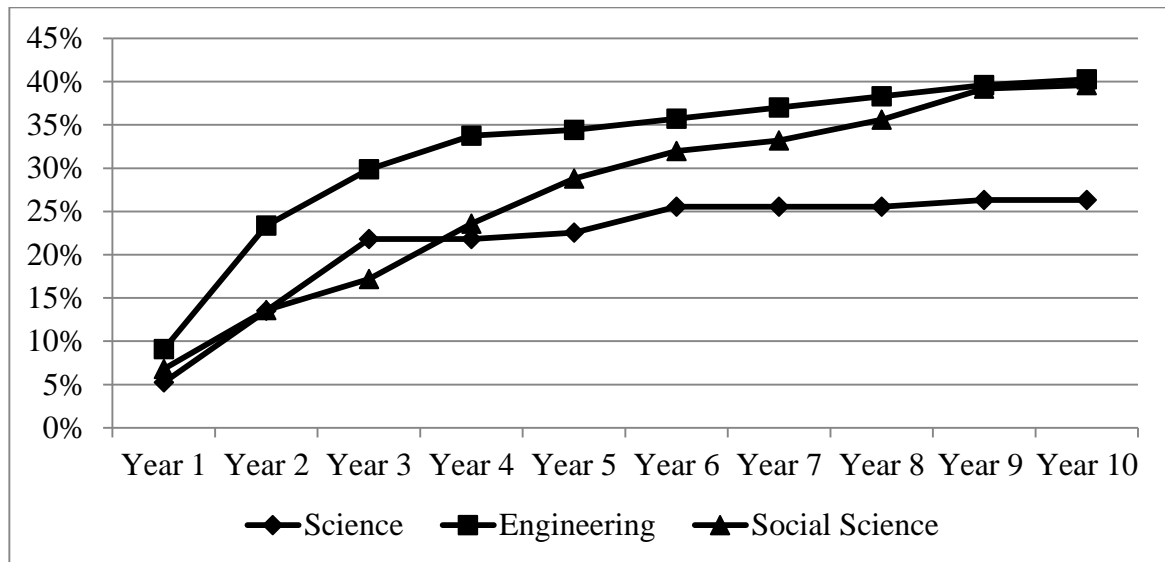
Figure 3 Cumulative attrition rates, aggregated cohorts (1994-1999)

The two figures demonstrate that there are differences between faculties, but they do not demonstrate whether these differences are significant. Additional analysis that compared column proportions (z-tests) with α=0.05, reveals that there are significant differences between completion, attrition, and continuation rates for the three faculties under investigation. The percentage of students in the Science faculty who successfully completed by the end of year 10 (72%) is significantly larger than Engineering (58%) and Social Sciences (53%) and while only a small proportion of students were continuing their studies at this point, Social Sciences students were significantly more likely to do so. The final point of difference between the three faculties is the percentage of students who withdraw prior to completion. Not surprisingly, students in the Science faculty were significantly less likely to withdraw from their program, while Engineering and Social Sciences students were significantly more likely, each reporting attrition rates of 40% by the end of the tenth year of study.

Table 15 Rates by Faculty

	Science	Engineering	Social Sciences
Graduated	72%ₐ	58%_b	53%_b
Continued	2%ₐ	1%ₐ	8%_b
Withdrew	26%ₐ	40%_b	40%_b

Subscripts not sharing the same letter are significantly different at α=0.05.

There is a history of research that describes the patterns found at the faculty level (e.g., Elgar, 2003; Archambault et al., 2006), but little of this work moves to the next level of uncovering which disciplines drive rates or whether disciplines within faculty tend to be fairly homogeneous.

Differences between disciplines

Table 16 highlights the proportion of students who successfully completed their PhD by the end of their tenth year, as well as those with withdrew prior to completion. While the proportion of students that successfully completed their PhD by the end of year 10 varies between disciplines, only one of the differences is found to be significant. As will be shown, Chemistry has the strongest graduation rates with 84% completing by the end of the tenth year and is the only department to have significantly higher completion rates than Sociology, with less than half of all students graduating by the end of year 10.

There is also a good amount of variation between the proportions of students who withdraw prior to completion by discipline. Chemistry reports the lowest attrition rate, with only 16% of students withdrawing prior to completion, while Civil Engineering reports the highest, with half of all students in the 1994-1999 cohorts withdrawing prior to completion. Despite the range of approximately 30% between the highest and the lowest attrition rates, none of the differences are statistically significant. This is a result of

the small sample sizes. The proportion difference power / sample size calculation reveals

that the samples sizes would have to be significantly larger for the difference between

Chemistry and Civil Engineering to be statistically significant (608 and 426,

respectively).

Table 16 Rates by Discipline

	Bio	Chem	CE	CS	ES	Econ	EE
Graduated	76%	84%[a]	50%	69%	66%	54%	62%
Withdrew	24%	16%	50%	28%	35%	46%	37%
	His	Math	MAE	PS	Psych	Soc	
Graduated	48%	64%	56%	52%	58%	46%[b]	
Withdrew	41%	31%	41%	38%	38%	42%	

The above analysis provides insight into disciplinary differences in graduation and

attrition rates, but offers this only for a snapshot of time. A more detailed analysis of

graduation and attrition rates by program follows.

Science

The Science faculty has the highest graduation rates and the lowest attrition rates, but also

has some variation within it. At every year included in this analysis, Chemistry reports the

highest graduation rates, reaching the final completion rate of 84% by the end of the

seventh year. Mathematics reports the lowest Science graduation rate, as 64% of students

from the 1994-1999 cohorts completed by the end of their eighth year. Hovering just

above Mathematics is Earth Sciences with a graduation rate of 66%, followed by

Computer Science, and 76% for Biology. Interestingly, while Mathematics reports the

lowest completion rate, they are the only discipline within the Science faculty to report a

student completing by the end of year 2.

Table 17 Graduation Rates in Science, Year 1-10

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Biology	0%	0%	17%	34%	52%	59%	66%	69%	69%	76%
Chemistry	0%	0%	26%	58%	74%	77%	84%	84%	84%	84%
Computer Science	0%	0%	3%	19%	38%	47%	50%	59%	63%	69%
Earth Sciences	0%	0%	7%	14%	41%	55%	62%	66%	66%	66%
Mathematics	0%	3%	13%	21%	38%	49%	51%	56%	62%	64%

The rank order for attrition rates within the Science faculty is similar to that for completion rates. Chemistry report the lowest attrition rates within the Science faculty with less than one-fifth of students dropping out and all students withdrawing by the end of year 3. Just less than one-quarter of all Biology students and just more than one-quarter of Computer Science students dropped out of their program by the end of year 10. Keeping in line with the trends seen for completion rates, Mathematics and Earth Sciences report the highest attrition rates, with just less than one-third and just more than one-third withdrawing from their program, respectively. Notable is the fact that disciplines with lower rates of attrition are those that tend to be laboratory-based, while those with higher attrition rates are less likely to be laboratory-based.

Table 18 Attrition Rates in Science, Year 1-10

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Biology	0%	17%	21%	21%	21%	24%	24%	24%	24%	24%
Chemistry	7%	14%	16%	16%	16%	16%	16%	16%	16%	16%
Computer Science	6%	9%	16%	16%	19%	25%	25%	25%	28%	28%
Earth Sciences	10%	24%	31%	34%	34%	34%	34%	34%	34%	34%
Mathematics	5%	10%	28%	28%	28%	31%	31%	31%	31%	31%

The differences in graduation and attrition rates for Science disciplines are checked for statistical significance using a two-sided test of equality for column proportions. None of the differences in disciplinary rates are significant, likely for reasons of small sample size, as discussed above.

Engineering

The completion rates for all Engineering programs included in this analysis are lower than those in the Science faculty. Electrical Engineering, reporting the highest completion rate (62%) is the only discipline to report a proportion of students in the 1994-1999 cohorts completing their degree by the end of the second year. Hovering at, or just above the 50% completion rate, are Civil Engineering and Mechanical and Aerospace Engineering.

Table 19 Graduation Rates in Engineering, Year 1-10

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Civil Eng.	0%	0%	3%	23%	40%	47%	50%	50%	50%	50%
Electrical Eng.	0%	1%	7%	24%	42%	52%	57%	60%	61%	62%
Mech. and Aero. Eng.	0%	0%	3%	24%	29%	32%	41%	44%	50%	56%

Civil Engineering, the only faculty to report no students continuing their program after the tenth year, have an equal proportion of completers and leavers. Generally, most students in Engineering programs withdrew by the end of their sixth year –the point at which all full-time students must complete their program according to university regulations.

Table 20 Attrition Rates in Engineering, Year 1-10

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Civil Eng.	13%	30%	40%	47%	47%	47%	50%	50%	50%	50%
Electrical Eng.	7%	23%	28%	30%	30%	31%	32%	34%	36%	37%
Mech. and Aero. Eng.	12%	18%	26%	32%	35%	38%	38%	38%	41%	41%

The differences in graduation and attrition rates for Engineering disciplines are checked for statistical significance using a two-sided test of equality for column proportions. None of the differences in completion and attrition rates between programs are significant.

Social Sciences

It is evident from Figure 2 and Figure 3 that Social Sciences report the lowest completion rates and the highest attrition rates. Of the four disciplines, only Sociology reports that less than half of the students completed. Political Science and Economics graduated just over half of all students in the 1994-1999 cohorts by the end of year 10 and Psychology just less than 60%. While disciplines in Science and Engineering see a moderate amount of students completing by the end of the fourth year, it is not until the end of the sixth year that a similar trend is seen for disciplines within the Social Sciences. In fact, no Economics and Sociology student entering between 1994 and 1999 graduated by the end of their fourth year.

Table 21 Graduation Rates in Social Sciences, Year 1-10

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Economics	0%	0%	0%	0%	7%	21%	32%	43%	43%	54%
Political Science	0%	0%	1%	4%	17%	22%	35%	43%	45%	52%
Psychology	0%	0%	0%	6%	16%	31%	41%	52%	57%	58%
Sociology	0%	0%	0%	0%	8%	20%	26%	37%	42%	46%

Given that the completion rates are fairly low, it is not surprising that the attrition rates for Social Sciences programs are fairly high. Unlike other faculties, all but one of the disciplines falling under the Social Sciences report having students still enrolled after ten years. Of all students enrolled in the 1994-1999 cohorts, approximately 5% of Psychology students were still continuing their program by the end of the tenth year, 10% of Political Science students were still enrolled, and 12% of Sociology students had still not completed their degree requirements by the end of their tenth year. Similar to the other two faculties, by the end of the fifth and sixth year most students who withdrew had already done so.

Table 22 Attrition Rates in Social Sciences, Year 1-10

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Economics	21%	32%	39%	39%	43%	43%	43%	43%	46%	46%
Political Science	3%	6%	9%	16%	23%	29%	29%	32%	36%	38%
Psychology	7%	17%	18%	25%	30%	33%	34%	36%	38%	38%
Sociology	5%	9%	15%	23%	28%	29%	32%	35%	42%	42%

A test for significant differences in attrition and completion rates between Social Sciences disciples using the two-sided test of equality for column proportions reveals no significant differences.

Research Question 3

Average TTC by discipline and faculty

Given the results presented thus far it is not surprising to find that the Science faculty

reported the shortest TTC and Social Sciences the longest. Engineering did not report

completion rates that were as strong as the Science faculty but their average TTC was not

substantively different. Looking at the variation within, Science and Engineering show a

range in TTC of 1.8 and 1.3 years, respectively. Social Sciences on the other hand does

not have a range nearly as large, with the difference between the best and worst

performing disciplines equivalent to 0.6 years.

In an effort to better understand these findings the program requirements for the

disciplines with the shortest and longest TTC within each faculty are examined (see Table

23 for average TTC). Upon examining the program requirements associated with the best

(Chemistry) and worst (Computer Science) performing Science programs with respect to

average TTC, minimal differences are found. Computer Science students were required to

complete one additional course, a written comprehensive exam, and had a longer

expected TTC than Chemistry students.

In Engineering, students in Civil Engineering (the best performing discipline) had

shorter average TTC than Mechanical and Aerospace Engineering (the worst performing

discipline) but had additional program requirements, including approximately two

additional courses, completing an oral comprehensive exam, and having a written exam.

Because there were several changes in program requirements for Sociology

students, interpreting the differences between the best and worst performing Social

Sciences disciplines was not as straightforward as others. Compared to Psychology (the best performing discipline), students in Sociology (the worst performing discipline) on average had to complete one additional course, were required to orally defend their research proposal (for a period of time), and to complete a language requirement. Psychology students had a negligibly higher mean number of written comprehensive exams and were required to complete an oral comprehensive exam, while this was only true for some Sociology students (63%).

Given the information above, there do not appear to be any common trends between disciplines with the shortest and longest completion times. The fourth research question addressed in this paper will help uncover if particular program requirements are associated with successfully completing a PhD or withdrawing prior to completion.

Table 23 Average TTC by discipline and faculty

	Average TTC (years)
Biology	5.2
Chemistry	4.2
Computer Science*	6.0
Earth Sciences	5.3
Mathematics	5.4
Science	**5.1**
Civil Engineering	4.7
Electrical Engineering	5.1
Mechanical and Aerospace Engineering	6.0
Engineering	**5.2**
Economics	6.8
Political Science	6.8
Psychology*	6.5
Sociology	7.1
Social Sciences*	**6.8**
History	6.3
Total	**5.8**

*Estimates are likely biased upward as these disciplines tend to enroll higher proportions of part-time students.

Research Question 4

The fourth and final research question uses two discrete-time survival models, one with program requirements only and one with program requirements and faculty.

Model 1

The first model includes only independent variables coded from archived graduate calendars between 1994 and 1999 for the thirteen programs under review. The dependent variable, year 6, identifies students' status at the end of their sixth year, the total allowable time to complete a doctoral program at Carleton University according to university regulations. The baseline category for the dependent variable is the status of

continue, that is, students in this category have neither completed nor withdrawn from their program.

There are a number of statistically significant variables in this model, some of which provide contradictory findings. Possible explanations for these contradictory results are addressed in the discussion portion of this paper.

All but two of the variables included in model 1 are significantly related to graduating. Surprisingly, increasing the number of courses is associated with an increased likelihood of graduating as is having a language requirement. Conversely, variables associated with a decreased likelihood of graduating include the number of written comprehensive exams required of students and expected TTC. That is, as the number of written comprehensive exams and the departmental expected TTC increase, the likelihood of graduating decreases.

Table 24 Program Requirements associated with Graduating by end of Year 6: Odds Ratios from a Multinomial Logit

Variables	OR	Sig.	SE
Courses	1.159	0.002	0.054
Oral comprehensive exam	1.162	0.299	0.168
Number of written comprehensive exams	0.395	0.000	0.035
Required to orally defend proposal	0.903	0.465	0.126
Language requirement	1.942	0.000	0.301
Expected TTC	0.865	0.009	0.048

An examination of variables significantly associated with withdrawing prior to completion reveal that there are some contradictory results. For example, it is shown that as the number of courses required of students increases, so too does the likelihood of withdrawing. Having a language requirement is also associated with an increased

likelihood of withdrawing, and again in opposition to the results above, as the number of

written comprehensive exams increases, the likelihood of withdrawing decreases.

