Canadian Doctoral Students' Experiences on Their Journey Toward a Ph.D.: A Comprehensive Perspective of Personal, Financial, Departmental Factors and Well-being

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Abstract

The field of doctoral education in Canada has had a notable increase in research highlighting its significance within the domain of higher education. Despite increasing enrollments, comprehensive insights into the experiences, challenges, and emotions faced by doctoral students remain sparse. This dissertation comprises three manuscripts that extensively explore these aspects, with the objective of enriching our comprehension of the Ph.D. experience in Canadian universities. *Manuscript 1* investigates the role of stress in doctoral students' well-being and their propensity to abandon their studies. Drawing on theoretical models by Lazarus and Folkman (1984) and Núñez-Regueiro (2017), the research identifies significant correlations between perceived stress, program satisfaction, and various facets of well-being. Elevated stress levels were found to diminish program satisfaction, both directly and indirectly, further influencing a student's likelihood of departure. These associations underscore the necessity for academic institutions to prioritize the mental health of doctoral students by introducing measures to help them manage stress and bolster emotional and psychological resilience. *Manuscript 2* is based on the theoretical framework of Girves and Wemmerus (1988) and identifies financial and faculty support as essential elements guiding doctoral progression. A multivariate analysis of data from a sample of 18,822 doctoral candidates across Canada indicates that supervisor support prominently associates with satisfaction and social involvement, ultimately enhancing student progress. Furthermore, the research reveals that financial aid, especially in the form of research assistantships, indirectly boosts student productivity by facilitating social involvement. This manuscript highlights the crucial role of financial support in not only reducing financial constraints but also enhancing the academic experience. *Manuscript 3* examines the role of socialization in the doctoral students' emotional well-being and intention to quit. The study

provides longitudinal evidence showing that initial socialization directly relates to subsequent well-being, thus emphasizing the significance of belonging and engagement within the academic community. Notably, as students advanced in their doctoral studies, their perceptions of the departmental climate declined, suggesting the need for ongoing support throughout their academic trajectory. Taken together, these manuscripts advocate for the creation of nurturing academic atmospheres that emphasize mental health, supportive relationships, and enriching social experiences. This thesis highlights the interconnected nature of stress, support systems, and socialization in shaping the doctoral journey, offering crucial insights for universities, departments, and policymakers.

Résumé

Le domaine de la formation doctorale au Canada a connu une augmentation notable de la recherche soulignant son importance dans le domaine de l'enseignement supérieur. Malgré l'augmentation des inscriptions, les perspectives complètes sur les expériences, les défis et les émotions vécus par les doctorants restent rares. Cette thèse comprend trois manuscrits qui explorent de manière approfondie ces aspects, avec l'objectif d'enrichir notre compréhension de l'expérience du doctorat dans les universités canadiennes. Le manuscrit 1 étudie le rôle du stress dans le bien-être des doctorants et leur propension à abandonner leurs études. S'appuyant sur les modèles théoriques de Lazarus et Folkman (1984) et de Núñez-Regueiro (2017), la recherche identifie des corrélations significatives entre le stress perçu, la satisfaction du programme et diverses facettes du bien-être. Des niveaux de stress élevés ont été trouvés pour diminuer la satisfaction du programme, à la fois directement et indirectement, influençant ainsi la probabilité de départ de l'étudiant. Ces associations soulignent la nécessité pour les institutions académiques de prioriser la santé mentale des doctorants en introduisant des mesures pour les aider à gérer le stress et à renforcer la résilience émotionnelle et psychologique. Le manuscrit 2 se base sur le cadre théorique de Girves et Wemmerus (1988) et identifie le soutien financier et professoral comme éléments essentiels guidant la progression doctorale. Une analyse multivariée des données d'un échantillon de 18 822 candidats au doctorat à travers le Canada indique que le soutien du superviseur s'associe de manière proéminente à la satisfaction et à l'implication sociale, améliorant finalement la progression de l'étudiant. De plus, la recherche révèle que l'aide financière, notamment sous forme d'assistantships de recherche, renforce indirectement la productivité de l'étudiant en facilitant l'implication sociale. Ce manuscrit met en lumière le rôle crucial du soutien financier, non seulement pour réduire les contraintes financières, mais aussi

pour améliorer l'expérience académique. Le manuscrit 3 examine le rôle de la socialisation dans le bien-être émotionnel des doctorants et leur intention d'abandonner. L'étude fournit des preuves longitudinales montrant que la socialisation initiale est directement liée au bien-être ultérieur, soulignant ainsi l'importance de l'appartenance et de l'engagement au sein de la communauté académique. Notamment, à mesure que les étudiants avançaient dans leurs études doctorales, leur perception du climat départemental diminuait, suggérant la nécessité d'un soutien continu tout au long de leur trajectoire académique. Pris ensemble, ces manuscrits plaident pour la création d'atmosphères académiques nourrissantes qui mettent l'accent sur la santé mentale, les relations de soutien et les expériences sociales enrichissantes. Cette thèse met en évidence la nature interconnectée du stress, des systèmes de soutien et de la socialisation dans la formation du parcours doctoral, offrant des perspectives cruciales pour les universités, les départements et les décideurs.

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Dedication

To My Dad, your memory and love continue to inspire me in my life.

Preface and Contributions of Authors

I am the primary author of each manuscript and also responsible for the overall process of this dissertation from idea generation and proposal writing to ethics approval, data collection, statistical analysis, and manuscript writing. I wrote each of the chapters independently with my doctoral supervisor Dr. Frank Elgar reviewing the final draft of the dissertation and providing feedback. The Introduction (Chapter 1) and General Discussion (Chapter 5) were completed independently by myself with valuable input from my doctoral supervisor, Dr. Frank Elgar. Content in Chapter 1 was also informed by feedback from my committee members Dr. Bärbel Knäuper and Dr. Richard Koestner. The empirical papers in Chapters 2 to 4 were collaborative efforts with Dr. Frank Elgar, and our respective contributions are detailed in each chapter. Lastly, committee members Dr. Knäuper and Dr. Koestner. provided insightful feedback on the entire dissertation.

Chapter 2

Citation

Feizi, S., Knäuper, B., Elgar, F. (2024) Perceived stress and well-being in doctoral students: Effects on program satisfaction and intention to quit. *Higher Education Research & Development,* 2022-0489. https://doi.org/10.1080/07294360.2024.2317276

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Chapter 3

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Chapter 1

Introduction and Literature Review

Doctoral education is a critical component of Canada's higher education landscape, with thousands of students pursuing doctoral degrees in a wide range of disciplines each year. A doctoral program is a transition from dependent to independent research, and the transition to the scientific community builds in the Ph.D. program (Laudel & Gläser, 2008). However, relatively little is known about Canadian doctoral students' experiences on their journey toward a Ph.D.

According to the Canadian Association for Graduate Studies (CAGS), the number of students enrolling in Canadian Ph.D. programs has grown over time. The number of students who start graduate school is increasing every year (i.e., 2.7 percent globally; Council of Graduate Schools [CGS], 2019; Okahana et al., 2020), and the data show that student enrollment in doctoral programs in Canada has increased by 57% from 1998 to 2009 (OECD, 2013). During the 2021 academic year, Canada had 58,965 students enrolled in doctoral or equivalent degree programs (Statistics Canada, 2021). About 53% of Canadian Ph.D. student enrolments were female, and 47% were male. This indicates a 3.5% rise over the previous year and a 15.4% increase over the preceding five years (Statistics Canada, 2022). This growth in enrolment is a good indication for the Canadian education system since it indicates that more students are interested in obtaining higher degrees and contributing to research and innovation in a variety of sectors.

Despite increased enrolment, doctoral retention rates in Canada remain a problem (CGS, 2015a, 2015b). Attrition rates of doctoral students remain around 50% (Ministry of Education, Leisure and Sports 2013; Council of Graduate Schools, 2008, MELS, 2013) and between 50% and 70% for online doctoral programs (Terrell, 2005; Terrell et al., 2012). According to Statistics Canada data from 2021, the graduation rate decreases as the length of the program

rises. Furthermore, doctoral attrition rates may be higher for certain groups of students. For example, international students may be at a higher risk of dropping out due to language barriers (Ma, 2021), financial concerns (Kim & Otts, 2010), and lack of social support (Jackson et al., 2019). Students may drop out of doctoral programs for a variety of reasons, some of which may be beyond their control, such as a poor 'match' between a Ph.D. candidate and their supervisor, both personally and academically (van Rooij et al., 2021). The loss of highly competent students at this level of study not only affects the progress of research projects and scientific advancements but also wastes resources for academic institutions and faculty members who dedicate much time and effort to doctoral supervision (Gardner, 2008; Golde, 2000).

Entering a doctoral program and adapting to its structures and policies is challenging for many students (Barry et al., 2018; Gardner, 2013; Pyhältö et al., 2012). In addition to the lack of clarity in the structure and policies of the doctoral program that can cause distress and dissatisfaction for new students, other social and emotional challenges can affect the well-being and persistence of students (Lovitts, 2002). These challenges can include academic stress (Rico & Bunge, 2021), financial concerns (Szkody et al., 2022), depression (Evans et al., 2018), and balancing work-life commitments (Castelló et al., 2017). In addition, the doctoral journey can be emotionally taxing (Nutov & Hazzan, 2011), with many students reporting feelings of isolation (Ali & Kohun, 2006) and imposter syndrome (Handforth, 2022). Furthermore, underrepresented groups and international students may face additional challenges (Laufer & Gorup, 2019; Okahana et al., 2018), such as discrimination (Barthelemy et al., 2016), lack of belongingness (Miller & Orsillo, 2020), and cultural adjustment issues (Mukminin & McMahon, 2013).

An overview of relevant theories of doctoral student attrition, including the Attrition Theory of Doctoral Persistence (Tinto, 1975*)*, is presented below. Tinto's theory was used as the basis for several studies that examined factors that influence doctoral students' experiences and departure decisions. These insights can inform the development of more effective and inclusive policies and practices to support doctoral students' success and improve the overall quality of doctoral education in Canada. By monitoring more than 985 universities, Li et al. (2018) remarked the close association between doctoral student satisfaction and the quality of education systems and management services. Considering doctoral students' unique needs and more diverse (non-academic) career prospects perspectives, institutions can adjust to foster a more supportive learning environment and better prepare students for their future careers.

Theoretical Perspectives on Student Dropout

Theory of Doctoral Student Persistence

Tinto (1975) conceptualized attrition as a reflection of the degree to which doctoral students can integrate into the social and intellectual life of the institution. A higher level of integration strengthens doctoral student commitment to the institution and improves odds of degree completion (Golde, 2000). Doctoral students could socially integrate into the department but withdraw from the program due to insufficient academic integration (Tinto, 1975).

Tinto's Longitudinal Model of Doctoral Persistence was initially developed in 1975 and widely modified in 1987 and 1993 (see Figure 1). This model, which served as the basis for much of the research on student persistence in higher education, recognizes personal, institutional experiences, and social and academic systems as factors that build the departure decision over time (see: Tinto, 2006, 2012a).

According to this theory, students who feel socially and intellectually integrated into an academic program are more likely to complete their program. The theory describes the integration process as the key to decisions of non-completion or persistence (Tinto, 2006, 2012a). Other independent studies have confirmed that students who feel less engaged in the program are more likely to drop out (Ali & Kohun, 2006; Castelló et al., 2017). This longitudinal model posits that internal (e.g., family background, educational experiences, and student attribution) and external factors (e.g., social support, financial support, and program structures) impact the doctoral program completion decision (Tinto, 1993). Additionally, the interaction of these personal and environmental components, which may change over time, determines students' experiences.