Variables that are significantly associated with withdrawing that do not contradict

to shown to be those associated with graduating (Table 24) include: oral comprehensive

exams, oral defense of proposal, and expected TTC. The program requirement of an oral

comprehensive exam is associated with an increased likelihood of withdrawing prior to

completion as is the requirement of orally defending one's thesis proposal. Consistent

with these findings, as the expected TTC increases, so does the likelihood of withdrawing

prior to completion.

**Table 25 Program Requirements associated with Leaving by end of Year 6:
Odds Ratios from a Multinomial Logit**

Variables	OR	Sig.	SE
Courses	1.299	0.000	0.075
Oral comprehensive exam	1.572	0.009	0.272
Number of written comprehensive exams	0.552	0.000	0.059
Required to orally defend proposal	1.443	0.026	0.238
Language requirement	1.495	0.036	0.287
Expected TTC	1.285	0.001	0.093

Given the contradictory results presented above, for example, number of courses

is associated with an increased likelihood of graduating and an increased likelihood of

withdrawing, it seems necessary to control for faculty as it is assumed that some of the

contradictory findings are driven by particular disciplines[18] and faculties.

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[18] Discipline has not been included in model 2 due to small sample sizes.

Model 2

The second model includes the same independent variables as the first, as well as two faculty variables, Science and Social Sciences. Students' status at the end of the sixth year again acts as the outcome variable with continue status serving as the baseline. With respect to faculty, Engineering serves as the baseline category and Humanities has been excluded as a result of History being the only Humanities discipline with complete data for the cohorts under review.

   With the inclusion of two faculty variables, the odds ratios, including the directional impact associated with particular variables as well as the associated significance levels have substantially changed. Focusing only on those variables significantly associated with graduating, it is shown that as the number of written comprehensive exams increases the likelihood of graduating decreases. Requiring that students orally defend their thesis proposal is associated with a decreased likelihood of graduating as is increases in expected TTC. The requirement that students be proficient in a second language to the extent outlined by the department is associated with an increased likelihood of graduating. Not surprisingly given the results presented thus far, being enrolled in a PhD program in the Social Sciences is associated with a decreased likelihood of graduating.

Table 26 Program Requirements and Faculty associated with Graduating by end of Year 6: Odds Ratios from a Multinomial Logit

Variables	OR	Sig.	SE
Courses	0.979	0.679	0.051
Oral comprehensive exam	1.168	0.291	0.172
Number of written comprehensive exams	0.677	0.000	0.074
Required to orally defend proposal	0.653	0.003	0.095
Language requirement	2.244	0.000	0.428
Expected TTC	0.659	0.000	0.066
Science	0.680	0.084	0.151
Social Sciences	0.329	0.000	0.050

Considerably fewer variables are significantly associated with withdrawing prior to completion at α=0.05. The number of courses required of students to successfully complete is associated with an increased likelihood of withdrawing prior to completion as is the requirement of an oral comprehensive exam. The only contradictory finding at α=0.05 in the second model is number of written comprehensive exams as it was shown that the number of comprehensive exams is associated with both an increased likelihood of graduating and withdrawing prior to completion.

Worth noting are two variables that are significant at α=0.10. Expected TTC and requiring a second language of students are each associated with an increased likelihood of withdrawing prior to completion, with significance levels of 0.069 and 0.090, respectively.

Table 27 Program Requirements and Faculty associated with Leaving by end of Year 6: Odds Ratios from a Multinomial Logit

Variables	OR	Sig.	SE
Courses	1.283	0.000	0.090
Oral comprehensive exam	1.735	0.002	0.302
Number of written comprehensive exams	0.649	0.002	0.092
Required to orally defend proposal	1.287	0.142	0.221
Language requirement	1.473	0.090	0.336
Expected TTC	1.233	0.069	0.142
Science	1.164	0.535	0.285
Social Sciences	0.822	0.288	0.152

Discussion and Limitations

The initial review of results provides some insight into attrition and TTC in doctoral programs at Carleton University. What follows is a summary of the results by research question as well as an overview of the limitations faced. An interpretation of the findings is presented in the conclusion and recommendations section of the paper.

Research Question 1

Of those who complete and withdraw, at what point in their studies are they most likely to do so?

Analysis of Carleton University administrative data revealed that students successfully completed a PhD program in as little as two years and took as long as ten years (and possibly more, but I am unable to know given the time span of the data), but that the largest proportion of students finish in their fifth year. While two students did complete a PhD program in two years, it should be evident that these were likely not typical students as less than ten percent of graduates had finished their program in three years. Similar to graduates, students who withdraw from their PhD prior to completion do

so at various points in their program. With that said, a large proportion of students

withdraw in the first two years, with one-quarter of them leaving in the second year, just

prior to the point in the program where the dissertation process begins.

These broad level analyses do not provide enough detail to inform institutional

recommendations to improve completion and attrition rates. However, the data do support

how a four year expectation of completion is not realistic given the proportion of

graduates that were able to complete their program in four years (27.2%). This of course

is not the proportion of students who successfully completed their program in four years,

but the proportion of *graduates* who successfully completed in four years. The data also

reveal that if intervention methods were to be implemented to reduce attrition that they

would likely be most beneficial if implemented in the first year of study. An intervention

could be mandatory social and academic events that are geared towards improving social

and academic engagement and integration, said to have a positive effect on schooling

outcomes (e.g. Tinto, 1993; Lovitts, 2001; Barr-Telford et al, 2003; Lambert et al, 2004;

Shaienks & Gluszynski, 2007).

Research Question 2

Are there disciplinary and faculty level differences in completion and attrition rates in

PhD programs?

The data presented provide a detailed look at completion and attrition rates by

both discipline and faculty for a ten year period of time. Significant tests reveal that

students in Science based programs are more likely to successfully complete by the end of

their tenth year. Figure 1 revealed that the trend of higher completion rates began by the

end of the third year and persisted until the end of the tenth year. Similarly, students in a Science program were less likely to withdraw from their program than students in Engineering and Social Sciences.

The Engineering faculty reported the highest attrition rates until the tenth year, at which point Social Sciences also reported a 40% attrition rate. Unlike graduation rates, the rank order of faculties did fluctuate over time, with Science reporting a higher attrition rate than Social Sciences in year 3. However, it was only for this year that Science had a higher attrition rate than any other faculty.

A significant difference was also found in graduation rates between two disciplines, and not surprisingly, the disciplines come from the Science and Social Sciences faculties. Chemistry students were found to be significantly more likely to graduate from their program in ten years than Sociology students. It was also shown that Chemistry students had the shortest TTC and Sociology the longest. While there were differences in attrition rates between disciplines, none were found to be significant.

Given the findings presented, it is obvious that some faculties and disciplines are better able to successfully move their students through the PhD program than others. The ability of departments to successfully move students through their program may be a reflection of disciplinary differences and standards. For example, students in Science based disciplines tend to do more group work, putting greater pressure on them to be academically and perhaps socially engaged. These of course are not aspects that are measured in administrative data, and thus were unable to be accounted for, but if possible, should be attended to in future research. The significantly greater proportion of students

still continuing their studies after their tenth year could be a reflection of disciplinary expectations that a PhD can and perhaps should take a significant time to complete. Further, because of the more subjective nature of Social Sciences, preferences of supervisors and committee members may require additional time on the part of the student.

Research Question 3

How does TTC vary by discipline and faculty, and within each faculty are there any clear outliers?

After aggregating six cohorts of data for a ten year span of time, average TTC by discipline and faculty were calculated. The results reveal that there is greater variation within the faculty with the shortest TTC than there is for the faculty with the longest TTC. Social Sciences by far seem to have the most difficulty seeing their students through to completion within a timely manner as they report an average completion time of 6.8 years. Within the Social Sciences the programs with the shortest and longest TTC do not vary much from the faculty average with Psychology reporting an average TTC of 6.5 years and Sociology 7.1 years.

Average completion times for all other disciplines do not reach the levels found for the Social Sciences, and with the exception of History, none surpass an average completion time of six years. The discipline with the shortest average TTC, also belonging to the faculty with the shortest average TTC is Chemistry, with an average completion time of 4.2 years. Chemistry is one of the two disciplines with average completion times less than five years; the other being Civil Engineering. Engineering as a

whole performed fairly well, with an average TTC of 5.2 years at the faculty level, only 0.1 years more than Science.

Despite the greater variation seen for disciplines within the Science and Engineering faculties, those that lie at opposite ends of the spectrum do not vary too substantively from the mean. Within Science, the best performing discipline had an average TTC just less than a year shorter than the faculty mean and the discipline with the longest TTC was just less than a year greater than the faculty mean. There are smaller deviations from the mean for Engineering disciplines, with Civil Engineering reporting an average TTC that is half a year shorter than the faculty average and Mechanical and Aerospace Engineering reporting an average TTC 0.8 years longer than the faculty average. As has been mentioned, the range in the disciplines with the shortest and longest TTC within a single faculty is was the smallest for Social Sciences with both deviating from the faculty mean by 0.3 years. No clear outliers were identified within faculty, but the Social Sciences are an outlier faculty when compared to the Science and Engineering faculties.

Research Question 4

Do program requirements or faculty account for differences in completion and attrition rates?

Two models were run to determine the impact that program requirements and faculty have on completion and attrition. There are minimal differences in the results associated with each independent variable between the two models. In most instances the direction of the coefficient remained the same and the significance level changed, with the

exception of the number of courses required of students. In the first model having additional courses are associated with an increased likelihood of graduating, but when controlling for faculty, the number of courses is not significantly associated with graduating by the end of the sixth year of study.

The analysis reveal that additional written comprehensive exams are associated with a decreased likelihood of graduating as is having to orally defend one's research proposal, and having a longer expected TTC. Interestingly, requiring that students complete a language requirement is associated with an increased likelihood of graduating. Returning to the descriptive statistics by faculty it is seen that Social Sciences have the greater number of written comprehensive exams and were tied with Engineering for having the longest expected TTC. The results for how faculty is associated with completion further confirms the link between the Social Sciences and a decreased likelihood of graduation as Social Sciences are less likely to graduate when compared to Engineering students. As expected, Science students are more likely to graduate than Engineering students (α=0.1).

When controlling for faculty, the number of courses students are required to complete, requiring an oral comprehensive exam, and an oral defence of a research proposal are found to be significantly associated with withdrawing prior to completion. Contrary to the findings for variables associated with completing, additional written comprehensive exams are shown to be associated with a decreased likelihood of withdrawing as is completing a language requirement. Looking again at the descriptive statistics, the average number of written comprehensive exams is highest for Social

Sciences and identical for Science and Engineering. The descriptive statistics indicate that the contrary finding surrounding language requirements may be a result of the proportion of students required to complete a language requirement by faculty –23% of Science and 38% of Social Sciences students. Note however, that this finding is not significant at $\alpha=0.05$, but rather at $\alpha=0.1$.

Limitations

At the outset of this research the goal was to obtain data for all PhD programs at McMaster University for at least a ten year span of time, possibly with some demographic information. Unfortunately administrative data are not something that institutions will freely part with, even after assuring anonymity. While Carleton University did provide, through its institutional research website, data that were rich enough to perform meaningful analysis, there are some definite flaws to the data.

The number of doctoral programs with complete data for the time period under review (the time period with the most plentiful data for a ten year span of time) is a limitation of this research. For example, only one program from the Humanities (which Carleton University refers to as Arts) is available for analysis. This limited the amount of comparisons that could be made across and within faculties.

In addition to the lack of disciplines with complete and comparable data, the inability of the researcher to separate part-time and full-time students is also a limitation. Including both part-time and full-time students in the sample is predicted to bias upward the estimates of TTC. While it is not possible with the available data to determine the

proportion of students who were enrolled on a part-time basis, it is known that between 1988 and 2012, 13% of doctoral candidates in the disciplines included in this analysis were enrolled on a part-time basis.

Even with the limitations discussed above, the analysis undertaken has helped to illuminate differences in TTC, completion, and attrition rates across disciplines and faculties. In addition, using data to perform this type of analysis for a non-research intensive university is something not abundantly available which adds to its importance. What follows are some recommendations informed not only by this research but also by its data limitations.

Conclusion and Recommendations

This analysis shows that students who withdraw prior to completion tend to do so in the first few years of study, and that certain program requirements are associated with an increased likelihood of graduating and withdrawing prior to completion. Namely, the number of courses required, orally defending a comprehensive examination, departmental expected TTC, orally defending a thesis proposal, and being enrolled in a doctoral program in the Social Sciences. Taking together the results from the discrete-time survival analysis and the descriptive statistics, the significant findings from the models are thought to reflect disciplinary differences (such as a laboratory culture that fosters integration and socialization) and not necessarily differences in program requirements. For example, the contradictory findings associated with language requirement—that it is associated with an increased likelihood of withdrawing and graduating—are thought to be

a reflection of the fact that similar proportions of Science and Social Sciences students were required to complete a language requirement. Recall that these faculties lay at opposite ends of the spectrum in terms of completion rates. Additional models were run controlling for particular disciplines (Chemistry and Sociology) as it was thought that these may be driving the contradictory findings; however, similar results are found, indicating that the differences found cannot be attributed to these disciplines alone.

Perhaps most notable are the differences in graduate student outcomes by both faculty and discipline. Disciplines that are laboratory-based tend to have better completion rates and lower average TTC than non-laboratory-based disciplines, with the most substantive differences between Science and Social Sciences, with Engineering occupying a middle ground.

The question now becomes why are laboratory-based disciplines outperforming non-laboratory-based disciplines? There are some obvious differences in the structure of these two discipline types. The variation that exits between laboratory-based and non-laboratory-based disciplines with respect to socialization and integration were addressed at the outset of this paper. Given the results presented, it is evident that these aspects deserve greater consideration in an attempt to understand TTC and completion rates by discipline and faculty. Recall that it was highlighted that laboratory-based disciplines such as Chemistry support integration and socialization quite heavily through the very nature of the structure of the discipline. Students and their supervisors work together on a regular basis, they do so in a shared space, and they research the same topic. The same degree of integration and socialization is not seen in disciplines such as Sociology where

students are much less likely to collaborate on research with their supervisor or other

students (this tends to come after the PhD), they do not share a space with their supervisor

(they may share an office with other students), and often do not work on the same topic as

their supervisor. Thus, the Chemistry doctoral candidate will face significantly fewer

obstacles to academic and social integration than the Sociology doctoral candidate simply

because of the nature of the disciplines. These differences are thought to be more

significant for understanding differences in TTC and completion rates by discipline and

faculty. Thus, they should be attended to by grant providers, schools of graduate studies,

and those involved in policy making at the graduate level as they may provide insight into

differences in graduate school outcomes at the disciplinary and institutional level.

      The data presented in this paper provide a good basis to inform institutional and

departmental recommendations. This research, as well as others in the area (e.g. Lovitts,

2001; Elgar, 2003; Archambault et al., 2006) informs the following three

recommendations. These recommendations highlight different avenues that could be

undertaken to improve student, departmental, and institutional success.

      The first recommendation is fairly straightforward. If no changes to program

requirements or to disciplinary expectations are expected to take place, changes to

funding should be carefully considered as there is a mismatch between periods of funding

and average degree completion time. While this model does not test whether funding has

an effect on completion – due to the nature of the data – it has been shown in previous

research that funding is positively associated with completion (e.g. Seagram et al., 1998;

Grayson & Grayson, 2003; McElroy, 2005; Archambault et al., 2006). When funding

periods end, but students study period has not, students will likely be required to seek outside employment which can become a significant distraction from school. The importance of reviewing funding schemes assuming that program requirements and disciplinary expectations remain static is especially pertinent to Social Sciences students (and likely Humanities) as they have significantly longer completion times and lower completion rates.

Given that there are current fiscal restraints that may prevent governments and institutions from prolonging the current period of funding, the second recommendation aims at altering current program requirements and likely disciplinary expectations. Through examining archived course calendars it became immediately obvious that there is a good degree of variation in program requirements and how they are defined. For example, a great deal of variation was found between departments definition of what a comprehensive exam referred to. Already noted is that some disciplines perceived the research proposal, including the writing and oral defence of it, to be a comprehensive exam. Other disciplines deemed successfully completing a course, in particular the final examination, as a comprehensive exam while others indicated that the comprehensive exam involves becoming an expert in usually two areas by deciding on a list of material to read in conjunction with a supervisor and committee. These differences in definition are an exemplar of decoupling that is often discussed in the context of education (Meyer & Rowan, 1977). It seems that it would be beneficial for departments to review their program requirements, how these compare with others, and whether adjustments can be made to ensure more students are able to successfully complete the requirements.

The third recommendation arose out of my experiences and involves the availability of data. As was stated in the limitation section, the goal at the outset of this research was to obtain institutional data from McMaster University, and to provide a copy of the research to the institution. It was expected that this offer would be taken up in the spirit of making evidence-based research a key component for policy development. However, it soon became clear that data sharing was not something the university had a particular interest in – and McMaster University is not alone in this mindset. The lack of take-up would have been more easily understood if the office of institutional research and analysis (IRA) were undertaking such analysis; however, it was made abundantly clear that those working in the IRA office were overworked. I was told that my data request would not be readily granted because those in the IRA office were overworked, and my request would impact their ability to provide snapshot statistics (the best means of meeting the data request) in a timely manner.

Thus, the third recommendation is to make administrative data from many universities, such as that provided by Carleton University, publicly available. This would allow for a significantly greater amount of data analysis to be performed, greater insight into student, disciplinary, and faculty level outcomes, and would likely lead to better and more innovative policy resulting from the expected increase in institutional data analysis. The administrative data exist, and are shared among U15 members, but aside from that it seems that little is done with the data. We are in the midst of a "data movement": 2012 was the year for "big data", 2013 will be Canada's year for "open data"[19], and academic

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[19] The launch of the Government of Canada's Open Data Portal is slated for Spring 2013.

analytics are the route many institutions are taking. Should Canadian institutions want to keep pace with the United States and other similar nations, it is necessary for them to make some radical changes with how they allow their data to be used. Most Canadian universities are public institutions and their data should be treated as such.

In sum, this paper was premised on the possibility that differences between laboratory-based and non-laboratory-based disciplines may play a key role in graduate student outcomes. Unfortunately, I was unable to directly measure these cultures, but my results are consistent with that premise, since Chemistry had the best completion rates and Sociology had the worse. The third and final paper in this dissertation further explores this possibility. Taking a case study approach to a single discipline (Sociology), the broad goal of the third paper is to understand how students and faculty make sense of, attribute, and understand the variation in their department's PhD completion times and rates. In attending to this research question the role of integration in achieving positive graduate school outcomes is explored. While this research does not permit any comparative analysis (e.g. laboratory versus non-laboratory) it helps illuminate the extent to which integration influences the successful completion of a PhD in a discipline known for lower than average completion rates.

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Appendix 3A

Independent Variables

Discipline: Biology, Chemistry, Civil Engineering, Computer Science, Earth Science, Economics, Electrical Engineering, History, Mathematics, Mechanical and Aerospace Engineering, Political Science, Psychology, and Sociology.

Faculty: Engineering, Humanities[20], Science, and Social Sciences.

Number of courses: the number of courses (including seminars) students must complete prior to graduation.

Oral comprehensive exam: students are required to completed an oral comprehensive examination (0=no, 1=yes).

Number of written comprehensive exams: number of written comprehensive examinations students must complete prior to graduation.

Required to orally defend thesis proposal: students required to orally defend their thesis proposal (0=no, 1=yes).

Language requirement: students are required to complete a language requirement as defined by the department (0=no, 1=yes).

Expected number of years to completion: the expected years to completion as indicated in the graduate calendar, or as stated by the relevant graduate administrator.

Graduate handbook: students provided with a graduate handbook that outlines program requirements and expectations (0=no, 1=yes).

Dependent Variable

Student status: status of student for each year until completion or status in year 10, the final year observed, (1=graduate, 2=continue, 3=leave).

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[20] Recall that the humanities faculty was not included in any models.

Proxies

Chemistry: oral defence of research proposal (current requirement)
Civil Engineering: expected TTC (current requirement)
Electrical Engineering: no TTC listed; used university TTC as proxy
Mathematics: expected TTC (current requirement)
Political Science: no TTC listed; used university TTC as proxy

Appendix 3B

Table 3B-1 Number of Students by Discipline

	n	%
Biology	29	4.8
Chemistry	43	7.1
Civil Engineering	30	5.0
Computer Science	32	5.3
Earth Sciences	29	4.8
Economics	28	4.6
Electrical Engineering	90	14.9
History	29	4.8
Mathematics	39	6.4
Mechanical and Aerospace Engineering	34	5.6
Political Science	69	11.4
Psychology	88	14.5
Sociology	65	10.7
Total	605	100.0

Table 3B-2 Number of Students by Faculty

	n	%
Science	172	28.4
Engineering	154	25.5
Social Sciences	250	41.3
Humanities*	29	4.8
Total	605	100.0

*History only

Table 3B-3 Descriptive Statistics -Independent Variables

	n	Mean / %	SD	Min.	Max.
Number of courses	605	3.9	1.30	2	6
Oral comprehensive exam	605	62%	.49	0 (no)	1 (yes)
Number of written comprehensive exams	605	1.3	.88	0	3
Required to orally defend thesis proposal	605	56%	.50	0 (no)	1 (yes)
Language Requirement	605	27%	.44	0 (no)	1 (yes)
Expected number of years to completion	605	5.2	1.06	3	6

Chapter 4

A Case Study of Student and Faculty Perceptions of Time-to-Completion and Completion Rates in a Doctoral Program

Abstract

Attrition and time-to-completion in doctoral programs vary by discipline, with notably higher attrition rates and longer times to completion in the Social Sciences. This micro-level analysis sheds light on the process of attrition and barriers to timely completion in two Sociology departments in two Ontario research intensive universities through interviews with completers, non-completers, and faculty. This research highlights how aspirations differ between groups of students, and how a department's climate can have indirect effects on student outcomes. Faculty and student are shown to have some different perceptions of factors that lead to non-completion and the importance of supervisory relationships is found to be paramount to both student experiences and outcomes. Students face many challenges throughout their journey in the doctoral program, but many can be overcome through a department's recognition of challenges faced as well as a commitment to improve them. Additionally, this paper highlights barriers to timely completion and reasons for withdrawal. It concludes with recommendations for change that can be implemented at the department level.

Introduction

Timely completion and good completion rates can be thought of as a measure of productivity and status –both at the department and the institution level. Departments and institutions with high completion rates and low times to completion may be perceived as having academically strong students, good faculty, realistic degree expectations, a positive climate, and good student supports. With that said, the degree to which departments and institutions embody these features is often unknown and left to speculation beyond the institutions themselves. It can be argued that students' outcomes

in Canadian graduate schools are not well-understood. Doctoral programs seem to have the greatest difficulty in maintaining reasonable (and timely) completion rates and involve greater investments of resources than master's programs.

There are a variety of differences between departments within and across institutions and these serve to shape graduate student outcomes. For example, laboratory and non-laboratory based disciplines have different structures and orientations to research and even within the same discipline, departments may have different policies and requirements. Given that such variations exist it is necessary for researchers to 'get inside' departments to more deeply understand these variations.

The first paper in this sandwich dissertation takes a macro-level approach, using logistic regression and discrete-time survival analysis with time-varying covariates to analyze data from the Youth in Transition Survey. It provides insight into the type of student most likely to enroll in graduate school, highlights student characteristics associated with different graduate school outcomes, and provides evidence of the average time-to-withdrawal in graduate programs. The second paper takes a meso-level approach and identifies thirteen PhD programs at Carleton University with complete data for a ten year span of time for the 1994 to 1999 cohorts. Program characteristics are coded and assessed for their relationships with completion and withdrawal. Comparisons in time-to-completion (TTC) and completion rates are also made across the thirteen programs as well as the three faculties represented in the data. My second sandwich dissertation paper shows that after a ten year period of time, 46% of Sociology students at Carleton University in the 1994-1999 cohorts completed their PhD, 42% withdrew, and the

average TTC was 7.1 years. The next step is to take a micro-level approach to the question of graduate school attrition.

To understand the processes of PhD attrition, this chapter undertakes two case studies of two Sociology departments in two Ontario research universities. This micro-level case study gets at the variations and commonalities that exist within and across the two departments. Focusing on two departments provides a great deal of insight as accounts from multiple students from the same program can be used to make meaningful comparisons between completers and non-completers. Controlling for outside factors such as institution and discipline allows for more substantive conclusions to be drawn about TTC and attrition for the discipline of interest.

This research provides first-hand accounts of the factors that lead PhD students to withdraw from their program, as well as how this decision was arrived at. It compares aspirations, experiences, and perceptions of dropouts, completers, students who are nearing completion, and faculty members' on reasons why students withdraw from their PhD or take longer to complete. The advantage of comparing these groups is that student differences – should they exist – can be highlighted and the degree of congruence between student and faculty perceptions can be teased out.

This research draws on three frameworks/models for studying attrition in PSE. Background characteristics and funding are highlighted by Tinto (1993), Lovitts (2001), and Nettles and Millett (2006) as being relevant to student outcomes and are worth including in any in-depth study of attrition and TTC in graduate school. Students' aspirations upon entering PSE are also highlighted by Tinto (1993) as affecting decisions

to withdraw. While Tinto does not focus on doctoral students, I argue that students'

aspirations are relevant to decisions about withdrawing from the PhD program as well as

TTC. Socialization, which overlaps with academic and social integration, is also included

in each of these authors' frameworks and thus, is incorporated into the framework for this

research.

While these concepts have traditionally been used in quantitative research, I adapt

them for use in my qualitative case study. Integration and socialization are expected to

play a role in climate of the department, the supervisor-supervisee relationship, and the

level of student understanding of the expectations placed on them. Each of these variables

is thought to be relevant to students' decision to withdraw.

Literature Review

Empirical research has demonstrated that aspirations, climate/department policies,

engagement, the supervisor/supervisee relationship, and funding all play a role in attrition

and TTC from graduate school. This literature review has been organized as a series of

stages, starting with pre-existing factors, moving to on-going processes, and finishing

with exiting the program.

Entering the PhD: Pre-Existing Factors

Aspirations and Goal Commitment

Aspirations can be fluid and continuously re-evaluated, and as such, they often change

over time (Tinto, 1993). Attrition research at the undergraduate level often measures

aspirations in terms of hoped-for educational attainment. At the graduate level, future

educational attainment has less variation (e.g. bachelor's degree, master's degree, etc.) and so is thought to center more on career aspirations.

Ott, Markewich, and Ochsner's (1984) work on graduate student retention seeks to better understand how a number of variables are related to retention, one of which is goal commitment. Registration status (part-time and full-time) is used as a proxy for goal commitment and is found to be relevant to predicting retention rates for doctoral students, whereby full-time students' predicted retention rates are higher than those of part-time students. Further, they note that the advantage that students perceive from completing the doctorate likely impacts retention. The links to career aspirations are clear, if students do not aspire to a career that does not require a PhD, the financial and personal sacrifices often made by doctoral candidates may not seem like a rational choice. Closely related to this is the work of Ampaw and Jaegar (2012) which uncovers the impact that labour market conditions have on completion. They find that higher expected earnings are associated with increased motivation and an increased likelihood of completing.

Climate

The impact of the climate of the department as well as department policies and practices are stressed by Lovitts (2001) and are also themes that emerge in other attrition and TTC research. Previous work demonstrates that having positive relationships between students and advisors can result in more favourable student outcomes as well as a more positive department climate (Hartnett, 1976). In looking at departments with high completion rates and short TTC, de Valero (2001) finds that a positive department climate promotes completion and TTC. Departments with low completion rates and long TTC are found to

have poor department climates. de Valero (2001) notes that the poor department climate

likely contributes to the poor student outcomes and that in general positive departments

climates are thought to increase the likelihood of completion. While not addressed in the

research, it may also be the case that poor outcomes lead to worsened department

climates.

Baird (1990) concludes in his research that it is likely that attrition and TTC are

affected by departmental policies and practices. Seagram et al. (1998) also highlight how

a departmental emphasis on research and academic careers impacts TTC in doctoral

programs. Graduate students and faculty included in Wilson's (1965) research provide

suggestions for reducing TTC and among their suggestions are changes to administrative

policies and procedures. Several participants discuss department policies throughout the

course of their interview and those that are thought to have an impact on student

outcomes are highlighted in the setting section of this paper.

Getting Through and Finishing the PhD

Engagement and Integration

Two closely related concepts are integration and engagement as it is often the case that

the more engaged a student is, either academically or socially, the more he or she is

integrated. The extent to which doctoral students are academically engaged has been

shown to impact both their TTC and completion more generally. Using a rational student

choice model, Gillingham, Seneca, and Taussig (1991) demonstrate that increased

academic engagement, measured by number of hours spent on academic work, reduces

the amount time taken to complete the PhD. Other types of academic engagement such as participating in meaningful research projects have also been shown to impact degree progress (Maher et al., 2004).

Integration is emphasized by Lovitts (2001) in her research on doctoral TTC and completion, and even more so by Tinto (1993). Themes of integration stand out in Golde's (2000) qualitative research which focuses on three students and their accounts of contemplating the decision to withdraw from their doctoral program. Through her interviews, Golde (2000) teases out how academic integration at the level of the department plays a significant role in students' decision to withdraw from their doctoral program. The importance of academic integration for graduate student degree progress is noted by Girves and Wemmerus (1988) who demonstrate that the type of academic integration is different by credential level, with graduate grades mattering more for master's students and involvement in one's program having a larger impact for doctoral students. In an effort to undercover aspects of integration and its impact on students' experiences in their program – including their outcomes – and following the work of Nettles and Millett (2006), students were asked about their relationships with their peers and faculty.