Tinto's (1993) theoretical model may serve as a platform for comprehending the causes of doctoral student attrition. The parameters that predict attrition among doctoral students may be categorized into two categories. The first category is *internal factors,* which include the lack of motivation to complete the program (Deci et al., 2001; Kuo et al., 2017; Litalien & Guay, 2015), feeling overwhelmed with the demands of doctoral studies (Alharbi & Smith, 2018; Chýlová & Natovová, 2013; Dumitrescu, 2016) and burn out (Bresó et al., 2011; Gibson et al., 2009; González-Romá et al., 2006). Personal factors may also include family-related stressors (e.g., starting a family) as well as physical health issues (Kernan et al., 2011; Levecque et al., 2017; Rouse et al., 2014). The second category is *external factors*, which include students' dissatisfaction with academia or a specific program of study (Rummell, 2015), faculty members affiliated with the program (Lovitts, 2002), characteristics of the thesis advisor (Gill et al., 2012; Godskesen & Kobayashi, 2016; Litalien & Guay, 2015), and aspects of the discipline. This

category also consists of financial contributors to attrition, which include financial pressure and concerns associated with employment prospects after graduation (Szkody et al., 2022).

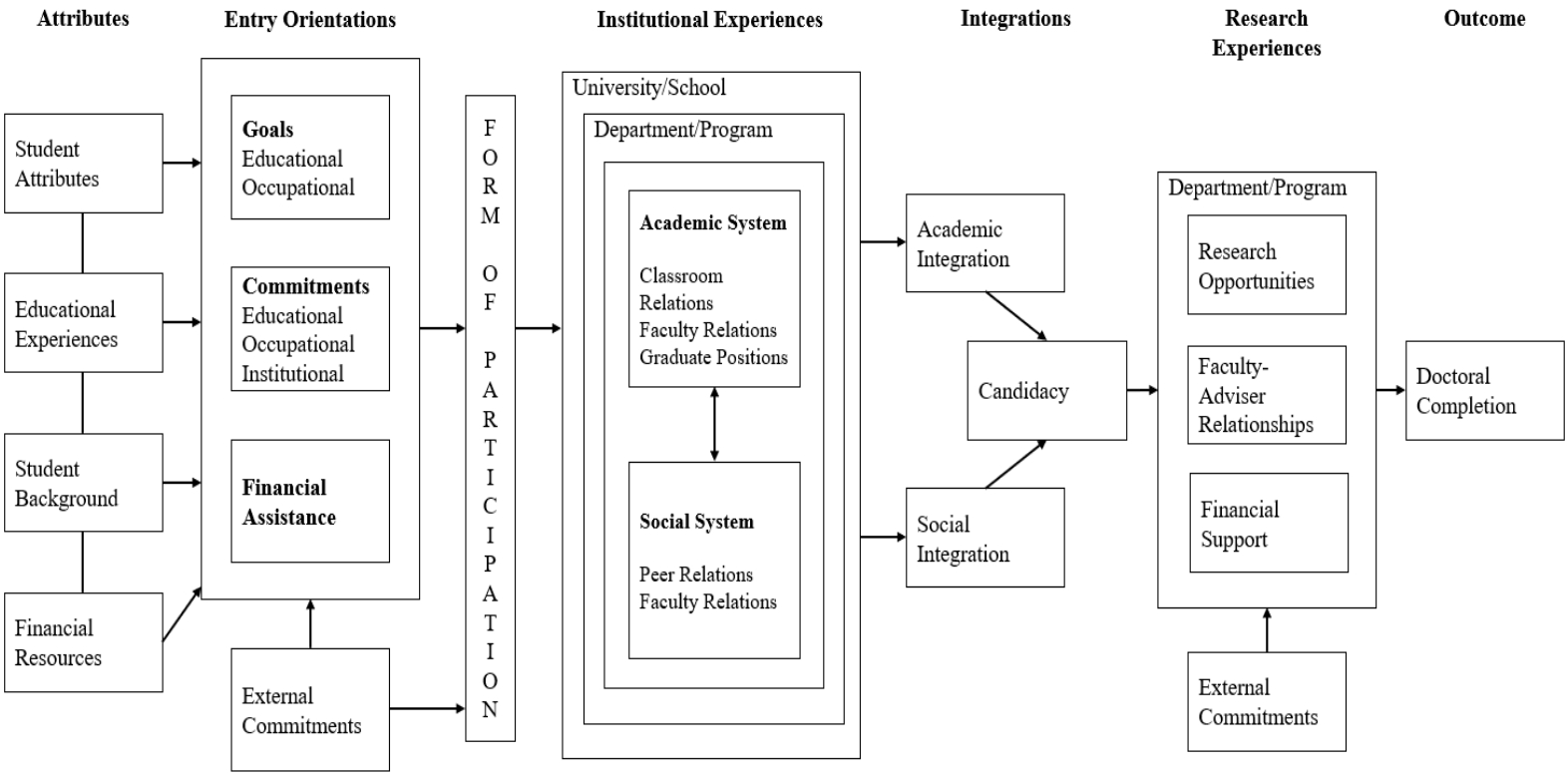
The longitudinal model of doctoral persistence consists of three steps: pre-entry attributes, student experiences, and outcomes (see Figure 1). The first phase corresponds to the first year of doctoral study, during which students decide to enroll in a particular doctoral program and begin to integrate into the academic and social communities of the institution (Gardner, 2008; Weidman, 2010). The significance of these pre-entry characteristics in predicting student success (i.e., a strong sense of academic preparedness, financial resources, and motivation) has been underscored by research showing that doctoral students who are academically prepared and motivated are more likely to complete their program (Lassibille & Navarro Gómez, 2008; Leijen et al., 2016). Further studies assert that financial assistance enables students to participate in academic tasks with their supervisors and peers, which are critical to promoting graduate retention (Gardner, 2013; Mendoza et al., 2014).

The second phase is the transitional period (i.e., student experience), during which students begin to integrate into their academic program. This phase is distinguished by building relationships with faculty members and peers, aligning research interests with the program's emphasis, and developing a feeling of ownership and engagement in research (Tinto, 2006, 2012a). Often referred to as the road to candidacy test, the second phase comprises obtaining foundational information and skills required for academic research.

The third phase is the post-transitional phase, whereby students begin to feel the consequences of their program integration (Tinto, 2006, 2012a). The post-transitional phase is defined by the decision to remain or quit the program. This phase also includes preparations for the dissertation's oral defense.

Figure 1

The Longitudinal Model of Doctoral Persistence



Tinto's Longitudinal Model of Doctoral Persistence (1993) asserts that universities have two distinct systems, namely academic and social. Doctoral students must be integrated into both systems to remain committed to their academic institutions (Anderson, 2021). Academic integration can be assessed by students' academic achievement, intellectual growth, as well as student participation in classes, colloquia, and the development of fundamental theory and research skills (Golde, 2000). Whereas social integration can be determined by analyzing their participation in academic society, including their interaction with peers and faculty members. Relationships with faculty members and supervisors are positively related to satisfaction and negatively related to intention to quit (Fernando, 2013; van Rooij et al., 2021).

Tinto's (1993) *Longitudinal Model of Doctoral Persistence* focuses specifically on the experiences and outcomes of doctoral students. According to the model a student's integration into their academic program is influenced by the quality of doctoral students' interactions with faculty and peers, the degree to which their research interests align with the program's research focus, the extent to which they feel ownership and investment in their research, and the level of program support they receive (Tinto, 1997, 2006, 2012a). Tinto's theory has been influential in shaping research on student retention and has been widely adopted in higher education. It also provides a framework for understanding the complex processes of student retention in higher education. The model emphasizes the importance of student integration and the dynamic nature of the retention process.

Socialization Theory

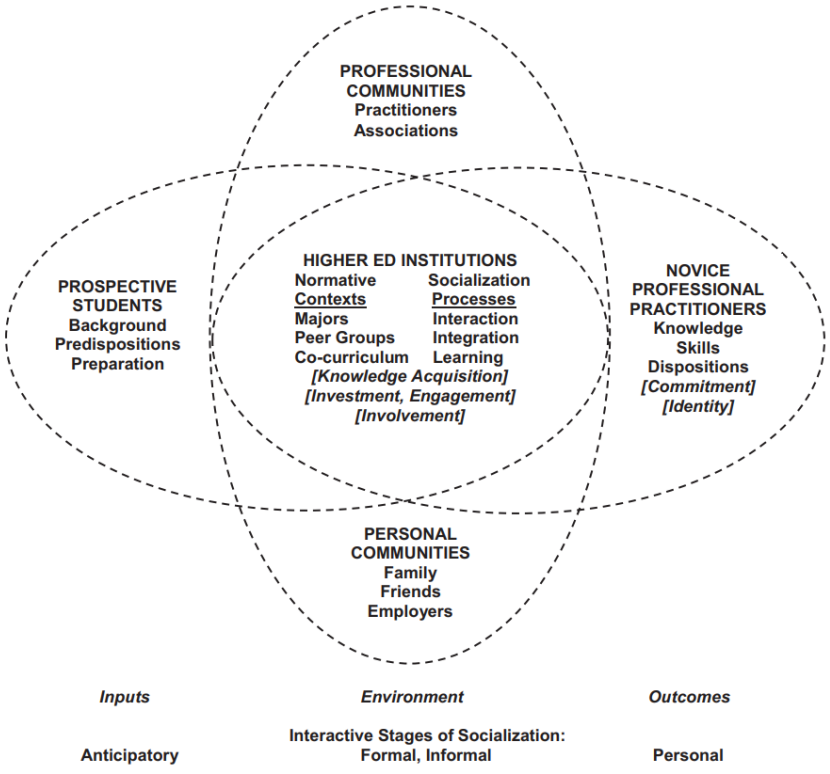
Socialization is also defined as the process of being integrated into the community or organization (Austin, 2002). The socialization process occurs when an individual directly influences another individual's perceptions, behavior, and skill acquisition (Smart, 2008), and for graduate students when they become a member of an academic department (Golde, 1998). This socialization in educational contexts is facilitated by close connections between faculty members and students and indirect connections between peers (Smart, 2008). Weidman et al. (2020, p. 21), "construe socialization of students in higher education institutions as a set of fluid and iterative (as opposed to invariant) processes, with permeable boundaries across spaces and dimensions (see Figure 2). This is depicted by enclosing dimensions in intersecting ellipses with dotted lines rather than solid boxes connected with lines."

The *interactive* model of socialization in the process of professional role acquisition entails a discrete set of steps, namely *anticipatory*, *formal*, *informal*, and *personal* (Weidman,

Twale, & Stein, 2001). Similar to the pre-entry stage in the Longitudinal Model of Doctoral Persistence developed by Tinto (1993), the *anticipatory* stage in *Graduate and Professional Student Socialization* refers to the pre-professional experiences prior to enrollment in a doctoral program. The *anticipatory* stage encompasses the pre-professional experiences that students undertake to transition from the position of an outsider to an insider within their chosen field of study.-During this stage, students learn to identify with new professional roles and develop an understanding of the norms and expectations of the departmental environment (Weidman, 2020).

Figure 2

Interactive Stages of Socialization



Note. Model of graduate and professional student socialization by Weidman et al. (2006)

The *Formal socialization* stage occurs during the first year of university and is characterized by faculty, staff, and peers' influence. During this stage, students learn to

internalize the values and norms of the university culture and begin to develop a sense of belonging to the academic community. This is also the stage when students begin to develop their academic and social identities and a sense of personal agency and autonomy (Weidman, 2020). *Informal* socialization occurs after the first year (formal stage) and is characterized by the influence of peers and the campus community (i.e., mutual sharing, group maturity, embracing diversity in class, faculty and student bonding, socio-cultural activity, and social interactions; Weidman, 2020). During this stage, students learn about the departments' values, norms, and expectations through informal interactions with other students and by participating in collaborative communities. This stage can also involve the development of close friendships (e.g., appreciating diverse colleagues) and a sense of belonging to the campus community (e.g., networking and role identification; Weidman, 2020).