Supervisor/Supervisee Relationship

The importance of the supervisor/supervisee is paramount in doctoral studies. For many students, it is the supervisor who shapes their experiences and helps them navigate through unknown territory (Girves & Wemmerus, 1988; Zhao, Golde, & McCormick, 2005). Research that focuses on departmental factors that affect TTC and completion

rates in doctoral program reveals that across four clusters of departments (grouped by completion rates and TTC) only two variables are consistently found to impact student outcomes, peer support and the advisor/advisee relationship (de Valero, 2001).

Barnes and Austin's (2009) highlight the importance of the supervisor to student outcomes and the complexity of this role through interviews with what they refer to as "exemplary advisors." Their research reveals that to be an effective doctoral student advisor one must understand that it is a complex role. Exemplary advisors, who have graduated a substantial number of doctoral students, indicated that their responsibilities include helping students negotiate several aspects of their program including publishing, assembling committees, and managing projects. Student outcomes are shown to be better when advisors contribute to their graduate students professional development and develop a relationship that is built on intellectual development and guidance, as well as care and support (Maher, Ford, & Thompson, 2004; Barnes & Austin, 2009; Bain, Fedynich, & Knight, 2010).

Financial Support

Most research that focuses on financial support highlights how the type of support affects attrition and TTC. Baird (1990) finds that TTC is related to having the financial resources to pursue scholarly activities, particularly those that directly support scholarly work, such as fellowships and research assistantships. Research based on York University students finds that students who take longer to complete reported having a greater number of teaching assistantships (Seagram, Gould, & Pyke, 1998). In line with both Baird's (1990) and Seagram et al.'s (1998) research, Ehrenberg and Mavros (1995) find that in general,

financial support plays a greater role on attrition than TTC. With that said students who do not receive funding, or receive tuition waivers or teaching assistantships, have longer TTC and lower completion rates than students who receive research assistantships or fellowships.

Contrary to these findings, Bowen and Rudenstein (1992) find that students with fellowships are less likely to advance to candidacy (the dissertation phase of the PhD) than students with teaching assistantships. Interestingly, Attiyeh (1999) finds that greater amounts of funding in the first year are associated with greater persistence in four out of the five disciplines examined, with the fifth discipline revealing the same patterns identified by Bowen and Rudenstein (1992). While it may be obvious that financial support is associated with TTC and attrition, its effects vary by type of support.

Research Questions

The broad research question that guides this study is: how do students and faculty make sense of, attribute, and understand the variation in their department's PhD completion time and completion rates? What rationales are used to explain why some students withdraw prior to completion or have longer than expected TTC, and while others successfully complete their degree? For example, do faculty and students perceive the supervisory relationship as pivotal to outcomes? Do students perceive funding to be a factor in timely completion? Are completers more engaged and integrated than non-completers and do their aspirations vary? Furthermore, this research will address how

prevalent thoughts of withdrawing are, who these are discussed with and how TTC and retention can be improved.

While these concepts have been addressed in quantitative research, adapting them to a qualitative study can hopefully enlighten and deepen our understanding of them. By answering these questions, this chapter attempts to shed light on the lived experiences of PhD students, examining how their aspirations, types of engagement, and congruence with faculty perceptions of decisions to withdraw impact their completion rates. From this research I offer a series of recommendations that are aimed to inform actions that can be taken by Sociology departments, and likely other Social Science departments, to help improve graduate student experiences and outcomes.

Sample

To gain an in-depth understanding of TTC and attrition it is crucial to speak with students who have actually withdrawn from a PhD program. Interview data from 20 individuals are utilized in this analysis. Participants come from two Sociology departments at two Ontario research universities. The two departments highlighted in this research have significant variation in TTC both within and between them, with some students completing their degree in the expected amount of time, but several taking well beyond four years. Variation in TTC provides a rich source of data and an opportunity to learn about some of the differences between short and long completers as well as some of the factors that are associated with TTC.

While two institutions are drawn on for this research, the bulk of respondents come from a single institution. This project was originally aimed at a single department, but while attempting to recruit interviewees, it became evident that participants from a second university were needed due to a lack of faculty agreeing to participate. Interviews were conducted with a combined total of ten short and long completers, five non-completers, and five faculty members. Short completers are those who finished their degree in less than five years, while long completers finished their PhD in their fifth year or later. A small number of completers had yet to defend their dissertation at the time of their interview but given that they were within a couple months of defending, the risk that they would not complete was extremely minimal.

Table 28 Student Participants

Name[21]	Completer Status	University
James	Short	A
Joplin	Short	A
Cobain	Short	A
Morrison	Short	A
Lennon	Short	A
Bonham	Long	A
Staley	Long	A
Hendrix	Long	A
Clapton	Long	A
Nowell	Long	A
Marley	Non	A
Redding	Non	A
Thorton	Non	A
Buckley	Non	B
Waters	Non	B

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[21] Pseudonyms are used for student and faculty participants.

Table 29 Faculty Participants

Name	University	Gender
Dr. Soul	A	M
Dr. Blues	B	M
Dr. Rock	A	M
Dr. Reggae	B	M
Dr. Jazz	A	F

Research Methods

Prior to participating in their interview all student participants were asked to complete a

brief online survey used to collect background information as well as to develop measures

of social and academic engagement. This information is thought to be relevant to the

research but given the nature of the questions it is not necessary that they be asked during

the interviews. In instances where clarification was needed, participants were asked

during the interview or in a follow-up email. The surveys can be found in Appendix B.

The semi-structured interviews lasted between 45 minutes and one hour. Three

mediums were used for interviewing: face-to-face, online, and telephone. The medium

used depended on the location of the researcher relative to the participant and participant

preference. The interview guides, included in Appendix A, outline the questions asked of

participants. While at times the interview went "off script," the questions in the

appendices reflect the topics discussed during all interviews.

Methodological Limitations

While a great amount of depth is gained through undertaking a case study, there are also

limitations associated with this approach. For example, focusing on two departments

within a single discipline does not allow for an assessment of whether the same processes

occur within other departments, institutions, or disciplines. While some differences

between departments come through in the interviews such as social climate, two

departments still do not provide a great deal of breadth. However, it is possible to extend

this research in the future by examining additional Canadian Sociology departments.

Analysis

Data are first categorized by group – short completer, long completer, non-completer, and

faculty – and subsequently coded within and across groups by common ideas and themes.

Coding across groups is possible for questions that are asked of all participants, such as

how completion times could be improved. Within group coding is undertaken for

questions that are particular to a group; for example, non-completers were asked why they

decided to withdraw from the PhD. The number of common themes varies by question

and group, as certain questions lend themselves to a greater variety of responses and in

some cases there are particular groups that are more likely to highlight the same themes.

Setting

Completers, non-completers, and faculty from Sociology departments in two research-

intensive U15[22] Ontario universities participated in this study. While there are a number

of similarities between the two institutions they also differ with respect to certain policies.

A notable policy at *University A* is the requirement that students withdraw from their PhD

program if they have not finished within a set number of years. *University B* on the other

hand does not have a similar policy. The Sociology department at *University A* presents

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[22] Canada's 15 research-intensive universities

itself as being more stringent with timelines and progress reports, which are in large part enforced by the school of graduate studies. Both universities currently have a professional development requirement that must be met, and have similar degree requirements (e.g. coursework, two comprehensive exams, a dissertation proposal, and a dissertation).

Findings

Completers and non-completers were asked a number of similar questions about their experiences during their PhD program. Questions are oriented around five broad themes: aspirations, engagement, perceptions of and satisfaction with the program, timely completion, and completing the program. These themes represent those identified in the theoretical frameworks presented at the outset of this chapter. Faculty also discussed completing the PhD and timely completion, including the role that the supervisor plays in these outcomes.

Entering the PhD: Pre-existing Factors

The climate of a department as well as student characteristics play a role in both doctoral student experiences and outcomes. Both of these aspects can shape how students perceive their program, their future in academia, and can impact their level of engagement.

Departmental Climate

Completers and non-completers were asked to comment on the social climate of their department while they were a PhD student. Student perceptions of the social climate are not limited to this particular point in the interview as they permeated other discussions, such as the most challenging part of the program and withdrawing from the program. As

noted by Lovitts (2001), student experiences are thought to be shaped by both the student and faculty climate –the differences between the two cannot be stressed enough. While there is a certain degree of variation in perceptions of social climate, the descriptions below are thought to be good generalizations of completer and non-completer perceptions.

The question that elicited the greatest amount of emotion and intensity during the interviews with completers and non-completers is the question that tapped into the atmosphere of department *A* while participants were enrolled in the PhD program. For example, one respondent prefaced their response to this question by telling me to "brace myself" (*Hendrix)*. There is a certain degree of difference in the social climate of the two universities, and given the importance of setting and how it can shape student experiences, it should be noted that the large majority of interviews are with those who attended *University A*.

University A: This department was described as one with significant faculty tensions, but fairly good student relationships. While some students recognized that the social climate varies every year, each respondent commented on the poor faculty climate. This department has tensions, and they were abundantly clear to students. One completer noted that it was a "heated climate" (*Cobain*) while another noted "the department has been so unhealthy for so many years" (*Clapton)*. However, the department seems to have evolved over time as some of the earlier cohorts who still have some level of involvement with the department noted that improvements have been made since they were students. It is also true that more recent graduates had fewer negative things to report about the

climate of the department. This is not to imply that tensions no longer exist as a more recent completer noted that the department was a place that lacked involvement –perhaps a repercussion of its "fragmented" nature. The student climate was perceived to be more collegial than the faculty climate. Student tensions were highlighted but overall most had positive experiences with their peers and noted that there was a supportive student body.

University B: This department was also said to have faculty tensions but they were not nearly as present, or if they did exist, students were not nearly as aware of them. Tensions were noted among faculty in the context of putting together committees, whereby students were vaguely aware that some faculty do not work well with others. Or, to put it another way, students' progress could be slowed down by having certain faculty on a committee together. Overall, the climate of this department seems to be fairly positive, with one participant noting that the department was "pretty open and comfortable" and that "people more or less pretend that everyone gets along" (*Buckley*). Students were said to be fairly collegial and non-competitive –with a single noted exception.

While the climate of the department was not said to have a direct effect on TTC and completion, indirect effects were cited. For example, funding was a challenge for many and one means of dealing with minimal funding was to obtain employment, which detracts from time spent on studies and often leads to longer completion times. Scholarships, a major source of funding, were perceived to be impacted by one's supervisor and if a student was supervised by a faculty member who did not belong to the right "camp", that was thought to decrease the likelihood of receiving scholarships.

Additionally, the inability of certain faculty to amicably work together was seen to hinder the formation of dissertation and comprehensive examination committees, and in some instances negatively impacted outcomes, which added to time taken to complete their PhD.

Student Aspirations

Aspirations have been shown to be relevant to student persistence (e.g. Tinto, 1993), and while they are thought to evolve throughout a student's academic career, aspirations upon entry are assumed to have a certain degree of impact on students progression in the doctoral program. Many students provided more than one reason as to why they enrolled in the PhD, but short, long, and non- completers all had similar motivations. Commonly and equally mentioned reasons for enrolling were the subject matter (including theory and methods) and that the PhD was a natural progression after completing the Master of Arts. However, the most common reason for enrolling was the desire to work in a university.

Having clear career aspirations upon entry are thought to be relevant to students' retention in the doctoral program as for some careers, such as a professor of Sociology, the PhD is required. Thus those who aspire to be a university professor likely have a stronger motivation to finish the program than those who do not hold the same aspiration. In fact, one student noted that being a professor was her goal and everything she did was based on achieving this goal. All but two completers noted that they wanted to be a professor at the outset of the PhD program. All completers who did not have any clear career aspirations fell into the long completer group.

Students who withdrew from the PhD were less likely to want to be a professor and less focused with respect to their career aspirations. Contrary to the completers, only one former student indicated having a clear aspiration of being a professor and others had thought about the idea but were not solely committed to the career. As highlighted by Tinto (1993), student aspirations and expectations can change throughout the educational experience. It was not until enrolling in the PhD program that one student reconciled their thoughts about being a professor "my aspirations changed, yes certainly the thought of teaching inside of a university became very unappealing after spending so much time in one. The politics were ridiculous; the people I used to look up to became real life, fallible humans. It really took the sheen off" (*Redding*). This recalibration of aspirations was also expressed by other student participants.

Different Responses between Students and Faculty: Student Intelligence

Faculty were asked whether they believe there were any substantive differences between students who complete and those who withdraw. All faculty were able to identify differences. Some provided caveats to their statements; for example, one faculty member commented on two students who withdrew but did not have many of the characteristics that non-completers are thought to have. Common differences identified by faculty between completers and non-completers centered on motivation, intelligence, effort, priority, commitment, life circumstances such as socioeconomic status, and psychological issues. When comparing faculty and students responses, there was one clear point of divergence –intelligence. When asked about whether any substantive differences exist between those who complete and those who withdraw, one faculty put it quite bluntly by

saying "yeah, those who have withdrawn have been less capable" (*Dr. Reggae*). Another faculty noted "there's no question that some people are smarter than others, they get it more quickly, better capacity for logic and inference, it's easier for them" (*Dr. Blues*). While most faculty addressed the issue of intelligence, no completers or non-completers mentioned this as a significant barrier to completion.

Completers and non-completers also provided a number of reasons as to why students withdraw and the only reasons that touch on notions of intelligence were academic dishonesty and failing comprehensive examinations. However, the two completers who provided these responses did not make reference to intelligence. Other reasons included lack of fit, timing out, lack of financial and academic support, poor treatment from others in the department, and a lack of work-life balance. The most commonly referenced reasons were working and labour market uncertainty.

What should be immediately evident are the significant differences in the types of reasons provided by faculty and students participants. Faculty explanations tend to be student-centric reasons while student explanations for the most part tend to be centered on department and external factors.

Processes: Getting through the PhD

Getting through the PhD can be a long and difficult process. Students struggle with their self-confidence, identity, isolation, and pressures involved with completing a PhD. One means of combating isolation, coming to terms with one's identity, and dealing with the pressures of the PhD is to be engaged, on both a social and academic level. These two types of engagement are commonly discussed in the literature as a means of reducing

attrition and improving retention (e.g. Terenzini & Pascarella, 1977; Tinto, 1993; Pike and Kuh's, 2005; Lehmann, 2007). These concepts are explored in the interviews and short survey.

Progress and Academic Engagement

The type and frequency of academic activities completers and non-completers were engaged in varied, but all were involved in some type of department or university activity. Commonly mentioned roles and activities included serving on committees, participating in the graduate caucus meetings, attending job talks, attending brown bag lunches, and planning and/or participating in the department graduate conference. The extent to which activities were available for students to participate in did vary by university, with *University A* offering a greater number of activities. The impact of being involved with respect to time and intellectual development was not the same for all participants. For example, a handful of students discussed participating in, and knowledge of, reading and working groups that were organized by supervisors. These groups were reported to be highly beneficial and looked upon fondly. One student noted that participating in this type of activity "helped to keep me sharp and my mind involved in the theory" (*Hendrix*). This not only helped this student's engagement with the literature but also resulted in a publication, something for which many PhD students strive.

There was a clear divide between completers and non-completers with respect to publishing. All short and long completers interviewed indicated having published or trying to get a paper published while the opposite held true for non-completers. It is usually the case that many publications come near the end of the PhD, however only one

non-completer withdrew prior to their fourth year signalling that duration in the program is likely not the reason for a lack of publications or attempting to have work published. In addition to the activities mentioned above, the large majority of completers and non-completers attended and presented at a variety of conferences. However, similar to publishing, the only participants that did not attend any conferences were non-completers.

Completers and non-completers were drawn to participating in academic activities for a variety of reasons. Some participated in department and university activities to build their curriculum vitae, to bring about change, for social justice, to contribute to the community, and for professional preparation. The amount of time demanded from students participating in academic activities varied with some requiring a substantive amount of time. As one short completer commented, "it was demanding, and it took a lot of time away from my work but it was also rewarding" (*Joplin)*. Most did not express that being involved in activities detracted from their work, but many felt there were positive repercussions from participating.

Differences between short, long, and non- completers are found when examining responses to survey questions. Interestingly, short and non- completers spent on average the greatest amount of time per week on school work. This of course could be driven by the fact that all long completers held jobs while pursuing their PhD (although about half of long completers started working in their fifth year), and only one short completer and two non-completers were employed while in school. Further, the short completer who did work reported working an average of 1-10 hours per week above and beyond teaching and research assistantships, while all others worked between 11 and 30+ hours per week.

Another difference between the three groups is that short completers were more likely to always meet program deadlines.

Non-completers were more likely to express some degree of discontent with respect to progressing through the PhD. The isolation that often coincides with the dissertation phase of the PhD was difficult to for some, but for another, the difficulties went well beyond a single aspect of the program.

> I think if I was being honest, I would describe it as a gradual disenchantment. I feel somewhat bitter now because it feels like I spent a lot of time and commitment in the program with very little to show for it, but I know this isn't the case. … But I certainly left thinking that with the job prospects being as bad as they were, the departmental politics, and the like, that if I had the choice I wouldn't have done it again --even though I think it was instrumental in getting me the job! I suppose for me that I wish there was a lot more clarity in terms of what's expected of you--much more detailed than simply here's what you do in year 1, year 2, etc. … I never, ever felt like I belonged there - that I didn't have what it took to do doctorate level research, that I felt stupid, and I wasn't sure of the pathway forward, really. When I started to have doubts about being in the program, it felt like there was no one that I could talk to - that the idea of discontinuing your doctorate was just not a possibility (*Marley*).

The experiences of this non-completer signal a number of department or faculty issues to be addressed, such as providing greater clarity around student expectations and helping to foster support groups. Clarity of student expectations, or what Lovitts (2001) refers to as cognitive maps, have been said to impact how students make their way through the system and is strongly supported by the comments made by the non-completer above.

Social Engagement

While all completers and former students were academically engaged, the same level of participation in social activities organized by the department or institution was not found. This was not necessarily because of a lack of desire to participate, but rather because of

the notable dearth of social events organized by the department. All completers and non-completers participated in social functions organized by the department or institution, and most attended their department's holiday party, but many noted that this was often the only organized social event with an academic year. The lack of faculty participation in social events was also felt to limit the number of opportunities students had to meet faculty.

There was some hesitation about attending department social events at the student level. "I usually went to the December get together. But to be honest, I had a lot of anxiety about going to department functions and hanging out with grad students (though I did hang out with them a few times a month). I preferred university activities that were outside the department" (*Hendrix*). Similar to this completer, most students participants recalled getting together with other graduate students on an informal basis.

Developing social ties was an important part of their PhD experience for some. In fact, both completers and non-completers commented that this was the best, or among the best part of their program: "I loved my fellow students, which is why I kept in touch with so many" (*Redding*), "…on the positive side, I met some of my closest friends while in that program" (*Staley*), "I liked hanging out with other classmates" (*Morrison*). The importance of being socially engaged was clearly not lost on one long completer who noted that "Forced socialization is a positive thing!" (*Bonham*).

Supervisory Relationships

The impact that supervisors and committee members have on students' experiences cannot be underestimated. At some point during each interview all completers and non-

completers discussed the importance of their supervisor, and in some instances, the supervisor role more generally. When asked about the best part of the PhD program, approximately one-third of all completers and non-completers mentioned their supervisor, committee members, or specific faculty. "The best thing was working with [my supervisor] and finding my home in sociology" (*Hendrix*). The close relationships that were formed were spoken about fondly, and many recognized the importance of the supervisor for successful completion. In one instance the motivation to study a particular topic was driven by the desire to work with a particular supervisor, contrary to the approach many students take whereby their research topic often dictates their choice in supervisor. Supervisors providing professional mentorship were also highlighted by some completers as a positive aspect of the program. For example one long completer mentioned that the best part of the PhD program was the professional preparation that a small handful of professors were able to provide.

Relative to perceptions of one's institution and department, greater satisfaction was found with supervisors. Only three students indicated they would not choose the same supervisor if they were to start their PhD over –one short, one long, and one non-completer. One long completer felt the quality of their supervisor was below average, but all others indicated that the quality of their supervisor was above average or excellent. The greater satisfaction students expressed about their choice and quality of supervisor is not necessarily the same thing as satisfaction with the program or institution, since satisfaction with one's supervisor is often a product of mutual self-selection.

Not all experiences with supervisors and committees were positive. When asked about barriers to timely completion the most common reason provided was the supervisor and in some instances the supervisor and committee. Some commented on the inability of committee members to work together effectively, others noted the lack of mentorship provided by a supervisor, and the amount of time students spent waiting for feedback which some believed may be due to the understaffing of graduate faculty within the department. Supervisors were not only thought to be a potential barrier to timely completion, but also to completion more generally "I think a lot of students don't finish because of their supervisor" (*Bonham*).

All but one faculty recognized that supervisors play a role in TTC; however, perceptions of the significance of this role varied. One faculty focused heavily on the role of the student in timely completion noting that faculty cannot "give into a student who is lazy" (*Dr. Blues*). Another faculty noted that as a supervisor they can help set expectations of timely completion for their students and that providing timely responses could help ensure that the supervisor does not act as a barrier to completion.

 The importance of the supervisor is well-recognized, but what faculty believe this role entails is not as well-known. Almost all faculty indicated that their role was to provide some type of professional mentorship, some saw this as providing "unrelenting criticism… unlimited support … advice and discussion about goals…what kind of professional do you want to be. Then some realism about what the goal (student goal) would entail" (*Dr. Soul*). Others believed part of their role as a supervisor is to teach

students how to manage a big project and how to write –some faculty were especially

vocal on this topic.

The personalities and the working styles of students impact the role that

supervisors take in the supervisor-supervisee relationship. In discussing the role of the

supervisor as more a coaching role, one faculty member highlighted how their role is

"going to depend hugely on the individual involved and how you work together and their

level of independence and so on" (*Dr. Rock*). Some students prefer to work independently

while others require significantly more time and hand-holding. Throughout a student's

time in the program these boundaries and working styles are negotiated with their

supervisor.

In addition to students and supervisors negotiating their roles, relationships are

formed. The relationship that develops between a student and their supervisor is shaped

by the student, but more so by the supervisor. One faculty member sees the supervisor-

supervisee relationship as being:

> an interesting relationship. For that period of time you're really very close, or you
> develop this kind of closeness, ummm, that that is academic and is academically
> driven but there is a lot more to that relationship, ummm, that sort of touches on
> the more personal and, and all of that. So, it's finding a balance between how
> much support that you provide and helping kind of guide students in taking
> responsibility for their academic journey. But not setting them adrift…" (*Dr.
> Jazz*).

It was also stressed by another faculty member that there needs to be a good personal

relationship with the student being supervised but that there is a clear difference between

being friendly and being someone's friend, and that this is something that is up to the

faculty to manage. The importance of making this distinction centers on the treatment of

students. For example, it may be the case that when a close relationship (being friends) develops that a supervisor may feel compromised in the type of critique they can provide.

Program Issues and Challenges

Throughout the process of completing the PhD, student participants in this research faced a number of challenges. However, some of the challenges would be difficult, if not impossible, to attend to given their nature. For example, multiple participants mentioned that having the discipline and motivation to work on the dissertation were challenges. While not all challenges discussed by participants can be addressed by departments, completers, non-completers, and faculty revealed a number of program issues that could be attended to.

The admission process to the PhD program was thought to be in need of refinement. Enacting a more strict admission process would likely result in smaller class sizes and fewer students per faculty supervisor and was thought to be a good avenue to improve doctoral student outcomes. One non-completer thought a more strict admissions process could have been personally beneficial. "Well, I want to say it starts before retaining, because it's as much a failure of poor selection, or selecting people like me who maybe would benefit from being on the outside for a bit. Maybe PhD students should be required to have some real-world experience first, like MBA's" (*Redding*). It should be made clear that this issue is not only a department issue, but an institutional and provincial government issue. The Government of Ontario has a funding structure that is heavily weighted towards inputs, with very little funding devoted to outputs. This incentivizes institutions and departments to increase enrollments so that they can increase

their funding but does little to incentivize outputs. Thus, the issue of admission and class size is an issue to be addressed at multiple levels.

A closely related concept is program design and students and program fit. When asked about improvements that could be made to the PhD program that would help with TTC and completion, one short completer provided what some may perceive to be a fairly radical suggestion: that there should essentially be more than one stream available in the PhD program - "differentiation by student career goals makes sense" (*Joplin*). A faculty member also suggested a similar approach. It was suggested that more applied programs which could be more useful for students be created and that the MA and the PhD could be classified as "boutique" programs that only admit a small number of students. Reconceptualizing the Sociology PhD as a two stream program, or as a boutique program, was thought to help improve student outcomes by ensuring that student needs are better addressed.

The lack of community was perceived by both completers and non-completers to deserve attention and improvement. They felt that creating a sense of community would provide students with a sense of support but that this may not come naturally "I would argue that both academic departments and students would benefit from a more cohesive and supportive environment, but that 'support' may need to be enforced" (*Thorton*). While it may be difficult for departments to create a sense of community for a number of reasons (e.g. pre-existing tensions, lack of interest, etc.) it was thought to be a means of improving retention.

Another program issue for some was comprehensive exams, and for one long completer they were the most challenging part of the program. The challenge stemmed from the lack of preparation students receive for the process. "We all know how to read, but aren't necessarily taught how to synthesize information. We also have never (for the most part) had an oral exam. I think there's a lack of preparation. I'm not talking about hand-holding through the process, but these are skills that should be taught to us in the classroom setting" (*Bonham*). It was felt that these skills can be taught to students through making a conscious effort to teach these skills in graduate courses, or through offering mandatory courses to help students prepare for program milestones.

The quality of financial support was not looked upon fondly by participants with the majority of completers and non-completers reporting that it was average, and one long completer indicating that the financial support provided was extremely poor. Funding, and in particular scholarships, was a challenge for some and perceived to be a barrier to engagement and completion. Some felt that more funding was needed, not for a longer duration, but for a larger pool of students and that all students should have either a teaching assistantship (TA) or research assistantship (RA). Scholarships were a source of funding that had a significant amount of attention drawn to it. One long completer (*Staley*) focused on scholarships and the inequitable distribution of them while another highlighted how "equitable sharing of financial and academic resources" would be a good place to start with respect to improving retention. However, many of the participants were scholarship holders, so one may question whether this in fact would have been a more prominent issue had the sample included fewer scholarship recipients. Tensions

surrounding scholarships could be relatively easily attended to by a department through greater transparency. Many students were not clear on how they were being ranked and how decisions about scholarships were arrived at and these were identified as a point of contention at both universities.

Systemic challenges were noted by some and tended to center around support systems –both financial and mental. Two participants in particular noted the lack of support received in these areas. For one non-completer there was a lack of resources for dealing with psychological issues:

> For me the most challenging thing were probably psychological issues - I struggled with uncertainty, lack of confidence, and even depression at times while going through the program, and it never really felt like that I could talk to any of the faculty members about these kinds of issues, and there was no mental support or counseling services that were ever recommended or that we were told about (*Marley*).

One long completer who was struggling financially sought out information about additional sources of funding, such as bursaries and was advised to apply for them the following year. This long completer believed the responses and treatment received to be systemic rather than personal and was able to arrive at this conclusion only after having spent time at another institution whereby comparisons were made.

The dissertation proposal, which for the departments participating in this research, follows coursework and comprehensive examinations, was recognized as a key point at which many students begin to lag behind expected timelines, "suggest[ing] that students have difficulty formulating a dissertation project" (*Dr. Rock*). The dissertation proposal was mentioned by some as the most challenging part of the PhD. Departments could

attend to this pitfall relatively easily through placing greater emphasis on the proposal

through required courses, workshops, or changes to current course structures.

Satisfaction with the program varied among short, long, and non-completers.

Completers were more likely to be satisfied with their time as doctoral students, but often

recognized that this was not the case for all, and that their supervisor and committee

played a big role in their positive outcomes. "But I know I'm lucky. There are problems

with the program, but I managed to side step most of them I think. My committee was/is

fantastic, it would have been a lot different without them" (*Joplin*). Perceptions of the

quality of the program were not very strong with about half completers and non-

completers indicating that the quality of their program was average or below average.

About one-third of student participants indicated that they would not choose to study at

the same university if they were to start the PhD over, with short completers being the

only group who unanimously said that they would. While just less than one-third

indicated that they would not recommend their department to someone considering doing

their PhD, this did not hold true for all groups as all short completers said that they would

recommend the department.

Finishing / Leaving the PhD

There are two clear end points for doctoral students, completion and withdrawal, and

there are several factors that play a role in reaching them, as well as the amount of time

taken to reach them. Even some completers considered withdrawing from the PhD, and

their reasons for doing so ranged from a degrading experience with a faculty member to

burnout. Participants commented on barriers to finishing in four years and reasons why

some students do not complete, including who they turned to for guidance and support as well as the difficulties that accompanied it.

Finishing in Four Years

As the third chapter in this sandwich dissertation highlights, the majority of doctoral candidates across disciplines, especially in the Social Sciences, do not finish in four years, yet most completers and non-completers expected to do so. A handful expected to be finished in five years, one former student expected to be finished in as little as three years, while one long completer simply did not know and did not care how long it took to finish the PhD. The fact that most students expected to be finished in four years, and that most do not, signals that not only that unrealistic expectations are imposed on students, but also that the students' expectations of themselves are often unattainable.

While not all agreed that TTC is a point of concern "Maybe this a good point to say that I don't think that completion time is very important, in comparison, for example, to the quality of students' work and the learning that takes place in grad school" (*Dr. Rock*). It is true that long PhD completion times are a point of concern for many, especially given Ontario's funding model –which was recognized by *Dr. Rock*. Queen's University, for example, has expressed an interest in addressing their long times to completion[23].