Personal socialization occurs during the program's final years (i.e., dissertation stage) and is characterized by personal and professional identities. Students internalize professional roles by focusing on research interests and become more involved in professional matters such as publication (i.e., role transformation; Weidman et al., 2001). This stage may entail a process of socialization into a specific professional culture through internships, assistantships, and clerkships (Weidman, 2020). During this stage, individuals must adapt to a new social context and may need to learn new values, norms, and expectations in order to be successful in their chosen profession. This stage can also involve a process of resocialization as individuals transition from a student to a professional identity.

The socialization theory by Weidman et al. (2001, 2006) builds upon Tinto's work by providing a more complex explanation of the socialization process in higher education, emphasizing the significance of *formal* and *informal* interactions that shape student's identity

and behaviors. In particular, socialization theory provides a common and useful framework for understanding doctoral student's experience (Gardner & Barnes, 2007; Weidman, 2020; Weidman et al., 2001), and it is distinct from professionalization (Weidman & Stein, 2003; Weidman et al., 2001). Antony (2002, p. 369) noted that:

> Professionalization should be viewed as the transmission of content knowledge; the informing about professional norms, ethics, and values; and the teaching of technical skills. Socialization distinguishes itself from the process of professionalization, however, by requiring the internalization or adoption of the profession's norms, values, and ethics to the point of defining the neophyte's own professional identity and self-image.

Graduate Student Degree Progress Theoretical Model

Consistent with the Longitudinal Model of Doctoral Persistence (Tinto, 1975), Graduate Student Degree Progress Theoretical Model by Girves and Wemmerus (1988) is based on academic and social integration. Compared to the two previously described theories, Girves and Wemmerus (1988) incorporate a faculty perspective in addition to the departmental, student, and financial factors. Their theoretical model of graduate student degree progress consists of two stages shown in Figure 3. The first stage includes four sets of variables related to department characteristics, student characteristics, financial support, and perceptions of the faculty. These variables are expected to affect the four mediating factors in the second stage, which directly contribute to graduate student degree progress, namely graduate grades, involvement, satisfaction with the department, and alienation.

The first factor in this theoretical model is department characteristics. The department primarily determines policies affecting student life, including admissions, financial assistance, criteria for degree completion, and the curriculum (Golde, 2005). Furthermore, the mismatch

between doctoral students and their departments lies at the heart of student attrition (Golde, 2005); therefore, it is important to understand the department's role in shaping students' academic experiences. The departmental climate involves the current perceptions individuals have about the procedures, practices, rewards, and policies in an organization (Ostroff et al., 2003). A more supportive and welcoming climate can positively impact graduate student degree progress (Dericks et al., 2019) and offer more opportunities for collaboration, mentoring, and scholarly productivity (de Valero, 2001; Weidman & Stein, 2003). A negative departmental climate increases feelings of isolation (Kohun & Ali, 2005), competitive academic environment (Virtanen et al., 2017), and lack of faculty support (e.g., academic, psychosocial, and sociocultural support; Posselt, 2018). Research has found that a lack of support from departments and departmental faculties is associated with doctoral students' persistence (de Valero, 2001; Golde, 2000, 2005). Furthermore, department size (de Valero, 2001), student-faculty ratios, and percentage of full-time faculty (Goenner & Snaith, 2004) are important characteristics that play a significant role in explaining graduation. Graduate students in bigger departments have access to more research opportunities, funding, and mentoring, which can positively impact their degree progress.

Student characteristics (i.e., second factor) can be classified into several categories, including age, gender, ethnicity, and marital status. Empirical evidence suggests that the age of doctoral students is linked to their time to completion. Specifically, research has shown that the average time to complete a doctoral program increases with the average age of students (Academy of South Africa, 2010; Stackhouse & Harle, 2014). Moreover, a significant relationship has been found between doctoral dropout rates and age at registration, with younger students exhibiting higher completion rates (Wollast et al., 2018). Prior research also suggests

that married students are more likely to complete their degrees than unmarried students (Ampaw & Jaeger, 2011; Lott et al., 2009; Wollast et al., 2018).

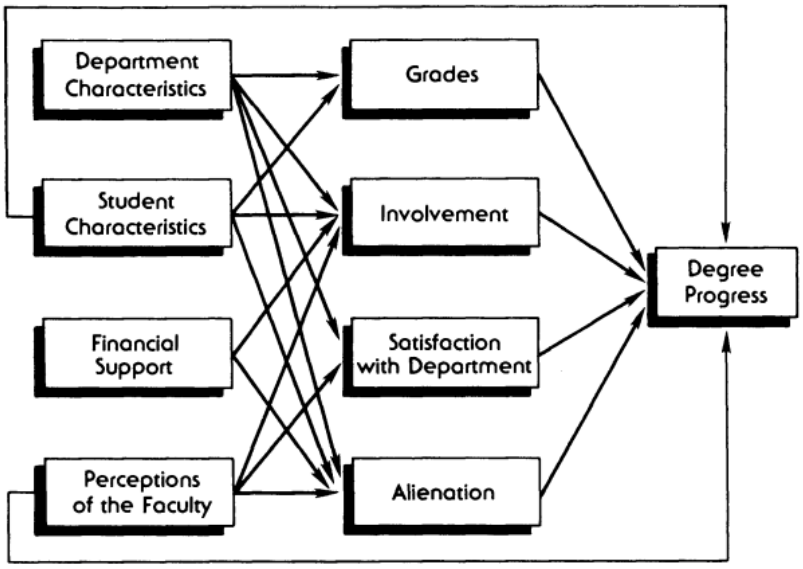
According to this theoretical model, the third factor is financial support. Financial strain is a significant obstacle to doctoral student completion and has been linked to dropout rates (Larivière, 2013; Van Der Haert et al., 2014). Doctoral programs generally offer financial support to students through fellowship, teaching, and research assistantship positions, but the amount of funding provided can differ substantially by discipline (Wu et al., 2018). While these assistantship positions are often mandatory, they primarily serve departmental needs rather than doctoral student education (Austin, 2002). Nevertheless, studies have found that research and teaching assistantships facilitate socialization among doctoral students and increase their chances of integrating with their departments and faculty members (Acker & Haque, 2015; Ampaw & Jaeger, 2012; Mena et al., 2013; Mendoza et al., 2014). Financial support can reduce the need for students to seek employment outside the department and foster a sense of community within the department.

The fourth factor in the first stage is the perceptions of the faculty. Weidman et al. (2021) emphasized the faculty role by pointing out that this is the "faculty who establish the norms for teaching, research, and service, who shape the curriculum as well as the organization of instruction and social relationships among the members of the academic program and admit students and decide on the kinds of financial support to be offered" (p. 38). Faculty members are the source of student socialization, and students "learn the ropes" by interacting with them (Weidman et al., 2001); furthermore, they can "make or break" Ph.D. students (Lee, 2008). One of the critical faculty members in a doctoral student's academic journey is their supervisor. The perceptions of doctoral students on their relationship with their supervisor may be classified into

categories such as autonomy at work (Ray, 2007), academic advising related to training and progress (Zhao et al., 2007), good communication (Alamri et al., 2020; Bireda, 2019; Ray & Marakas, 2007), the frequency of interactions with faculty (Feizi, 2022), and support (Gill et al., 2012). Supervisors are the socializing agents of discipline and impart students' satisfaction (Zhao et al., 2007). A good supervisory relationship positively influences students' satisfaction with their program (An et al., 2020), perceived self-efficacy (Fernando, 2013), mental health (Nagy et al., 2019), and persistence (Litalien & Guay, 2015).

Figure 3

Model of Graduate Student Degree Progress



Note. Model of Graduate Student Degree Progress. Reprinted from "Developing models of graduate student degree progress," by J. E. Girves, and V. Wemmerus, 1988, The Journal of Higher Education*, 59(2), 163-189.*

In the second stage of the Model of Graduate Student Degree Progress (i.e., student characteristics), the four intervening variables contribute directly to graduate degree progress. In most doctoral programs, grades do not measure academic achievement and progress but

according to a review article on doctoral student well-being, doctoral students' academic progress can be measured by the number of publications or conference presentations (Schmidt & Hansson, 2018). Tinto (2012b) considered doctoral students' participation in professional organizations relevant to their chosen disciplines as a type of academic involvement. Furthermore, Astin (1999, p. 528) defined involvement as "the quantity and quality of the physical and psychological energy that students invest in the college [school] experience". While involvement in one's program reflects the extent to which the student is engaged in research (Borders et al., 2014) and professional activities (i.e., local, and national levels) related to their future career (Gardner & Barnes, 2007). Local involvement, such as socialization to institution and culture, and national involvement, such as observation of research dissemination or networking, lead students to professional development and socialization in higher education (Gardner & Barnes, 2007). Doctoral students perceived levels of academic involvement strongly predict a higher level of self-efficacy and satisfaction (Anderson et al., 2013).

Satisfaction with the department refers to the student's overall satisfaction with the program, faculty, and resources provided by the department. Research has shown that satisfaction with the department is associated with several factors, including mentoring, financial support, access to resources, and academic socialization (Rummell, 2015; Tram et al., 2020). Furthermore, the department's policies and practices related to funding, teaching opportunities, and research support can also have an impact on student satisfaction (Lovitts & Nelson, 2000). Studies have also identified additional factors associated with doctoral students' program satisfaction, including socialization and motivational factors (Shin et al., 2018) and relationships with peers and academic advisors (Maher et al., 2013). Therefore, it is critical for

departments to regularly assess and address student satisfaction to ensure the best possible academic experience for doctoral students (Gardner & Barnes, 2007).

Finally, the last factor from the second stage of this theoretical model is alienation which refers to "the state or experience of being isolated from a group or an activity to which one should belong, or in which one should be involved" (Mann, 2001, p. 8). Ali and Kohun (2006) noted that there are two key issues that contribute to the development of isolation among doctoral students. First, students may begin to feel isolated due to confusion regarding the program and its requirements. What may initially manifest as simple confusion can quickly grow into feelings of being overwhelmed and left behind. Second, lack of communication between both student-to-student and student-to-faculty can also contribute to feelings of isolation. The feeling of isolation evolves around three issues, namely lack of communication, miscommunication, and confusion (Ali & Kohun, 2006). Therefore, students who are less integrated into their departments' academic, professional, and social life have a higher risk of dropping out (Ali & Kohun, 2006; Gardner, 2008; Pyhältö et al., 2012).

Conclusion

Based on the three theoretical models discussed, it is clear that various factors influence doctoral student persistence and success. Tinto's *Longitudinal Model of Doctoral Persistence* emphasizes the importance of academic and social integration for doctoral student persistence. Based on this theoretical model, students are more likely to persist if they feel connected to their academic program. *Socialization Theory* (Weidman, 2001) expands on Tinto's model by highlighting the role of socialization processes in shaping student outcomes. This theory suggests that socialization experiences, including interactions with peers and faculty, contribute significantly to doctoral student persistence by emphasizing the importance

of socialization experiences in shaping their identities and sense of belonging within their academic communities. The Graduate Student Degree Progress theoretical model proposed by Girves and Wemmerus (1988) further expands on these ideas by incorporating faculty perspectives as an additional factor influencing doctoral student progress. This model includes departmental, student, financial, and faculty factors as predictors of doctoral student degree progress. The authors suggest that these factors indirectly influence student degree progress through four mediating factors: graduate grades, involvement, satisfaction with the department, and alienation. Despite the differences in their emphases, these theories share some similarities, as summarized in Table 1. For instance, they all acknowledge the importance of social integration, financial assistance, and supervisor support in promoting doctoral student persistence and degree progress.