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[23] http://www.queensu.ca/sgs/facultystaff/forum/spring/sdo2TTC-Presentation-Spring-Forum-2013.05.06.pdf; http://www.queensu.ca/connect/principal/2013/03/13/time-to-completion-and-extensions-for-graduate-students/; http://www.psac901.org/2013/03/psac-901-exec-responds-to-proposed-changes-to-ma-and-phd-completion-times/

While some students do finish in four years, several barriers lengthened completion times beyond four years. The time detracted from studies to fulfill employment obligations was commonly cited as a barrier to timely completion. Many students begin working while pursuing their PhD because of the funding structure, with funding essentially cut-off after the fourth year. A common type of employment students pursue is sessional work which can significantly detract from time devoted to the PhD. Some faculty believed that taking sessional positions was unnecessary. There was faculty concern over PhD students wanting to live a middle-class lifestyle while in graduate school which for some, is not a lifestyle to be pursued until the PhD is completed. Students end up "teaching when they shouldn't be…their asses should be at their desks" (*Dr. Blues*). *Dr. Blues* believes that students should be contributing at least 50 hours a week to their studies but that many do not. It is unlikely to that this amount of time can be devoted to studies when students are teaching. Teaching of course is just one type of paid employment that doctoral students pursue, but was by far the most cited by participants and recognized as a position that requires a large amount of time. It was even noted by one long completer who had taken a teaching position that "students shouldn't be allowed to take a teaching position" (*Hendrix*) because of the investment of time required. The impact that working has on TTC was exemplified in the survey responses with all long completers indicating that they worked while pursuing their PhD.

Life course events can also be barriers to timely completion, and as one faculty noted, Sociology is a discipline heavily dominated by women, many of whom are at the age when children begin to become a reality which can lead to longer completion times.

One faculty member sees this as partially a structural thing and partially a lifestyle thing.

He notes,

> we have a different demographic for students now than what we used to…more
> females for one…the quote problem with that in little double quotes is that they
> get pregnant…women should not be punished for having children. That is not my
> point. My point is that it is also a lifestyle decision. Because they decide to have
> children and then when they make the decision to have children it just takes
> forever, it just draws out forever (*Dr. Blues*).

This is also true for males. While they do not bear children they are often at the age when

families are started and in turn can end up devoting a significant amount of time to their

children. Looking at the small sample used for this research there were some participants

with parental responsibilities during their PhD. Those with parental responsibilities were

long- and non-completers. Although one long completer explicitly mentioned that their

family responsibilities had no impact on their TTC.

A barrier to timely completion that was only discussed by two faculty members

but that likely warrants additional attention is the impact that the structure of the program

and the discipline more generally, has on timely completion. The type of dissertation

written in Sociology differs from many other disciplines, notably those which are

laboratory based. It was expressed that students of Sociology for the most part do not

enter PhD programs with a well-defined project, or join a team of researchers as is

common in many laboratory disciplines, nor work in the same area of research as their

supervisor.

> Part of it is the model that happens in laboratories...you walk in and you're doing
> your part of a big project and you chug along and do your thing. I mean even
> those of us with big research projects, we're still not set up that way…In any kind
> of social science research it's hard to just plug somebody in and have them do a
> thesis that fits in with your project (*Dr. Reggae*).

Together these can serve as major barriers to finishing the PhD in four years. This was exemplified in the second sandwich dissertation paper whereby students in laboratory based disciplines had on average shorter TTC and better completion rates than non-laboratory based disciplines.

It is also becoming more commonplace for students to complete a coursework MA which means that aside from an honours major research paper (which is not required at all institutions); doctoral candidates may have no experience in mounting and completing a large research project. Inexperience in undertaking a large research project was a barrier of timely completion noted by some. The dissertation for many is a huge endeavor; this, coupled with a lack of experience in being solely responsible for a large project, can increase TTC. Thus, while there are many benefits to completing a coursework thesis, that year saved at the Master's level might be added onto time spent completing a PhD. Additional barriers to finishing in four years include lengthy ethics processes, a lack of direction, and difficulty with research methods. Interestingly, there was no consensus among my interviewees on which methodological approach – qualitative or quantitative – lead to longer completion times. If students' methodological approach was recorded in administrative records, any links between methods and completion could be easily determined.

Labour Market Uncertainty

The uncertainty of job prospects is the biggest challenge some students faced while in the PhD program. For example when asked about the most challenging part of the program, one short completer quickly responded with "The uncertainty of the academic job market.

Easy :)"[24] (*Joplin*). *Joplin* also drew attention to the importance of the labour market for completion in raising the idea of a two-stream PhD program as a means for improving student outcomes. He envisioned having one stream focus on skills that are likelier to be used outside of academia, and would also provide directions for possible career avenues. The impact of the labour market was among the most common reason noted by a number of completers and non-completers to explain why students withdraw prior to completion.

Labour market uncertainty, especially in the academic labour market, is perhaps one of the most external challenges noted by students. There is little that can be done by a department or institution to alleviate this fear, except perhaps ensuring that professional development courses provide information on academic and non-academic careers. While labour market uncertainty was noted by completers, the relevance of the degree to careers was a key factor for some non-completers when deciding to withdraw.

The Process of Leaving

For many, making the decision to withdraw was a complicated process. Some had spent several years pursuing the PhD and, over the course of the program, had developed relationships with faculty that were difficult to sever. In one instance, the decision to withdraw still had yet to be fully communicated with the committee.

Non-completers all discussed the decision to withdraw with their partners, and most discussed it with their peers as well. Discussing this decision with peers was not always an easy task. One commented: "I even tried to talk to people in similar situations –

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[24] This interview was conducted using an online chat room; emoticon appeared in log of interview.

PhD's who hadn't finished and who had gone to work or whatever - but it seemed like it was totally taboo to talk to them about it, so I never got any insight or validation there, either" (*Marley*). About half of all non-completers discussed withdrawing with their supervisor, and in one instance it was the supervisor who broached the subject with the student, though the latter appears to be very uncommon. In that case, the two had developed a good relationship and that likely allowed the supervisor to begin that uncomfortable conversation.

All non-completers noted that no single reason prompted their decision to withdraw. All had a combination of reasons. Juggling multiple commitments such as school, work, and family life was found to be stressful and overwhelming and often did "not make for a happy or healthy person" (*Marley*). While not all non-completers noted explicitly that juggling multiple commitments lead to their decision to withdraw, all were working and were in a relationship when they made that decision, suggesting that they indeed had multiple commitments.

Disenchantment with the PhD, including views of the benefits of finishing the program, was highly relevant in decisions to withdraw. "I did not think that finishing would teach me much more, and I still had a ways to go. Probably a year of working weekends. I am not concerned about having the credentials and I don't think having or not having them will change my career path" (*Thorton*). Finishing the PhD when the benefit of the degree is uncertain can be especially difficult when students lose their enthusiasm for their dissertation topic, as was the case for one non-completer.

As was previously noted the decision to withdraw from the program was not an easy one, and most noted that it was accompanied by a feeling of uneasiness. One non-completer who noted its difficulty said that in the end "making the decision felt very good" (*Thorton*). It is not uncommon for students to contemplate the idea of leaving for an extended period of time before actually following through with it. This was clearly the case for the non-completer who has yet to make their withdrawal official:

> So while I discussed it, I never officially said that I'm out of the program. Perhaps I wasn't direct enough with anyone, but every time I tried to make a move towards that exit, I got the feeling that people were saying, just leave that door open. But I don't think they realized how much it affected me to be in that kind of limbo with my status. I used to wake up in cold sweats, or having nightmares, thinking about how little work that I would have done on my dissertation while I was working. I would push myself to work binges on it sometimes, and I realized that it wasn't effective and it wasn't good for my health. Since I couldn't commit to the program and my research more, I decided that the smartest decision would be to end my time in program - but like I said, every time I did this, it felt like I was being steered away from that exit (*Marley*).

While some students struggle with the decision at the front end, others struggle months after making the decision. This was the case for one non-completer who immediately felt great about the decision to withdraw and the relief it provided, but started reconsidering the decision four to five months after officially leaving the program.

Conclusion

Below is a summary of my primary findings and their links to previous research in this area, followed by eight recommendations that are informed by this research. These recommendations could be easily implemented by any department. I have avoided recommendations that could not be easily implemented by departments.

Summary of Findings

My interviews with completers, non-completers, and faculty suggest that students have both common and greatly diverging experiences. Student aspirations, including their reasons for enrolling and career goals, differ by type of student, with short completers tending to have clearer goals. Echoing previous research (e.g. Ott et al., 1984; Maher et al., 2004) completers were thought by some faculty to be better motivated, and this also came through in some of the interviews, especially with respect to short completers. Previous empirical research has often touted the importance of academic integration (Girves & Wemmerus, 1988; Lovitts, 2001), but in many respects the level of involvement in academic activities did not differ significantly by groups included in this research, with the exception of publishing. Nor did they differ in the degree of their social engagement. While social integration tends to be included in attrition frameworks, research does not always demonstrate its role in TTC and completion (Girves & Wemmerus, 1988; Ishanti & DesJardins, 2002). Based on my research, it appears as though integration may not be an issue of quantity, but of quality. Publishing can be thought of a more rigorous form of integration than attending conferences and can often involve working with faculty or peers. Working closely with faculty on an article is similar to the type of relationship seen the laboratory disciplines which is thought to provide a deeper level of integration than non-laboratory disciplines.

Student groups differed in their perceptions of the quality of the program, including courses and the instruction received. Long and non-completers had less favourable perceptions of and experiences with faculty and the support they received

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from the department. Most groups did however have lower ratings of the financial support offered by the department. There were fewer differences in their perceptions of supervisors, with students rating to the quality of their supervisor highly, as well as noting the importance of their supervisor in their doctoral experience. The supervisor for many is at the heart of the doctoral degree. Many had positive things to say about their supervisors. But there were exceptions. Some noted their supervisor's or committee's lack of timely feedback, attention, and mentoring, all of which were said to hinder their timely completion and their experiences more generally. These themes have also emerged in other research (Zhao et al., 2005; Barnes & Austin, 2009).

While there is a fair bit of congruence between faculty and student perceptions of barriers to timely completion there are also some differences. Perhaps most notable is faculty's perception that students who fail to complete tend to be less intelligent than those who complete. Some non-completers were also thought to possess a different skill set than that which is necessary for completing the PhD. While some faculty focused on intelligence, not a single student participant mentioned this as a barrier to completion. There may be a number of reasons why student participants did not mention intelligence. It could be that because they are not privy to reading their peers' work and thus have no means of making these judgments. Alternatively, they might simply do not believe that intelligence is a factor. Or they may be afraid to raise the issue. At this point however, only speculations can be made.

Barriers to timely completion that were commonly mentioned by students (and by some faculty) centered on funding, employment, motivation and self-discipline, methods,

ethics, and supervisors. There is of course some interrelation among some of these themes such as funding and employment. Given that funding is essentially cut-off after the fourth year, most students who do not finish by then must secure employment. Doing so detracts from the amount of time they are able to spend on academic work, as emphasized in the work done by Gillinham et al. (1991).

Three main reasons were cited for non-completion: multiple commitments, disenchantment, and perceived benefit of the degree. The latter has been highlighted in research that points to the importance of the labour market for doctoral student retention (Ampaw & Jaeger, 2012). Thus, this finding was not surprising, especially given that many non-completers were already working in the kinds of careers they were seeking when they withdrew.

In sum, this case study highlights both the strengths and challenges facing these two departments and the discipline of Sociology more generally with respect to graduate student completion. While some of the grievances students had with respect to their program cannot be addressed, many areas could be improved upon. What follows is a list of recommendations that are informed by this case study, as well as from evidence provided in other empirical work.

Recommendations

My interviews with completers, non-completers, and faculty touched on recommendations for improving attrition and TTC, with a focus on changes that could be made at the department level. It is important to flag that some participants noted that retention should not always be the prime goal and that in some instances "some of them

should have left earlier than they did (so in some cases, students shouldn't be retained;

my interpretation[25])" (*Joplin*). That caveat notwithstanding, the following

recommendations are aimed to improve graduate student outcomes and experiences.

1. Course redesign is a good place to start with respect to making changes that can improve doctoral student experiences and outcomes. Three changes are being proposed. First, improve the integration of literature used for comprehensive exams with courses. While this is done by some faculty, it is not done by all. Second, teach students the skills required to successfully complete their comprehensive exams, including how to properly synthesize material and how to effectively read books and articles. While some faculty may believe that students should already possess such skills, the fact is that not all do. Third, offer a course that provides students with the opportunity to develop their dissertation proposal. This could take the form of a traditional graduate course, or as a reading course between a supervisor and their student.

2. Changes to the admission process should be considered. Some areas to explore are conducting interviews with candidates who have been short-listed, requiring that students seek out faculty to supervise their work before applying, and the department providing more guidelines around the statement of interest. For example, it could be made mandatory that students explicitly state their reasons for applying to the PhD.

3. Increase the length of funding for graduate students. This could be achieved by providing five years of teaching and/or research assistantships and reducing the number of TA positions offered to undergraduate students.

4. Provide better social supports. Too often students spoke of the lack of social supports available. While part of the onus falls on students, having the department or supervisors encourage or facilitate this process could help students come together. Some faculty host reading or writing groups for their students and there should be no reason why all faculty with multiple students cannot do this. Should a faculty only have one student, opportunities should be available for their student to join another group closely aligned with an aspect of their research (e.g. methodology).

5. Faculty should be required to participate in a seminar on effective supervision, or at the very minimum be required to share their experiences with one another so that they have the opportunity to learn from other's failures and successes. Some of the aspects that should be stressed are how to effectively support students, the

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[25] This is taken from the log of the online interview. It is *Joplin's* interpretation, not the author's.

importance of providing progress reports, fostering professional growth, and helping students effectively manage projects. While some faculty may contest this recommendation because they believe it violates their academic freedom, such workshops have been introduced in elsewhere (see Elgar, 2003).

6. Strict deadlines should be enforced by the department and supervisors and there should be repercussions if they are not adhered to. There should be a written contract between students and their supervisors, similar to that between TAs and RAs and faculty. The contracts could be re-assessed as often as each term or as infrequently as each year. A condition of students and faculty working together should be that they *both* adhere to their contracts. For example, faculty should have a commitment to students to provide timely feedback while students should have a commitment to provide drafts at time negotiated by both parties. The role of the department could be to assess whether the contract is being upheld by faculty during their yearly review.

7. Given the mismatch between demand and supply for academic jobs, more attention should be given to the non-academic job market. Further, departments should not perceive their professional responsibility for students ending at graduation but continuing into the job market. This may also help motivate those who do not see the value of the PhD for non-academic careers to complete their degree.

8. Students need to be provided with practical advice for getting through the PhD. This information may be best to come from current students and recent graduates. Providing seminars on how to get through the milestones of the program could be very beneficial. For example, having students discuss how they got through their comprehensive exams or through the dissertation proposal would be helpful. This type of talk has been provided at *University A* but should become a regular feature of both departments and be offered for all of the milestones after coursework.

9. Exit interviews with students who withdraw prior to completion should be mandatory. This could be an ideal method to learn about any pitfalls of any graduate program. This might be best administered by the graduate chair as there may be tensions that exist between the student and their former supervisor.

Limitations

All research has limitations and this project was no exception. It has two major

limitations. The first is the inability of the researcher to establish contact with a large

number of non-completers. This is an extremely difficult group to not only reach, but to

have agree to participate in a study about withdrawing from a PhD program. To begin, it is difficult to find valid email addresses for non-completers. Throughout my interviews completers and non-completers were able to provide names of students who withdrew, but they were often unsure as to how contact could be made. Attempts were made through social networking sites but no responses were provided by non-completers.

It is also likely the case that many students have not come to terms with the fact that they will not be finishing their PhD. While this cannot be substantively stated, through conversations with other participants it became obvious that some former students (those who are ABD) seem to be caught in a state of limbo. Given the difficulty in making contact with this group, this research is lacking a more complete sample of non-completers –the group considered to be most relevant to this research.

The second major limitation of this research is the lack of compliance from faculty to participate. At the outset the goal was to undertake a case study of a single department. However, given the number of faculty from *University A* that declined to participate it became necessary to seek out a second and somewhat comparable department of Sociology. Faculty non-compliance was said to be related to issues surrounding research ethics such as privacy and confidentiality. Since supervisors were identified as a central component to PhD student outcomes as well as their experiences, I deemed faculty participation to be a crucial component of this research. While the interviews conducted are extremely informative, I believe that additional interviews would have been beneficial as it is likely that perceptions vary considerably among faculty. For example, only one female faculty member agreed to participate in my

research and her views on particular aspects were quite different from male faculty.

Additional interviews with female faculty would have allowed for a better understanding

of whether differences could be partially attributed to gender. The variation that exists

among faculty would have been better captured through additional interviews with a

broader sample.

Future Research

There is a large amount of work to be done in the area of attrition and TTC, especially at

the graduate level. One possible avenue would be to compare a laboratory based

department with one from a non-laboratory based discipline. It would be beneficial to

know whether the experiences and perceptions of students and faculty are shaped by

whether or not their discipline has a lab orientation, as was suggested by variations in

student outcomes found in the second dissertation paper. For example, several

participants noted the lack of alignment between student and faculty research in

sociology, and suggested that this affects student engagement, as repeatedly noted in the

literature on attrition and TTC.

Final Thoughts

Evidence-based policy-making is a movement supported across academic disciplines and

sectors. This movement has become especially prevalent in the health, education, and

criminal justice (Cooper, Levin & Campbell, 2009). The premise behind this movement is

that the incorporation of empirical research into public policy debates and program and

policy evaluation can lead not only to informed policy, but more successful practices and

outcomes (Copper et al., 2009; Australian Productivity Commission, 2010). Given that Sociology is an empirical social science that studies among other things social problems, institutions, and phenomena, it seems illogical for us not to use our research to focus on our *own* problems and design interventions to fix them.

This research has done just that by taking an in-depth look at two Sociology departments focusing on student and faculty experiences and perspectives. While the lived experiences of students and faculty varied, many faced, or at least recognized, common challenges of the program. Through interviews came recommendations for positive change at the student, faculty, and department levels. The applicability of these recommendations is thought to extend beyond Sociology to other disciplines with similar structures and barriers to completion. It is ultimately up to departments and institutions to enact changes gathered through the very methods many of them teach.

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Appendix 4A: Interview Guides

Completers

Aspirations:
- Why did you enroll in the PhD program?
- What were your program aspirations upon entering the program?
    - Probes: publish, distinction on comprehensive examinations, top of the class (course work), or finish in four years
  - Did they change at all throughout your PhD?
- What were your career aspirations upon entering the program?
    - Probes: faculty, government, private sector
  - Did they change at all throughout your PhD?

Engagement:
Academic engagement (behavioural involvement and identification with academic aspects of school)
- What kind of department/university academic activities were you involved in?
    - Probes: grad conferences, committees, attending caucus meetings, etc.?
  - Can you tell me about the intensity of this involvement?
    - Probes: how active were you, how much time did you devote to these activities, how committed were you to pursuing, etc.?
  - Can you talk to me about your reasons for pursuing _____ department/university activities
    - Probes: motivated to build curriculum vitae, was asked to by my supervisor, thought it would be fun, etc.?
- What kind of professional activities were you involved in?
    - Probes: publishing, conferences, etc.?
  - Can you tell me about the intensity of this involvement?
    - Probes: how active were you, how much time did you devote to these activities, how committed were you to pursuing ____?
  - Can you talk to me about your reasons for pursuing _____ professional activities?
    - Probes: motivated to build curriculum vitae, was asked to by my supervisor, thought it would be fun, etc.?

Social engagement
- How would you describe the atmosphere/social climate of the department when you were a student?
- Can you talk to me about the degree to which you participated in various social functions organized by your department?
    - Probes: Can you provide me with some examples?

o   Why did you participate in _____ functions?

Perceptions of/ Satisfaction with the program:
- How would you describe your experience as a graduate student?
- What was the best part of your program?
    - Probe: Why was _____ the best part of your program?
- What was the most challenging part of your program?
    - Probe: Why was _____ the most challenging part of your program? Did you overcome this challenge? If yes, what did you do to overcome this challenge?
- In terms of your satisfaction with the PhD program, can you talk to me about the relative importance of your supervisor, financial support, quality of instruction, and course selection?

Completing the program on time:
- How long did you expect it to take you to finish your program?
    - Follow-up 1: What prevented you from finishing in the expected amount of time?
    - Follow-up 2: Why did you expect it to take more than the expected four year period of time?
- Why do you think it takes some students longer than others to finish the PhD
    - Probes: work/financial commitments, family obligations, availability of faculty, program structure or requirements, course scheduling, etc.?
- How do you think completion times could be improved?

Completing the program:
- Did you ever think of dropping out of the PhD?
    - Follow-up: Can you tell me about why you were considering dropping out and what caused you to change your mind?
- What do you think are the most common reasons students' dropout
    - Probes: work/financial commitments, family obligations, availability of faculty, program structure or requirements, course scheduling?
    - Can you give me some examples

        - Probes: friends, fellow PhD students, 'urban legends' circulating

        the department, etc.?

- What are your feelings about dropping out?
- How do you think retention could be improved?

Do you have any additional comments or questions?
Ask if respondent indicated that they know someone in our department who has dropped out:
Would you be willing to pass my study and contact information along to your contact that dropped out of the Sociology PhD program at McMaster University?

Do you know anyone that has successfully completed the program?
Would you be willing to pass my study and contact information along to your contact that dropped out of the Sociology PhD program at McMaster University?

Non-Completers

Aspirations:
- Why did you enroll in the PhD program?
- What were your program aspirations upon entering the program?
  - Probes: publish, distinction on comprehensive examinations, top of the class (course work), or finish in four years
    - Did they change at all throughout your PhD?
- What were your career aspirations upon entering the program?
  - Probes: faculty, government, private sector
    - Did they change at all throughout your PhD?

Engagement:
Academic engagement (behavioural involvement and identification with academic aspects of school)
- What kind of department/university academic activities were you involved in?
  - Probes: grad conferences, committees, attending caucus meetings, etc.?
    - Can you tell me about the intensity of this involvement?
      - Probes: how active were you, how much time did you devote to these activities, how committed were you to pursuing, etc.?
    - Can you talk to me about your reasons for pursuing _____ department/university activities
      - Probes: motivated to build curriculum vitae, was asked to by my supervisor, thought it would be fun, etc.?
- What kind of professional activities were you involved in?
  - Probes: publishing, conferences, etc.?
    - Can you tell me about the intensity of this involvement?
      - Probes: how active were you, how much time did you devote to these activities, how committed were you to pursuing ____?
    - Can you talk to me about your reasons for pursuing _____ professional activities?
      - Probes: motivated to build curriculum vitae, was asked to by my supervisor, thought it would be fun, etc.?

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Social engagement
- How would you describe the atmosphere/social climate of the department when you were a student?
- Can you talk to me about the degree to which you participated in various social functions organized by your department?
    - Probes: Can you provide me with some examples?
    - Why did you participate in _____ functions?

Perceptions of/ Satisfaction with the program:
- How would you describe your experience as a graduate student?
- What was the best part of your program?
    - Probe: Why was _____ the best part of your program?
- What was the most challenging part of your program?
    - Probe: Why was _____ the most challenging part of your program? Did you overcome this challenge? If yes, what did you do to overcome this challenge?
- In terms of your satisfaction with the PhD program, can you talk to me about the relative importance of your supervisor, financial support, quality of instruction, and course selection?

Completing the program on time:
- How long did you expect it to take you to finish your program?
    - Follow-up 1: What prevented you from finishing in the expected amount of time?
    - Follow-up 2: Why did you expect it to take more than the expected four year period of time?
- Why do you think it takes some students longer than others to complete the PhD?
    - Probes: work/financial commitments, family obligations, availability of faculty, program structure or requirements, course scheduling, etc.?
- How do you think completion times could be improved?

Completing the program:
- Can you talk to me about why you decided to withdraw from the PhD program?
- Can you talk to me about who you discussed leaving the program with?
- What do you think are the most common reasons students' withdraw
    - Probes: work/financial commitments, family obligations, availability of faculty, program structure or requirements, course scheduling, etc.?
    - In addition to you, do you have any other examples?
        - Probes: friends, fellow PhD students, 'urban legends' circulating the department, etc.?

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- Can you tell me how you feel about leaving the PhD program prior to completion?
- How do you think retention could be improved?

Do you have any additional comments or questions?
Ask if respondent indicated that they know someone in our department who has dropped out:
Would you be willing to pass my study and contact information along to your contact that dropped out of the Sociology PhD program at McMaster University?

Do you know anyone that has successfully completed the program?
Would you be willing to pass my study and contact information along to your contact that dropped out of the Sociology PhD program at McMaster University?

Faculty

- What do you think being a graduate student supervisor entails?
- How important do you think the supervisor role is to student's time-to-completion and completion?
- It is fairly uncommon for students in Sociology and the social sciences more generally to finish in four years. What do you think prevents most students from finishing in four years?
- There are some pretty big differences in the amount of time it takes students to finish their PhD. What do you think accounts for the differences in time-to-completion?
- Do you think there are steps that could be taken to improve completion times?
- Thinking about students who complete and withdraw from the program, can you think of any substantive differences between the two groups of students?
- What do you think are the most important factors in students' decision to leave the program?
- What role do you think the department could play in improving the retention of PhD students?

Do you have any additional comments or questions?

Appendix 4B: Surveys

<u>Background Information, McMaster Sociology Doctoral Graduates</u>

1. What is your gender?

○ Female

○ Male

○ Other (please specify)

[   ]

2. What is your age?

○ 18 to 24

○ 25 to 34

○ 35 to 44

○ 45 to 54

○ 55 to 64

○ 65 to 74

○ 75 or older

3. What is your marital status?

○ Single

○ Married

○ Common-law

○ Separated

○ Divorced

○ Widowed

4. Do you have any children under 18?

○ Yes

○ No

5. What is the highest level of education completed by your parent (1)?

○ Less than high school

○ High school diploma

○ Some postsecondary

○ Trades certificate/diploma

○ College certificate/diploma

○ Bachelor's degree

○ Graduate or professional degree

Other (please specify)

6. What is the highest level of education completed by your parent (2)?

○ Less than high school

○ High school diploma

○ Some postsecondary

○ Trades certificate/diploma

○ College certificate/diploma

○ Bachelor's degree

○ Graduate or professional degree

Other (please specify)

7. What was your undergraduate GPA?

○ A

○ B

○ C

○ D

○ F

8. What was your master's GPA?

○ A

○ B

○ C

○ D

○ F

9. Please describe your pathway into the doctoral program.
Example: a break between my bachelor's and master's degree, but directly from my
master's to my PhD

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10. What type of funding did you receive while enrolled in the Sociology doctoral
program at McMaster University?

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11. During what year of study did you complete (or plan to complete) your PhD?

○ 1st

○ 2nd

○ 3rd

○ 4th

○ 5th

○ 6th

○ 7th

○ 8th

○ 9th

○ 10th

Other (please specify)

12. While pursuing your PhD did you have any outside employment (please do not
include TA or RA work)?

○ Yes

○ No

13. How many hours per week did you work?

○ 1-10 hours/week

○ 11-20 hours/week

○ 21-30 hours/week

○ 30+ hours/week

14. How long did you have outside employment?

○ 1 year or less

○ 1-2 years

○ 2-3 years

○ 3-4 years

○ 4-5 years

○ 5-6 years

○ 6-7 years

○ 8-9 years

○ 9-10 years

Other (please specify)

15. During what year of study did you begin outside employment?

○ 1st

○ 2nd

○ 3rd

○ 4th

○ 5th

○ 6th

○ 7th

○ 8th

○ 9th

○ 10th

Other (please specify) [   ]

16. On average, how many hours a day or week did you spend on school work?

hours per day [   ]

hours per week [   ]

17. How often did you meet program deadlines?

○ Always

○ Almost always

○ Occasionally

○ Rarely

○ Very Rarely

○ Never

18. Did you attend or present at any conferences while in the PhD program? Please indicate the number of each.

	Attended only	Presented
1-5	☐	☐
6-10	☐	☐
10+	☐	☐

19. Did you TA or RA while in the PhD program? Please indicate the number of each.

	TA	RA
1-2 terms	☐	☐
3-4 terms	☐	☐
5-6 terms	☐	☐
7-8 terms	☐	☐
9-10 terms	☐	☐
11+ terms	☐	☐

20. How many papers did you publish while in the PhD program? If none, how many are you trying, or have you tried to get published?

Number of papers published	
Number of papers trying to get published	

21. Did you have friends in the program that you could talk to about school and personal problems?

○   Yes, school problems only

○   Yes, personal problems only

○   Yes, both school and personal problems

○   No

22. Did you attend many (more than two) social functions organized by the department or the institution?

○   Yes, by the department

○   Yes, by the institution

○   Yes, by both the department and the institution

○   No

23. On average, how much time did you spend in the department on a weekly basis? If it varied drastically by year, please specify.