Theories on doctoral student persistence and degree progress have emphasized the importance of the academic and social environment in shaping their persistence and degree progress. These theories recognize that multiple factors are likely at play in determining these outcomes, suggesting that persistence and degree of progress are complex phenomena. Prominent theories on this topic include Tinto's Longitudinal Model of Doctoral *Persistence* (1993), Weidman et al.'s Socialization Theory (2001), and Girves and Wemmerus' Graduate Student Degree Progress theoretical model (1988). These theoretical models have contributed significantly to our understanding of the factors influencing doctoral student persistence and degree progress.

Table 1

Theoretical Perspectives on Student Dropout Key Point and Their Similarities

Theory	Key Points	Unique Features	Similarities
Longitudinal Model of Doctoral Persistence (Tinto, 1993)	Persistence in doctoral programs is determined by a combination of pre-entry characteristics and experiences, academic and social integration, and degree progress	Emphasizes the importance of academic and social integration for persistence	Similar to the Student Degree Progress Theoretical Model in considering academic and social integration as key factors
Socialization Theory (Weidman et al., 2001)	The socialization process is a set of fluid and iterative processes that involve both formal and informal interactions with faculty, peers, and the departmental and campus community	Emphasizes the significance of both formal and informal interactions in shaping student identity and behavior	Similar to the Longitudinal Model of Doctoral Persistence, it has three stages: pre-entry, interactive, and outcome stage
Graduate Student Degree Progress Theoretical Model (Girves & Wemmerus, 1988)	Graduate student degree progress is influenced by four sets of variables related to department characteristics, student characteristics, financial support, and perceptions of the faculty	Incorporates a faculty perspective, in addition to the departmental, student, and financial factors	Similar to the Longitudinal Model of Doctoral Persistence and the Socialization Theory in considering departmental and student characteristics as key factors

Overview of the Chapters

This thesis investigates the multifaceted dynamics of doctoral students' experiences, and their well-being. Through a series of three manuscripts, this thesis covers various aspects of the challenges faced by doctoral students, examining their relationships with stress, financial and faculty support, and socialization processes.

Chapter 2: Perceived stress and well-being in doctoral students: Effects on program satisfaction and intention to quit (Manuscript 1)

Manuscript 1 primarily focuses on the impact of stress on doctoral students' well-being and the subsequent impact on their intention to quit. This chapter employs the theoretical model developed by Lazarus and Folkman (1984) and Núñez-Regueiro (2017) to investigate the effects of stress on the likelihood of student dropouts. The outcomes highlight a strong relation between heightened stress, a decline in program satisfaction, and a reduction in overall well-being. Furthermore, recommendations are presented to academic institutions emphasizing the importance of boosting mental health resources and supportive academic environments.

Chapter 3: Satisfaction, research productivity, and socialization in doctoral students: Do teaching assistantship, research assistantship and the advisory relationship play a role? (Manuscript 2)

Manuscript 2 is based on the theoretical model of graduate student degree progress by Girves and Wemmerus (1988), laying emphasis on financial support and perceptions of faculty support as critical indicators of student progress. It underscores the essential role supervisors play in a student's academic journey. Moreover, the chapter examines the complex dynamics between financial support (i.e., teaching assistantship, research assistantship), general

satisfaction, program satisfaction, and social involvement, emphasizing the significance of these aspects in doctoral students' success and productivity.

Chapter 4: Navigating health and academia: Exploring the effects of socialization on doctoral students (Manuscript 3)

Manuscript 3 is based on Weidman et al.'s *Socialization Theory* (2001), which provides an in-depth exploration of the role socialization plays in influencing doctoral students' dropout and well-being. It provides a detailed analysis and emphasizes the fundamental role of early social engagement in predicting subsequent socialization, emotional well-being, and intention to quit. The chapter also examines the changing nature of socialization across various stages of a doctoral program and sheds light on gender-specific perceptions within the academic environment.

Chapter 5: Conclusion

This chapter synthesizes the contributions of the three manuscripts, emphasizing the profound significance of understanding the multiple dimensions influencing doctoral students' experiences and choices. It also discusses the limitations of the works, suggesting areas for future research and offering potential strategies for academic institutions to foster a supportive environment conducive to the success and well-being of doctoral students.

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Chapter 2

Manuscript 1. Perceived Stress and Well-being in Doctoral Students: Effects on Program Satisfaction and Intention to Quit

Feizi, S., Knäuper, B., Elgar, F. (2024) Perceived stress and well-being in doctoral students: Effects on program satisfaction and intention to quit. *Higher Education Research & Development,* 2022-0489. https://doi.org/10.1080/07294360.2024.2317276

Abstract

Stress is a common negative emotion in students. Given the stress associated with doctoral studies, it is crucial to examine the influence of stress on well-being, program satisfaction, and retention in doctoral programs. This study examined stress-related issues and their relationships with intention to quit in a sample of 2,486 students enrolled in doctoral programs representing 38 disciplines. Participants completed a web-based questionnaire including sociodemographic and self-report measures assessing perceived stress, emotional, social, and psychological well-being, as well as program satisfaction and intention to quit. We tested three hypotheses based on Lazarus and Folkman's (1984) transactional theory of stress and emotions and Núñez-Regueiro's (2017) stress process model of school dropout. The results of Structural Equation Modeling (SEM) supported the hypotheses of the study and showed that perceived stress is negatively associated with emotional, social, and psychological well-being. The most significant finding from this study is that perceived stress, directly and indirectly, contributes to lower program satisfaction in doctoral students and a stronger intention to quit. These study findings underscore the need for departments to actively support students in completing their dissertations by establishing explicit expectation norms.

Keywords: stress, emotional well-being, social well-being, program satisfaction, intention to quit, doctoral students

Despite many studies on trends and predictors of student attrition in higher education, little is known about the dropout process for doctoral students. Enrolments in Doctor of Philosophy (PhD) programs and various professional degrees (e.g., MD, EdD, PsyD) saw continued growth during the past several decades. Graduate enrolment rose by 2.7 percent globally (Council of Graduate Schools [CGS], 2019; Okahana et al., 2020); however, attrition rates for doctoral students remain at about 50% (Ministry of Education, Leisure and Sports, 2013; Council of Graduate Schools, 2008) and between 50% and 70% for online doctoral programs (Terrell, 2005; Terrell et al., 2012). While a doctoral degree provides valuable skills to a variety of sectors, enriches individuals' lives in academia, institutions, and employment, and benefits both the individual and society (Council of Canadian Academies [CCA], 2021), doctoral program attrition continues to be a problem for universities in Canada and globally (CGS, 2015a, 2015b). The loss of highly qualified students at this level of study wastes resources for academic institutions and faculty members who devote significant time and attention to doctoral supervision (Gardner, 2010; Golde, 2000). Additionally, dropping out of a doctoral program might lead to significant emotional and psychological costs for students (Willis & Carmichael, 2011). The undertaking of a doctoral program can be a considerable source of stress (Levecque et al., 2017) due to the high workload (Kurtz-Costes et al., 2006; Maslach, 2003; Rummell, 2015), academic demands (Alharbi & Smith, 2018; Dumitrescu, 2016), and potential isolation (John & Denicolo, 2013). However, not being able to complete the program might lead to feelings of shame, embarrassment, anger, and frustration for these students (Willis & Carmichael, 2011).

There are several factors that contribute to doctoral student attrition. The determinants of doctoral attrition can be grouped into three categories. The first includes *academic factors*, such

as students' dissatisfaction with academia or a particular program of study (Rummell, 2015), dissatisfaction with faculty members affiliated with the program (Lovitts, 2002), thesis advisor characteristics (Gill et al., 2012; Godskesen & Kobayashi, 2016; Litalien & Guay, 2015), and aspects of the discipline. The second category is *personal factors,* which include the lack of motivation to complete the program (Deci et al., 2001; Kuo et al., 2017; Litalien & Guay, 2015), feeling overwhelmed with the demands of doctoral studies (Alharbi & Smith, 2018; Chýlová & Natovová, 2013; Dumitrescu, 2016) and burn out (Bresó et al., 2011; Gibson et al., 2009; González-Romá et al., 2006). Personal factors may also include family-related stressors (e.g., starting a family) as well as physical health issues (Kernan et al., 2011; Levecque et al., 2017; Rouse et al., 2014). The third category is *financial contributors* to attrition, which include financial pressure and concerns associated with employment prospects after graduation (Lovitts, 2002). Feeling disillusioned with a doctoral program or about academic life in general or lacking adequate financial support can drive some students to experience desperation, anxiety, stress and illness and ultimately drop out (Acker & Haque, 2015; Kurtz-Costes et al., 2006).

Student satisfaction supports retention in doctoral programs through increased motivation, engagement, learning, and academic performance (Sahin & Shelley, 2008; Wickersham & McGee, 2008). Additionally, student satisfaction results in greater well-being and, ultimately, better academic performance (Dericks et al., 2019). Well-being encompasses a psychological domain that includes happiness and pursuing the true nature and purpose in life (Ryan & Deci, 2001; Ryff & Singer, 2008) and subjective well-being that includes life satisfaction, self-realization, personal growth, and positive social relationships (Diener et al., 2018; Dodge et al., 2012; Kahn & Juster, 2002).

Student well-being in graduate school is linked to many factors such as professional development, facilities, home and health, research activities, social isolation, and supervisor and university support (Juniper, 2012). Findings show that close to 50% of graduate students experience highly stressful challenges during their program (Hyun et al., 2006), and 49.1% of students exhibit three or more symptoms of anxiety, and 39.3% of doctoral students have five or more symptoms of depression (Rummell, 2015). Other factors, such as frequent evaluations by the department, can also negatively affect emotional well-being (Kurtz-Costes et al., 2006).

Additionally, the rigorous demands imposed by completing requisite coursework, the comprehensive examination, and the dissertation challenge students' ability to maintain a sense of well-being (Stubb et al., 2011). Studies have found that doctoral students become emotionally exhausted due to heavy workloads and social conflicts (Kurtz-Costes et al., 2006; Maslach, 2003; Rummell, 2015), conflicts within their scholarly community (Stubb et al., 2011), and difficulties with their advisors (Ellis, 2001). A survey of doctoral students by Levecque et al. (2017) found that intense workloads increased the odds of experiencing psychological distress by 90%. Given the many stressors affecting doctoral student well-being, it is not surprising that more than one-third of them have reported symptoms of common psychiatric disorders (Levecque et al., 2017).

Other research on doctoral students has shown that stress reduces well-being (Moate et al., 2019; Rummell, 2015) and decreases the ability to meet deadlines and complete study-related tasks (Barry et al., 2018). Additionally, dissatisfaction with academia or a particular program of study (Rummell, 2015), faculty members associated with the program (Lovitts, 2002), thesis advisor characteristics (Gill et al., 2012; Godskesen & Kobayashi, 2016; Litalien & Guay, 2015), and aspects of the discipline could all contribute to doctoral student dropout.

Therefore, in the present, study we tested a model that identifies perceived stress as the predictor, and social well-being (i.e., Eudaimonic well-being), emotional well-being (i.e., Hedonic well-being), and psychological well-being (i.e., Eudaimonic well-being) as mediators of the association between program satisfaction and perceived stress. The conceptual model used in the study identifies program satisfaction as the key pathway between social, emotional, and psychological well-being and the intention to quit doctoral studies. The aim of the study was to examine how attrition and program satisfaction of doctoral students are related to well-being and stress.