24. If you were to start your PhD over again, would you select:

	...the same university?	...the same supervisor?
Yes	☐	☐
No	☐	☐

25. How would you rate the quality of:

	...the program, including courses and instruction?	...your supervisor?	...financial support?
Excellent	☐	☐	☐
Above average	☐	☐	☐
Average	☐	☐	☐
Below average	☐	☐	☐
Extremely poor	☐	☐	☐

26. Would you recommend McMaster's Sociology program to someone considering doing their PhD in Sociology?

○ Yes

○ No

Background Information, Former Sociology Doctoral Students

1. What is your gender?

○ Female

○ Male

○ Other (please specify)

[   ]

2. What is your age?

○ 18 to 24

○ 25 to 34

○ 35 to 44

○ 45 to 54

○ 55 to 64

○ 65 to 74

○ 75 or older

3. What is your marital status?

○ Single

○   Married

○   Common-law

○   Separated

○   Divorced

○   Widowed

4. Do you have any children under 18?

○   Yes

○   No

5. What is the highest level of education completed by your parent (1)?

○   Less than high school

○   High school diploma

○   Some postsecondary

○   Trades certificate/diploma

○   College certificate/diploma

○   Bachelor's degree

○   Graduate or professional degree

Other (please specify) [   ]

6. What is the highest level of education completed by your parent (2)?

○   Less than high school

○   High school diploma

○   Some postsecondary

○   Trades certificate/diploma

○   College certificate/diploma

○   Bachelor's degree

○   Graduate or professional degree

Other (please specify) [   ]

7. What was your undergraduate GPA?

○ A

○ B

○ C

○ D

○ F

8. What was your master's GPA?

○ A

○ B

○ C

○ D

○ F

9. Please describe your pathway into the doctoral program.
Example: a break between my bachelor's and master's degree, but directly from my master's to my

10. What type of funding did you receive while enrolled in the Sociology doctoral program at McM
University?

11. During what year of study did you withdraw from your PhD?

○ 1st

○ 2nd

○ 3rd

○ 4th

○ 5th

○ 6th

○ 7th

○ 8th

○ 9th

○ 10th

Other (please specify) [   ]

12. While pursuing your PhD did you have any outside employment (please do not include TA or R

○ Yes

○ No

13. How many hours per week did you work?

○ 1-10 hours/week

○ 11-20 hours/week

○ 21-30 hours/week

○ 30+ hours/week

14. How long did you have outside employment?

○ 1 year or less

○ 1-2 years

○ 2-3 years

○ 3-4 years

○ 4-5 years

○ 5-6 years

○ 6-7 years

○ 8-9 years

○ 9-10 years

Other (please specify) [   ]

15. During what year of study did you begin outside employment?

○ 1st

○ 2nd

○ 3rd

○ 4th

○ 5th

○ 6th

○ 7th

○ 8th

○ 9th

○ 10th

Other (please specify)

16. On average, how many hours a day or week did you spend on school work?

hours per day

hours per week

17. How often did you meet program deadlines?

○ Always

○ Almost always

○ Occasionally

○ Rarely

○ Very Rarely

○ Never

18. Did you attend or present at any conferences while in the PhD program? Please indicate the number of each.

	Attended only	Presented
1-5	☐	☐
6-10	☐	☐
10+	☐	☐

19. Did you TA or RA while in the PhD program? Please indicate the number of each.

	TA	RA
1-2 terms	☐	☐
3-4 terms	☐	☐
5-6 terms	☐	☐
7-8 terms	☐	☐
9-10 terms	☐	☐
11+ terms	☐	☐

20. How many papers did you publish while in the PhD program? If none, how many are you trying, or have you tried to get published?

Number of papers published

Number of papers trying to get published

21. Did you have friends in the program that you could talk to about school and personal problems?

○ Yes, school problems only

○ Yes, personal problems only

○ Yes, both school and personal problems

○ No

22. Did you attend many (more than two) social functions organized by the department or the institution?

○ Yes, by the department

○ Yes, by the institution

○ Yes, by both the department and the institution

○ No

23. On average, how much time did you spend in the department on a weekly basis? If this varies drastically by year, please specify.

24. If you were to start your PhD over again, would you select:
...the same university?...the same supervisor?

Yes ☐	☐	
No ☐	☐	

25. How would you rate the quality of:

	...the program, including courses and instruction?	...your supervisor?	...financial support?
Excellent	☐	☐	☐
Above average	☐	☐	☐
Average	☐	☐	☐
Below average	☐	☐	☐
Extremely poor	☐	☐	☐

26. Would you recommend McMaster's Sociology program to someone considering doing their PhD in Sociology?

○ Yes

○ No

Appendix 4C: Student Participant Information

Table C-1 Student Participant Background Information

Name	Completer status	University	Gender	Dependents	First generation	Undergrad GPA	Master's GPA
James	Short	A	F	No	No	A	A
Joplin	Short	A	M	No	No	A	A
Cobain	Short	A	M	No	No	A	A
Morrison	Short	A	F	No	No	B	A
Lennon	Short	A	F	No	Yes	A	A
Bonham	Long	A	F	No	Yes	A	A
Staley	Long	A	F	No	No	B	A
Hendrix	Long	A	M	Yes	Yes	A	A
Clapton	Long	A	F	No	Yes	A	A
Nowell	Long	A	M	Yes	No	A	A
Marley	Non	A	M	No	Yes	A	A
Redding	Non	A	M	No	No	A	A
Thorton	Non	A	F	Yes	No	A	A
Buckley	Non	B	F	Yes	No	A	A
Waters	Non	B	F	No	Yes	A	A

Chapter 5

Conclusion: Linking Levels to Understand Attrition and Guide Policy

Each of the three papers in this sandwich dissertation provides a different perspective on, and insight into, attrition and TTC in Canadian graduate programs. This is often done with a specific focus on doctoral programs. As a result of taking multiple perspectives in my empirical research, I offer several policy suggestions that are relevant to different levels (e.g. provincial, institutional, disciplinary, and departmental). What follows is a summary of my main findings, policy recommendations organized by level, and suggestions for future research on attrition and TTC in Canadian graduate programs.

Summary of Main Findings

The first paper, adopting a macro-level approach, provides evidence that students with certain characteristics are less likely to make their way to graduate school. For example, students' academic performance and experiences are shown to be good predictors of entry to graduate school. An association between certain individual level characteristics and graduate school outcomes are also found. Family responsibilities such as being married and having children are found to be associated with a reduced likelihood of successfully completing a graduate program. Knowing which individual characteristics play a role in graduate school entry as well as positive graduate school outcomes can lead to the

informed development and implementation of targeted programs and admission and recruitment policies.

The second dissertation paper takes a meso-level approach and focuses on a single institution. In addition to Carleton University's administrative data for 13 doctoral programs, program requirements are coded and analyzed for these 13 disciplines. Significant differences in the completion rates and average TTC across disciplines and faculties are found. Perhaps less clear is the impact that program requirements have on successful and timely completion. The central finding of this paper is that substantial differences in student outcomes exist between laboratory and non-laboratory based disciplines. On average, the outcomes are more positive for laboratory based disciplines. This is especially obvious when looking at the average TTC at the faculty level.

Science reports the lowest average TTC at 5.1 years, Engineering follows closely with an average TTC of 5.2 years, while the Social Sciences lag quite substantially with an average TTC of 6.8 years. Science-based disciplines also have strong completion rates after ten years with the Science faculty having an average completion rate of 72%, while Engineering and Social Sciences are considerably lower at 58% and 53%, respectively. This research helps highlight that long completion times may not be the result of unmotivated, less engaged, or less intelligent students, but rather may be the result of the structure of the disciplines.

The final paper in this sandwich dissertation narrows my scope by focusing on a single discipline and two departments. This research demonstrates that student experiences, whether of completers or non-completers, can be very similar, but can also

vary significantly both within and across groups. The supervisor/supervisee relationship

is found to be a central component to students' experiences and outcomes in the doctoral

program. The supervisor can facilitate student growth and progress but they can also act

as barriers to completion. Differences in faculty and student perspectives arose especially

with respect to perceptions of students who complete and withdraw, with several faculty

believing that intelligence plays a role. Students faced a number of different barriers to

timely completion as well as completion more generally, but many of these could be

somewhat easily attended to by each department.

Each of these papers brings to light different aspects that could be focused on to

improve student completion rates and TTC. My first paper flags characteristics and

resources that affect attrition, my second paper reflects disciplinary structures that

integrate students into research projects and those that do not, and my third paper

uncovers the centrality of the student/ supervisor relationship for student experiences and

outcomes. It is clear to see that a series of policies could be implemented by actors at each

level. For example, ministries could focus on funding issues, institutions could examine

admissions policies and discipline structures, and departments could place attention on

supervisory relationships. A more detailed discussion of my policy recommendations

follows.

Summary of Policy Recommendations

Policy recommendations that can be implemented at the macro, meso, and mico-levels are

provided in each dissertation paper. While each paper corresponds to a certain level of

analysis, the recommendations provided apply to multiple levels. The following recommendations are organized by level of implementation, rather than by dissertation paper.

Macro-level recommendations

There is a noticeable gender gap in PSE enrolment and attainment for recent cohorts. Given this gap, intervention should begin in high school to ensure that males are not lagging behind females with respect to academic performance and aspirations. This may require testing multiple government implemented intervention programs or different pedagogical approaches. These programs and pedagogical approaches should be coupled with research to uncover if there are any underlying issues that are leading males to underperform, such as lack of motivation. If intervention takes place at the high school level, it may be the case that little to no changes need to be made at the postsecondary level.

The government should not only continue to provide funding for graduate students to universities, but should increase the amount of funding. Providing funding packages is a good way to recruit students from all backgrounds, and access of underrepresented groups is definitely an ongoing priority of the Ontario government. Further, loans, scholarships, and grants were all shown to have positive associations with completing graduate school indicating that funding plays an important role in student outcomes.

Serious consideration should also be given to the current funding structure as there are clear mismatches between periods of funding and average degree completion time. Given that many institutions fund graduate students for the same number of years that

institutions themselves receive funds from the government, a discussion about the length

of funding needs to first take place at this level. While governments may be resistant

because of the costs involved, a solution could be to reduce the amount of money devoted

to graduate program expansion. This money could be re-directed to retention strategies

such as providing more generous fellowships and offering an additional year of funding.

It is possible that taking such an approach may yield more completions and shorter TTC

than merely increasing enrolments which could be a more efficient use of resources than

simply fuelling expansion without attention to completion rates.

Meso-level recommendations

Increasing the availability of institutional data is a meso-level recommendation that could

result in a significantly larger body of literature on attrition and TTC in Canadian

graduate programs. Expanding access to such data would result in little to no additional

costs as most data needed for this type of research are already collected by institutions. In

my second dissertation paper I called for administrative data to be publicly available as it

would allow for a significantly greater amount of research to be undertaken providing

greater insight into student, disciplinary, and faculty level outcomes. It could also lead to

better and more innovative policy resulting from the expected increase in institutional

data analysis.

A second meso-level recommendation stemmed from my first dissertation paper.

It showed that first-generation students are less likely to enroll in graduate school and to

have a successful graduate school experience. One means of attending to this is to create

intervention programs. Providing information sessions about graduate school, including

highlighting the funding opportunities available may serve to increase first-generation enrolment in graduate school. This intervention could be undertaken at both meso and micro-levels. Institutions could provide a general introduction to graduate school and departments could offer more tailored information sessions.

Micro-level recommendations

Changes to funding were included in the macro-level recommendations; however it is true that there are current fiscal restraints that may prevent governments and institutions from prolonging the current period of funding. Presuming that changes to funding are unlikely, changes to program requirements should be considered. My examination of archived course calendars made obvious the degree of variation in program requirements and how they are defined. It would be beneficial for departments to review their program requirements, how they compare with others, and to determine whether adjustments can be made to ensure more students are able to successfully complete their program requirements.

While family responsibilities are beyond the control of government, institutions, and departments, programs can be designed to allow more time to be devoted to one's personal life. Departments admitting more students on a part-time basis would allow for a greater work-life balance. Tuition rates are also lower for part-time students which may easily allow for the balancing of school and family financial responsibilities, especially for programs that are not well funded.

Course redesign can also improve student experiences and outcomes. Three course redesign changes were proposed in my third dissertation paper: 1) better

integration of literature used for comprehensive exams, 2) teaching students the skills required to successfully complete their comprehensive exams, 3) offering a course that provides students with the opportunity to develop their dissertation proposal. Changes could also be made to the admission process. These could include interviewing potential candidates, requiring students to seek out faculty to supervise their work before applying, and providing more guidelines around the statement of interest.

The following three micro-level recommendations largely focus on faculty. Providing better social supports for students through faculty initiatives such as reading and writing groups could lead to better student experiences and outcomes. Faculty development by means of required participation in seminars on effective supervision, or at minimum, sharing experiences with one another, was also recommended. The third faculty-focused recommendation was that strict deadlines be enforced by departments and supervisors. This could also be implemented and supported by institutions.

Given the mismatch between demand and supply for academic jobs, I suggested that more attention be given to non-academic jobs and that departments should not see their professional responsibility for students ending at graduation but continuing into the job market. Another means thought to improve student outcomes was the provision of practical advice for completing the PhD. This was thought to be best achieved by having talks provided by students at different stages of their PhD. The final suggestion provided in my third dissertation paper was conducting mandatory exit interviews with students who withdraw prior to completion as this should allow for flagging of program pitfalls and the identification of barriers to completion.

Suggestions for Future Research

While this research has been informative, there is additional work to be done in the area. In the macro-level study, the sample sizes are too small to allow for master's and doctoral students to be analyzed separately. Unfortunately, it is unclear as to when this type of analysis will be possible in the future given the cuts at Statistics Canada and the lack of longitudinal data such as the YITS and the Survey of Income and Labour Dynamics. Longitudinal data is beneficial for this type of research as it allows for the same individuals to be followed for an extended period of time. There is hope however that with the provincial-wide implementation of the Ontario Education Number that students pathways will be able to be tracked at some point. One means of combatting the dearth of national level longitudinal surveys is a heavier reliance on institutional data.

Institutional data can be a great source of information but the willingness of universities to share such data is currently limited. While there are some exceptions such as Carleton University and Ryerson University who make some of their administrative data publicly available, my own institution was unwilling to provide the type of data needed to do meaningful analyses. This was largely attributed to issues of privacy and confidentiality. While privacy and confidentiality are important, these issues can be addressed. For example, removing all personal identifiers makes identification difficult. Should caution still need to be exercised because of small sample sizes, it would also be appropriate to aggregate multiple years of data and present outcomes for each term.

It is unclear why more institutions cannot make their data public especially given that a large portion of their funding comes from the public purse. Research such as mine

is done with the interest of students and the public in mind. Should greater access to institutional data be available in the future, additional research should be done with a focus on laboratory and non-laboratory disciplines to determine if the same patterns are found at different institutions, or in different programs. Further, the inclusion of the Humanities in this type of research is needed.

This same focus on laboratory and non-laboratory disciplines would be useful to undertake in a micro-level study such as in my third dissertation paper. It would be informative to know about student and faculty experiences in laboratory disciplines, including any barriers they faced. Given the quite different structure of laboratory programs it can only be assumed that differences in challenges and experiences exist, especially with respect to the supervisor/supervisee relationship. This research would benefit greatly from having a means of obtaining contact information about former students as well as receiving support from faculty to participate in research that aims to improve student outcomes in their department.

Final Thoughts

It is clear that change will not happen overnight and that much work needs to be done in the area of graduate TTC and completion rates. It is also clear that changes can and should take place at multiple levels. A department cannot be expected to compensate for institution pitfalls and institutions cannot be expected to compensate for government drawbacks in funding. Each level has a role to play, and actors at each level need to recognize that a problem exists and that they play a role to improve it.

While beyond the scope of this project, examples of multi-level reform can be found. Currently, the MTCU has called for and offered funds for pilot projects that seek to revitalize undergraduate education. In response, institutions have created projects aimed to improve the undergraduate experience, and departments and individuals have responded by developing strategies to comply with these institutional projects. At each level concerted efforts have been made to improve undergraduate education. If actors at these three levels are able to work together to reach this common goal, there is no reason that they cannot do the same for the graduate school experience.