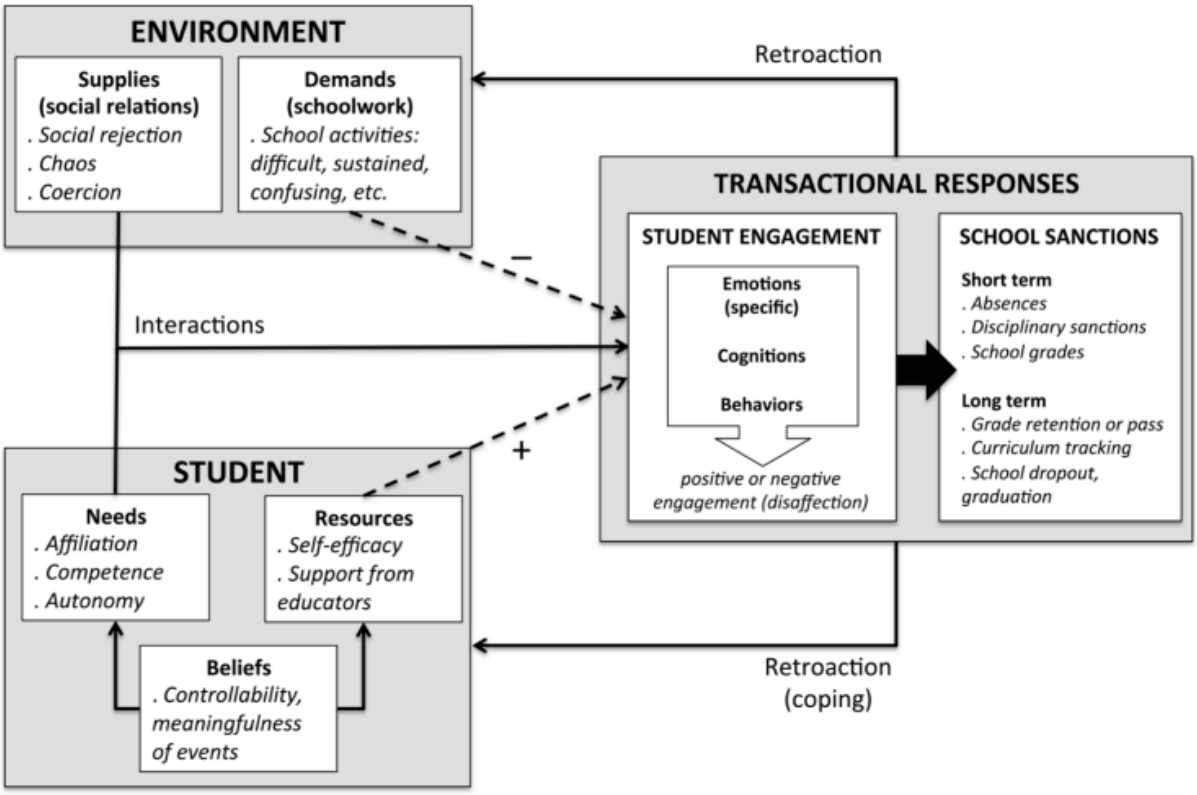
Common Stressors of a Doctoral Program

Stress is a common negative experience that hinders students' ability to achieve and maintain their well-being (Moate et al., 2019; Rummell, 2015). However, there are also positive forms of stress known as *eustress* or good stress. O'Sullivan (2011) defined eustress "as both the process of responding positively to stress as well as the positive outcome of this process. At the academic level, the positive response to stress could include studying and working to complete assignments whereas the outcome of eustress could include productivity and successful completion of assignments and exams" (p. 156). However, experiencing constant stress that is not within the optimal level can have negative effects (Robotham & Julian, 2006). Failing to cope with and adapt to these stressors effectively can harm students' academic achievement and, in the long term, their professional paths (Gustems-Carnicer et al., 2019). Lazarus and Folkman (1984) defined psychological stress as a "particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 19).

Núñez-Regueiro (2017) proposed a theoretical model building on the transactional theory of stress and emotions of Lazarus and Folkman that captured environmental constraints in the emergence of school dropout behavior by considering emotional states associated with stress processes (see Figure 1). According to Núñez-Regueiro's stress process model of school dropout the relationship between environmental demands and student needs, beliefs, and resources is influenced by student engagement (i.e., emotion, cognition, behavior). These positive or negative interactions have both short- and long-term consequences. In the short term, they might result in decreased academic productivity, but in the long term, could result in dropout. During doctoral training, there are several environmental and personal stressors that could result in lower emotional and behavioral engagement in students. Students could experience stress due to financial issues, workload, time pressure, and career uncertainty (Kurtz-Costes et al., 2006). Additionally, Wang et al. (2019) identified four common stressors for doctoral students as relationships (i.e., student-supervisor, marriage, and family relationship), job prospects (i.e., job expectation, employment situation), graduation (i.e., article publication, thesis writing), and other factors (i.e., financial factors, personal characteristics).

Figure 1

Stress Process Model of Dropping Out of School



Note. Reprinted from "Dropping out of school as a stress process: heterogeneous profiles in the form of boredom and burnout" by Núñez-Regueiro, F. (2017). *L'orientation scolaire et professionnelle*, 46(1), 1-27.

Entering a doctoral program and adapting to its structures and policies is challenging for many students. For some, adapting to the new environment of a doctoral program triggers fears of failure and stress (Ellis et al., 2015). The processes and procedures of the doctoral program are quite different from students' previous training experiences, and unfamiliarity with these procedures can make students feel as though they stepped into a "new territory" (Ali & Kohun, 2006). Therefore, it is possible that due to this unfamiliarity, stress is experienced differently at various stages of the program, such as coursework (Nelson et al., 2001) and dissertation work

(Hopwood & Paulson, 2012; Nelson et al., 2001). As doctoral students forge their new professional identity, they often feel stressed and think that they have “no breathing space” (Offstein et al., 2004).

Doctoral programs are complex and multidimensional and impose high demands and workloads on students. Understanding the complexity of doctoral students’ experiences depends on several factors. First, doctoral students have difficulty achieving a balance between professional and personal commitments (Austin, 2002). Second, doctoral students are likely to experience financial stress (Nelson et al. 2001; El-Ghouroury et al. 2012; Myers et al. 2012). Third, worries about their professional future lead many students to contemplate withdrawing from doctoral programs or feel dissatisfied with their program (Pyhältö et al., 2009). Fourth, other considerations about marriage, having children, and family responsibilities may also influence decisions to leave the program (Gardner, 2008).

In recent literature, common sources of student stress were found to stem from adapting to the new environment (Alharbi & Smith, 2018). A lack of appropriate structure and guidance frustrates many students and contributes to experiencing ambiguity and discouragement from continuing their program (Ali & Kohun, 2006; Gardner, 2007; Golde, 2000). Furthermore, a mismatch in the relationship between the environment and doctoral students (Stubb et al., 2011) and the demanding and stressful curriculum of doctoral programs can all elicit psychological stress (Offstein et al., 2004). Pyhältö et al. (2009) found that students who perceived the learning environment more negatively experienced more stress, exhaustion, anxiety, and disinterest. In contrast, those who evaluated their environments more positively reported less stress, exhaustion, and anxiety (Pyhältö et al., 2009). Hence, the scholarly community can buffer the negative experiences that elicit stress, doubt, and exhaustion (Stubb et al., 2011).

In addition to the internal and external factors reviewed above, international doctoral students experience additional stress due to acculturation (Berry, 2006), language proficiency (Duff, 2010), and loneliness (Sawir et al., 2008). International students experience more frustration due to delays, lack of resources, failure to achieve goals, and social isolation in addition to the pressures of competition, deadlines, work, responsibilities, and overload (Misra et al., 2003). Additionally, considering that students' writing is the primary mode of academic discourse socialization (Duff et al., 2019; Duff, 2010), English language proficiency becomes a powerful influence on socialization (Duff, 2010). The socialization process may be more challenging for new students and international students in comparison to students who are proficient academic writers and already involved in academic conferences and publications. These students have more advantages and social connections that allow them to learn the rules and values that support their success. Poor socialization and feeling isolated and disconnected from faculty members and peers contribute to doctoral students' attrition (Ali & Kohun, 2006; Gardner, 2008; Lovitts, 2002). Our aim in the present study was to examine these challenges and their associations with intentions to quit using data on a diverse sample of Canadian students. There were three general hypotheses in this study, as depicted in Figure 2:

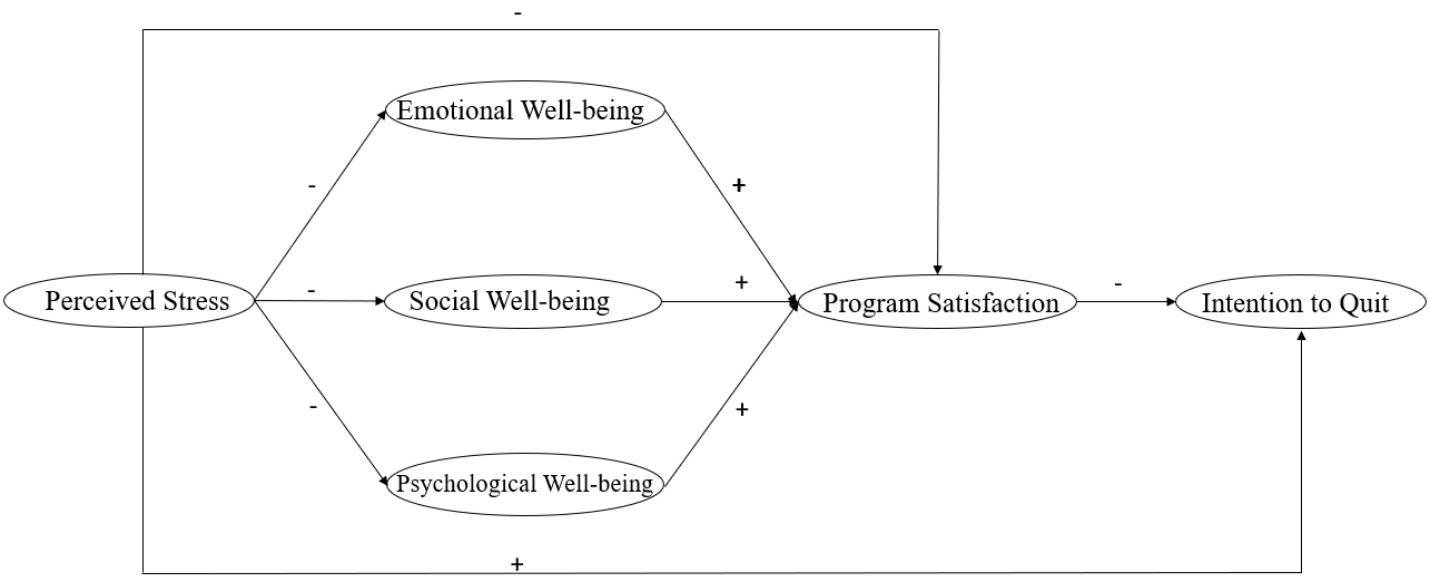
Hypothesis 1. Perceived stress is negatively associated with emotional, social, and psychological well-being. Lower levels of stress were expected to relate to better emotional, social, and psychological well-being.

Hypothesis 2. Perceived stress is negatively associated with intention to quit by mediators of the study, namely emotional, social, and psychological well-being, and program satisfaction. Stress is both directly and indirectly related to intentions to quit, with mediated pathways through program satisfaction and emotional, social, and psychological well-being.

Hypothesis 3. Perceived stress is negatively associated with program satisfaction, and positively associated with intention to quit. Higher levels of stress were expected to contribute to higher intention to quit and lower program satisfaction.

Figure 2

Hypotheses Model of the Study

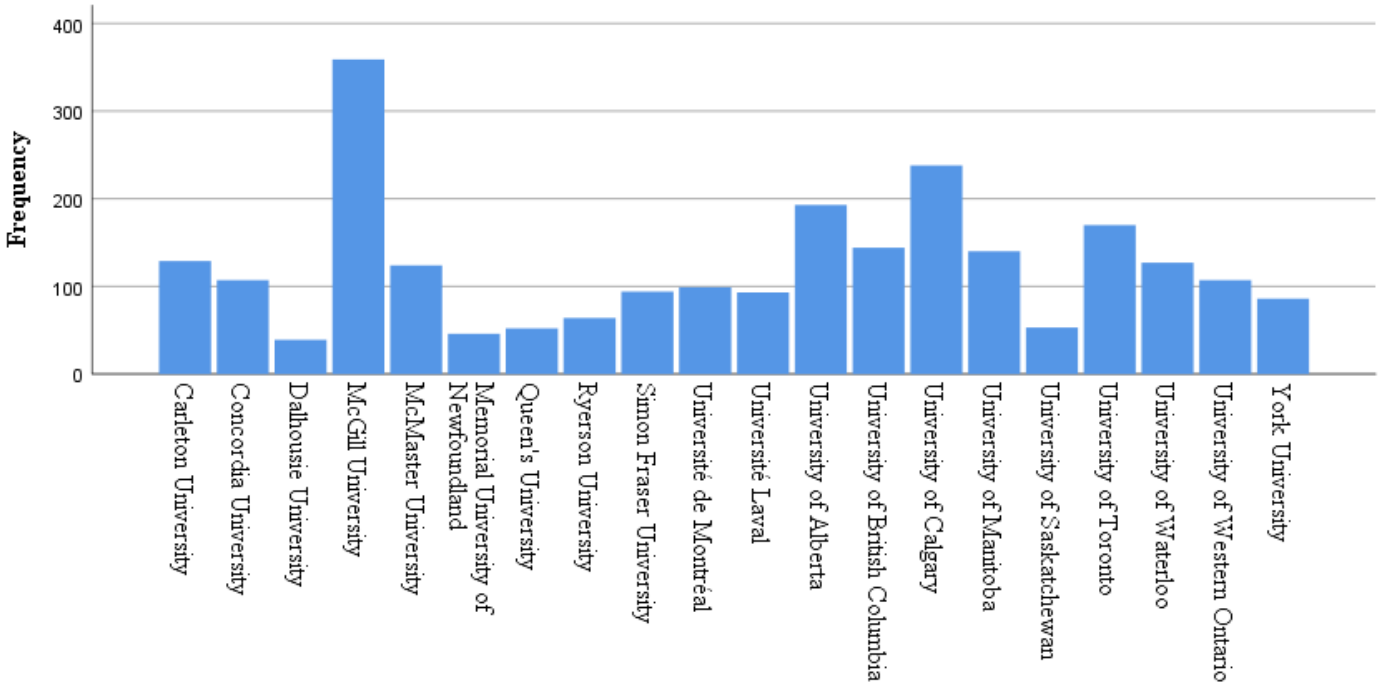


Methods

To conduct this study with a large and diverse sample of Canadian doctoral students, following approval by the Research Ethics Board Office of McGill University, we contacted 47 universities in Canada and obtained approval from research ethics offices at 30 universities. Students from 20 universities who were enrolled in a doctoral program were recruited via mass emails sent by university departments in Spring 2021. Prior to the participation, students read and accepted the terms of a consent form and then spent 20 minutes on average to complete the questionnaire. Participants were entered into a prize draw for one of twenty-five $50 CAD Amazon gift card prizes as compensation for participating in the study.

Figure 3

Distribution of the Sample Across Canadian Universities



Note. Twenty research intensive universities in Canada were included in the final analyses.

Study participants included 2,486 doctoral students recruited from twenty research intensive universities in Canada (see Figure 3) across 38 disciplines. All participants completed a web-based questionnaire including sociodemographic measures (e.g., age, gender, academic discipline, Ph.D. stage) and self-report measures assessing perceived stress, emotional, social, and psychological well-being as well as program satisfaction and intention to quit. Concerning background variables, 15.5% of the students were in the coursework stage, 21.1% in the comprehensive examination stage (e.g., literature search, review, writing), 56.6% in the dissertation stage (e.g., dissertation proposal, data analyses, writing), and 6.8% in other stages. Regarding the year of doctoral program, 20.0% were in the first year, 21.6% second year,

19.8% third year, 16.6% fourth year, 12.6% fifth year, and 9.5% more than fifth year. Participants were primarily female (60.8%) with an average age of 31 (*SD* = 6.73).

Table 1

Demographic Characteristics of Students Enrolled in Doctoral Program

	N (%)	Mean	SD
Gender			
Female	1512 (60.8)		
Male	899 (36.2)		
Non-conforming	54 (2.2)		
Neither	10 (0.4)		
Age		31.00	6.536
English as the First Language			
Yes	1323 (53.2)		
No	1152 (46.3)		
International Student			
Yes	936 (37.7)		
No	1530 (61.9)		
Stage in the Program			
Coursework	386 (15.5)		
Comprehensive Examination	524 (21.1)		
Dissertation	1408 (56.6)		
Other	137 (6.8)		
Year in the Program		2.78	1.347
First Year	496 (20.0)		
Second Year	538 (21.6)		
Third Year	491 (19.8)		
Fourth Year	412 (16.6)		
Fifth Year	313 (12.6)		
Full-time			

Yes	2386 (96.0)
No	63 (2.5)

Study Measures

Psychological well-being

Stress was measured by the *Perceived Stress Scale* (PSS; Cohen et al., 1983. Each of its ten items have response options that ranged from 1 = *never* to 4 = *very often* (e.g., "In the last month, how often have you felt nervous and stressed?"; α = .87, *M* = 31.14, *SD* = 7.10).

To measure emotional, social, and psychological well-being, we used the *Mental Health Continuum Short Form (*MHC-SF). Each of its 14 items has response options that ranged from 1 = *never* to 6 = *every day* (Keyes, 2009). MHC-SF items assessed emotional well-being (3 items; e.g., "how often did you feel satisfied with life"; α = .89,*M* = 11.62, *SD* = 3.61), social well-being (5 items; e.g., "how often did you feel that our society is a good place, or is becoming a better place, for all people"; α = .81, *M* = 14.78, *SD* = 5.61), and psychological well-being of the participants (6 items; e.g., "how often did you feel how often did you feel that you had experiences that challenged you to grow and become a better person"; α = .86, *M* = 23.45, *SD* = 6.74).

A 5-item questionnaire (Diener et al., 1985) ranging from 1 = *strongly disagree* to 7 = *strongly agree* was used to measure *program satisfaction* (e.g., "The conditions of my program are excellent"; "I am satisfied with my program"; α = .93, *M* = 21.35, *SD* = 7.81). *Intention to quit* was measured using a 4-item scale adapted from Hackett et al. (2001). Two items ranged from 1 = *Never* to 5 = *constantly*, and two others ranged from 1 = *very unlikely* to 5 = *certain* (e.g., "I think about finding a different doctoral program"; "I plan to quit my doctoral program"; α = .74, *M* = 6.43, *SD* = 2.82).

Results

Preliminary Analyses

An independent-sample *t*-test was conducted to determine potential gender differences among measured variables. Results showed a significant gender difference in perceived stress, $t(2098) = 6.78$, $p = .021$, with females ($M = 31.82$, $SD = 6.82$) reporting higher stress levels than males ($M = 29.66$, $SD = 7.37$). One-way ANOVAs were performed to examine the potential differences in study variables between different years and stages of the doctoral program. The results showed significant differences in program satisfaction in different years of the program, $F(4, 1946) = 11.05$, $p < .001$ (see Figure 4). Program satisfaction in the first-year doctoral students was significantly higher than third (M difference = 1.52, $SE = 0.52$, $p = .04$), fourth (M difference = 2.79, $SE = 0.55$, $p < .001$), and fifth year (M difference = 3.43, $SE = 0.60$, $p < .001$; the mean differences between other year of the program are reported in Table 2.

Table 2

Multiple Comparisons of Program Satisfaction

		Mean difference	*SE*	*p*
First year	Second year	1.18	0.51	.23
	Third year	1.52*	0.52	.04
	Fourth year	2.79**	0.55	.00
	Fifth year	3.43**	0.60	.00
Second year	First year	-1.18	0.51	.23
	Third year	0.34	0.51	1.00
	Fourth year	1.61*	0.53	.03
	Fifth year	2.24*	0.58	.001

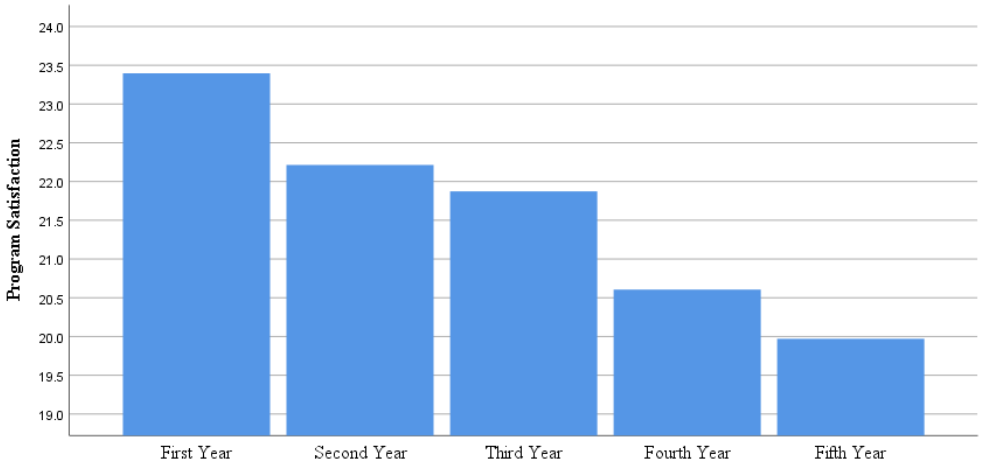
Third year	First year	-1.52*	0.52	.04
	Second year	-0.34	0.51	1.00
	Fourth year	1.27	0.54	.19
	Fifth year	1.90*	0.60	.01
Fourth year	First year	-2.79**	0.55	.00
	Second year	-1.61*	0.53	.03
	Third year	-1.27	0.54	.19
	Fifth year	0.64	0.61	1.00

Note. Number of students = 412 (first year), 468 (second year), 433 (third year), 368 (fourth year), 270 (fifth year).

* $p < 0.05$, ** $p < 0.001$.

Figure 4

Changes in Program Satisfaction in Different Years of the Program



Also, results showed significant differences in program satisfaction between the coursework stage and dissertation stage, $F(3, 2127) = 7.51$, $p < .001$, indicating that program satisfaction was significantly lower in the dissertation stage than in the coursework stage (*M* difference = 2.19, *SD* = 0.48). Pearson correlation coefficients were computed to assess the linear relationships between continuous variables. As shown in Table 3, anticipated perceived stress negatively correlated with emotional, social, and psychological well-being, and program satisfaction. Moreover, there was a positive correlation between stress and the intention to quit.

Table 3

Correlations Between Variables (n = 2486)

Variable	1	2	3	4	5	6
1. Stress	_					
2. Emotional well-being	-.57**	_				
3. Social well-being	-.46**	.60**	_			
4. Psychological well-being	-.55**	.71**	.65**	_		
5. Program satisfaction	-.41**	.41**	.37**	.38**	_	
6. Intention to quit	.38**	-.37**	-.27**	-.33**	-.59**	_

Note. * $p < 0.05$. ** $p < 0.001$.

Main Analyses

Our mediational analysis used structural equation modeling (SEM) in the R program to test the fit of the model shown in Figure 5. The model shows emotional, social, and psychological well-being as the mediators between perceived stress and program satisfaction. Also, program satisfaction mediates between emotional, social, and psychological well-being, and intention to quit. The model fit indices included the comparative fit index (CFI), Tucker–Lewis Index (TLI), and root mean square error of approximation (RMSEA). A comprehensive CFA analysis including all study measures showed an acceptable fit, $\chi^2 = 2544.68$, df = 449, $p <$ .001, CFI was 0.95, TLI was 0.94, SRMR was 0.04, and RMSEA was 0.05. Better model fit was indicated by higher CFI (values > 0.90 for adequate fit, >.95 for excellent fit) and TLI and lower RMSEA values (< 0.08 for adequate fit; < 0.06 for excellent fit).

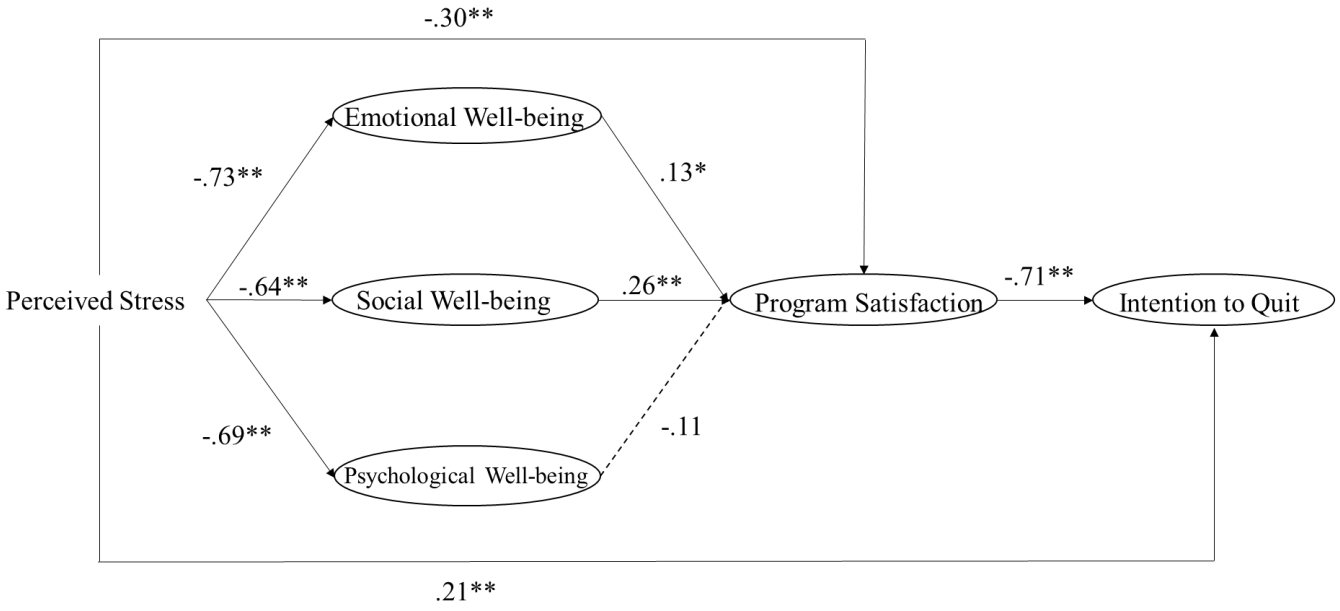
The SEM analysis of the mediational model is summarized in Figure 5. Indices of goodness-of-fit to the data were acceptable, $\chi^2 = 2490.807$, df = 450, $p < .001$, CFI was 0.95, TLI was 0.94, RMSEA was 0.05, and SRMR was 0.04. The results indicated that stress is negatively associated with emotional well-being (β = -.73, *SE* = 0.08, $p < .001$), social well-being (β = -.64, *SE* = 0.09, $p < .001$), and psychological well-being (β = -.69, *SE* = 0.08, $p <$ .001). Program satisfaction was positively predicted by emotional well-being (β = .13, *SE* = 0.10, $p = .03$), and social well-being (β = .26, *SE* = 0.13, $p = .006$). Program satisfaction was negatively associated with intention to quit (β = -.71, *SE* = 0.02, $p < .001$). Perceived stress had a significant positive direct association with the intention to quit (β = .21, *SE* = 0.05, $p < .001$) and a negative direct association with program satisfaction (β = -.30, *SE* = 0.13, $p < .001$).

Furthermore, the indirect path between perceived stress and program satisfaction through mediators, namely emotional, social, and psychological well-being were statistically

significant. The result of the indirect effect indicated that perceived stress had a negative impact on program satisfaction through emotional well-being (β = -.10, *SE* = 0.14, *p* = .032), and social well-being (β = -.17, *SE* = 0.19, *p* = .007). Additionally, the indirect effects of perceived stress on intention to quit mediating by emotional and social well-being and program satisfaction were statistically significant. As anticipated, perceived stress had a positive indirect effect on intention to quit by the path through emotional well-being and program satisfaction (β = .07, *SE* = 0.06, *p* = .032). Similarly, the result indicated the indirect positive effect of perceived stress on the intention to quit through the social well-being and program satisfaction path (β = .12, *SE* = 0.08, *p* = .007). Although psychological well-being did not mediate between study variables in the structural equation model it was not excluded from the theoretical model and had a significant total negative effect on program satisfaction (β = -.22, *SE* = 0.21, *p* = .001), and total positive effect on intention to quit (β = .16, *SE* = 0.10, *p* = .003).

Figure 5

Structural Equation Model



Note. Structural equation model with the standardized structural parameter estimates have been drawn on the path diagram to enhance interpretation of the results. The non-significant path from psychological well-being to program satisfaction is dashed. All other paths are statistically significant and shown with solid lines.

* $p < 0.05$, ** $p < 0.001$.

Discussion

The goals of the current study were twofold. The primary objective of this study was to capture the underlying factors contributing to students' decision to leave the program. To accomplish this goal, we examined the association between perceived stress and emotional, social, and psychological well-being among doctoral students. The second objective was to assess the relationship between these well-being variables of interest and program satisfaction and intention to quit. Hyun et al. (2006) found in their comprehensive study on graduate students that approximately half of the participants had experienced a stress-related problem in the past year, thereby underlining the prevalent mental health issues among this demographic. Their study further revealed a significant negative correlation between self-reported mental health needs and factors such as financial confidence, a functional relationship with one's advisor, regular contact with friends, and being married. This correlation implies that secure financial status, strong advisory relationships, regular social connections, and marital status may enhance students' emotional well-being and reduce stress levels. The intensity of the workload in doctoral programs increases the likelihood of experiencing distress (Levecque et al., 2017). In fact, doctoral students are twice as likely to struggle with mental health problems compared to other highly educated populations (Levecque et al., 2017). Contributing factors to these mental health issues include organizational policies, work-family interface, high job demands and

limited job control, the leadership style of supervisors, team decision-making culture, and perceptions of a career outside academia (Levecque et al., 2017). Given this research gap, our study aims to address this limitation by comprehensively investigating and analyzing all these variables in conjunction. By incorporating a multi-dimensional approach, we seek to provide a more nuanced understanding of the factors contributing to the well-being and academic experiences of doctoral students. Our study aims to test three hypotheses based on Lazarus and Folkman's (1984) transactional theory of stress and emotions, and Núñez-Regueiro's (2017) stress process model of school dropout.

Our study's findings, which substantiate Hypothesis One – predicting that perceived stress is negatively associated with emotional (i.e., Hedonic well-being), social, and psychological well-being (i.e., Eudaimonic well-being) in doctoral students, offer an expansive understanding of the complex implications of stress in the life of a doctoral student. This echoes the earlier work by Barry et al. (2018), wherein they highlighted the link between stress and lower mood, as well as emotional well-being, among doctoral students. The congruence between their work and ours underscore the pervasive nature of this issue in the academic community. In particular, Barry et al.'s research underscored how psychological distress, prevalent during doctoral training, can profoundly impact a student's well-being and extend their completion time. They noted expressions of sadness, loneliness, feelings of being overwhelmed, experiencing breakdowns, anxiety development, and excessive worry. These emotionally charged expressions vividly portray the profound psychological impact of stress. Within this same context, our findings reveal how perceived stress can significantly diminish doctoral students' emotional, social, and psychological well-being. The similarities in our results lend additional validity to our research, as the replication of results is critical in

establishing reliability in scientific research. More importantly, these findings underscore the urgent need for academic institutions to address this growing problem. These findings broaden the understanding of this issue by suggesting that stress in doctoral programs does not just lead to decreased emotional well-being and lower levels of social and psychological well-being. This underlines the broader, more comprehensive impact of stress in these academic settings and underscores the necessity for a holistic approach to mental health support for doctoral students.

The most significant finding from this study is that perceived stress directly and indirectly contributes to lower program satisfaction in doctoral students and to a stronger intention to quit, thus supporting Hypotheses Two and Three. This finding contributes depth to our understanding of how stress influences the experiences and decisions of doctoral students. Students enduring higher stress levels during their programs tend to express dissatisfaction and display an increased intention to drop out. This result aligns with the qualitative study by Barry et al. (2018), wherein most students explicitly reported that stress directly delayed their academic progress and ability to complete tasks. Even though we did not find that psychological well-being mediated the associations of stress with program satisfaction and intention to quit, other mediators, such as social and emotional well-being, were found to be significant mediators. This finding suggests stress-induced social and emotional challenges that, in turn, heighten the risk of doctoral student dropout. The results of this study thus reflect the impacts of the complexity and demand inherent in doctoral programs on students' mental health and their intentions to quit.

The results of our preliminary analyses showed that female students experienced more stress than males, which is in line with previous research that indicates that female doctoral students experience more stress and mental fatigue than their male counterparts (Brown &

Watson, 2010; Dahlin et al., 2005) due to financial instability, personal capacity doubts, and the challenge of navigating "*unwritten rules*" in academia (Appel & Dahlgren, 2003). The gender difference may be attributed to females facing more obstacles in balancing their personal lives with their professional development (Raddon, 2002). Furthermore, research has found gender differences in program satisfaction and the perception of support received from the supervisor (Harman, 2003). In terms of their overall course experience and the level and efficacy of supervision, female students were much more dissatisfied than male students (Harman, 2003).

Additionally, program satisfaction was significantly higher during the first year and coursework stage of the doctoral program than in later years. Program satisfaction in doctoral students in the fifth year and dissertation stage is significantly lower than first-year students. This is likely due to the structured nature of the coursework stage, where expectations are clearly defined, and students benefit from frequent interactions and feedback from faculty members and peers. The coursework stage enables students to develop a sense of competence (Ali & Kohun, 2006; Lovitts, 2002), contributing to their overall satisfaction. However, their satisfaction levels noticeably decline as students' progress to the later stages of their doctoral journey, especially by the fifth year or during the dissertation stage. According to Ali & Kohun (2006), this decline is likely due to the significant shift from structured coursework to the more independent and demanding dissertation process. As students transition into this "*new territory*" they face novel processes and procedures, which contrast significantly with their previous academic experiences (Ali & Kohun, 2006). Students are expected to develop new professional identities during the dissertation stage while undertaking independent research with less structured guidance (Offstein et al., 2004). Despite gaining independence, the reduced interaction with peers and faculty and the absence of regular feedback often lead to heightened

stress levels and a feeling of a lack of "*breathing space*" (Offstein et al., 2004). This shift towards a more solitary scholarly journey often challenges students, explaining the reported decrease in program satisfaction during the latter part of their doctoral program.

Limitations in the present study should be taken into consideration when interpreting these results. In this study, self-report questionnaires were used to measure perceived stress, persistence, and well-being. Future research should use observational, institutional, or physiological indicators to better examine objective measures of these important variables. Additionally, it should be emphasized that most participants (60.8 percent) were female, who reported more stress than males. A more equal gender distribution would have enabled the data to be analyzed on a stratified gender basis.

Additionally, the study findings may have been influenced by participants' stages of doctoral studies. Most (56.6 percent) were in the dissertation stage, when program satisfaction was significantly lower than during the coursework stage. Furthermore, it is important to mention that most doctoral dropouts occur during the first two years of the program; thus, it is likely that by the dissertation stage, students have already dropped out. Future research with comparable representation across doctorate program stages is needed to assess the generalizability of the study results for students at each level of their doctoral program. Moreover, the current study did not seek to establish causality between the study variables in a cross-sectional study; therefore, future research might examine the obstacles students face throughout their doctoral studies via a longitudinal study. Finally, we recognize that the participants in this research were Canadian students, which affects the generalizability of the findings given that doctoral programs' structure and protocols may vary by country.

Even though previous studies highlighted doctoral students' potential sources of stress such as financial stress (Nelson et al. 2001; El-Ghouroury et al. 2012; Myers et al. 2012), unfamiliarity with different stages of the program (Hopwood & Paulson, 2012; Nelson et al., 2001), new professional identity (Offstein et al., 2004), acculturation Berry, 2006), language proficiency (Duff, 2010), loneliness (Sawir et al., 2008), and isolation (John & Denicolo, 2013), the total effect of these stressors on doctoral student well-being remains unreported. Recent studies on doctoral students are mainly from qualitative data (Jackman et al., 2021), or focused on professional development in law or medicine students (Shapiro et al., 2000), and clinical training in psychology students (Pakenham & Stafford-Brown, 2012). This study provided insight into the association of stress with emotional and social well-being, program satisfaction, and students' intentions to quit doctoral training. Furthermore, these findings underscore the need for doctoral programs to actively assist students in completing their dissertations on time by enhancing supervisor training and establishing explicit expectation norms. Doctoral student well-being inevitably has consequences that affect the quality of their work and research productivity in the short term, as well as the quality of the academic community in the long term. Further research is needed to allow a deeper understanding of the underlying factors that impact doctoral student well-being.

Disclosure Statement

The authors report there are no competing interests to declare.

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Bridge to Chapter 3

Manuscript 1 focused on the subtle dynamics of stress and its diverse effects on doctoral students' emotional, social, and psychological well-being. Its key finding was an association of perceived stress with students' program satisfaction and intentions to quit, as well as the subtle function of emotional and social well-being as mediators. Furthermore, the study focused on gender differences in perceived stress, underlining the need to design support methods to meet these individual demands. Furthermore, tracking the progression of program satisfaction throughout the academic journey provided a clear picture of the differences in doctoral student experiences, arguing for stage-specific support programs.

Manuscript 2 describes a study that narrows the attention to identifying the fundamental factors that influence doctoral student degree progression. The research sheds light on the importance of financial assistance and supervisor support by drawing on a large dataset from the Canadian Graduate and Professional Student Survey. The results reported in Manuscript 2 reinforce the critical relevance of supervisor support in dictating several aspects of academic achievement, ranging from general and program satisfaction to social involvement. The research discusses the crucial function of connections, such as the tie between supervisors and students, in forming a doctoral students' experience, emphasizing the importance of the emotional and social components described in the first paper.

Furthermore, Manuscript 2 enriches the conversation by revealing the linked dynamics of financial assistance, student happiness, and social involvement. It emphasizes the indirect impact of financial support, particularly in the form of research assistantships, on productivity as mediated through social involvement. This not only aligns with the debates in Manuscript 1

on social well-being but also broadens the subject to include institutional decision-making about financial resource allocation.

In summary, while Manuscript 1 provides an analytical perspective encompassing the doctoral student's journey's stress, emotional, and social aspects, Manuscript 2 refines this knowledge by embedding it in the practical domains of financial and supervisory assistance.

Chapter 3

Manuscript 2: Satisfaction, Research Productivity, and Socialization in Doctoral Students: Do Teaching Assistantship, Research Assistantship, and the Advisory Relationship Play a Role?

Feizi, S., & Elgar, F. (2023). Satisfaction, research productivity, and socialization in doctoral students: Do teaching assistantship, research assistantship and advisory relationship play a role? *Heliyon*, 9(9). https://doi.org/10.1016/j.heliyon.2023.e19332

Abstract

Funding to doctoral students in the form of research and teaching assistantships help students become independent scholars and complete their programs. Insufficient funding, unforeseen financial obligations, and debt can discourage students from completing their programs in a timely fashion. However, supervisors may play an influential role in supporting doctoral student socialization and growth towards research autonomy. Girves and Wemmerus's (1988) Graduate Student Degree Progress theoretical model claimed that financial assistance and students' perceptions of faculty support are key predictors of doctoral students' progress. They also proposed that students' satisfaction with their department, sense of isolation, and engagement in their programs may explain (or mediate) these associations. The aim of this study was to investigate how supervisor support and financial assistance influence doctoral students' satisfaction with their programs as well as their academic and social engagement. Using data from the Canadian Graduate and Professional Student Survey (n =18,822 doctoral students), we evaluated a model of doctoral student productivity (i.e., publications and conference presentations) with teaching and research assistantships as key predictors and student satisfaction as mediators. We also examined how supervisor support and financial assistance relate to students' academic and social life. The results showed that teaching assistantships are negatively associated with general satisfaction ($\beta = -0.15$, $SE = 0.03$, $p < 0.001$) and program satisfaction ($\beta = -0.12$, $SE = 0.02$, $p = 0.001$) but positively associated with social involvement ($\beta = 0.29$, $SE = 0.01$, $p < 0.001$). Supervisor support was positively associated with doctoral students' general satisfaction ($\beta = 0.50$, $SE = 0.05$, $p < 0.001$), program satisfaction ($\beta = 0.59$, $SE = 0.04$, $p < 0.001$), and social involvement ($\beta = 0.15$, $SE = 0.02$, $p < 0.001$). The findings

support Girves and Wemmerus's theory and highlight the importance of faculty support to doctoral student success. (298/300)

Keywords: student financial aid, productivity, supervisor support, satisfaction, social involvement, doctoral students

Highlights

- Doctoral students with more financial aid graduate and conduct more research.
- Research assistantships positively predict socialization, presentation, and publication.
- Teaching assistantships negatively predict satisfaction in doctoral students.
- The supervisory relationship influences doctoral students' mental health.
- Doctoral supervisors positively influence student satisfaction and socialization.

Introduction

Inadequate financial support is a major contributor to student dropout from doctoral programs. Student funding comes in different forms, including internal awards from departments in the form of research and teaching assistantship positions and external awards from provincial, federal, and international councils. While doctoral students with better financial support are more likely to graduate [1, 2, 3], and conduct more research [4], many federal and provincial grants and loans are unavailable to graduate students. Changes to funding policies, rising tuition fees, and availability of bank loans all contribute to doctoral student attrition because they have made doctoral studies more accessible and more expensive at the same time [5]. Tuition and fees are major expenses for many doctoral students [6]. The rising cost of graduate education causes financial stress and negatively affects doctoral students' focus and efficiency in completing their program [7, 8, 9, 2, 10].

Most doctoral programs financially support doctoral students through part-time teaching, and research assistantship positions, but there are considerable differences between disciplines in the generosity of these awards [11]. These offerings are sometimes mandatory and teach students how to construct a course and deliver a lecture [12]. However, teaching and research assistantships are mainly designed to fulfill departmental needs instead of enhancing doctoral training [13]. Similar to the Graduate Student Degree Progress theoretical model [14], studies found that research and teaching assistantship positions facilitate social connections among doctoral students [15, 16] and with the faculty and staff in their departments [17, 18] and reduce the need to seek outside employment.

Research has also found that types of funding affect doctoral students differently. Zhou and Okahana [19] found that research assistantships predicted shorter times-to-degree while

teaching assistantships negatively predicted time-to-degree. However, the effects of funding sources could also differ between disciplines and programs. For example, STEM doctoral programs with more faculty members with grants and awards were more likely to have higher completion rates than non-STEM programs [19]. Furthermore, students in social sciences, education, and humanities who had larger graduate loans have a shorter time-to-degree than non-borrowers [20]. The student's stage of doctoral studies is another factor that should be considered because the availability of funding support changes over the course of the program. A study by Sowell et al. [21] showed that doctoral students experienced more financial problems when they entered the candidacy stage because most fellowships are restricted to students in the first three years of the program.

Financial strain is a significant barrier to doctoral student completion [3, 10, 22] and predicts dropout [8, 16, 23]. Financial support, on the other hand, has positive effects on doctoral students' retention, improves the likelihood of degree completion [15, 16, 21], and reduces time to completion [19, 20]. The benefits of funding support are not limited to doctoral retention and shorter times to completion. Research funding is also associated with students' productivity and scientific impact. A study by Larivière [3] revealed that funded students had approximately 25% more publications than unfunded doctoral students. Moreover, the type of assistantship affects how students integrate with their faculties [24]. Doctoral students who receive teaching and research assistantships spend more on campus and interact more with faculty members and peers compared to students who do not receive this support [24]. In other words, financial support to doctoral students facilitates opportunities to socialize in their departments [17, 25].

Although published studies to date have focused on graduate students' retention, there is a lack of research on the relative importance of different sources of financial support on graduate students' persistence in their programs.

Supervisor Support

Supervisors have a powerful influence on doctoral student socialization [24]. They shape and structure the learning experience for students [24, 26] and directly and indirectly foster a culture for doctoral students to transition to research autonomy [26]. They are the principle factor that determines student collaboration and involvement in different research opportunities [25, 27]. Since students experience various psychological stressors and mental health challenges at each stage of a doctoral program, the student-supervisor relationship can be critical throughout these stages [7, 24]. Supervisors can buffer the stress of graduate school and facilitate the socialization process, especially when students lack interaction with other faculty members and peers [15, 28]. Therefore, having a positive relationship with supervisors carries great importance for students because it affects various opportunities to integrate academically [25, 29].

Supervisors also influence students' satisfaction with their program [7], writing efficacy [30], mental health [31], well-being [32], research self-efficacy [33], and persistence [34, 35]. Supervisors influence students' understanding of graduate school and its requirements, selection of dissertation topics, and future career opportunities [24]. According to McAlpine and McKinnon [32], more than 50% of students rely on their supervisors as primary resources on all academic matters—not only research projects. Therefore, finding a supportive supervisor is crucial for new doctoral students.

Good supervisors support students in meeting degree requirements and departmental deadlines and preparing for qualifying exams [34]. Qualitative studies show that the supervisory relationship strongly influences doctoral students' emotions [32]. An unsatisfactory relationship between supervisor and advisee contributes to student dropout [24, 32]. Indeed, students' perceptions of their interactions with faculty supervisors affect their feelings of connectedness and belongingness [36] and help them perform academically better than students who lack these feelings of connectedness and belongingness [37].

Students value the quality of support, feedback, level of trust, and communication in their relationship with their supervisors [36]. This support can be emotional, informational, or practical and can be assessed with respect to actual support received or perceived support one believes to be available. All these types of support promote student well-being [38] and contribute to a better supervisory relationship and improved educational experiences [39]. Most doctoral students expect their supervisors to be open with them about disciplinary norms, value the pursuit of knowledge, and define what it means to be successful [25].

Numerous studies have examined the characteristics of doctoral supervisors and described important characteristics to look for when selecting a supervisor [40, 41, 42]. These qualities include reputation in research, the convergence of interest, and being time-conscious [40, 42], a good communicator [36, 40, 43], and supportive [39]. Ray and Marakas [40] ranked ten criteria for supervisor selection: a) committed and involved in graduate education, b) able to defend and support the student in contentious situations, c) has a strong scholarly reputation, d) is time conscious, e) shares research interests with the student, f) willing to support the student's career development, g) flexible about using alternative approaches in research, h) warm interpersonal style, i) has a large network of collaborators within and outside the program, and

j) has a record of successfully supervising doctoral students. Similarly, Rose [41] described communication skills ("My ideal mentor would communicate openly, clearly, and effectively") and the provision of feedback ("My ideal mentor would provide honest feedback; both good and bad, about my work") as the two main characteristics of an "ideal mentor." Moreover, in a second study by Rose [41], integrity, guidance, and relationship were defined as three dimensions of an ideal mentor.

Doctoral students' mental health is substantially impacted by their supervisory relationship [44]. Given the central role of the supervisor in doctoral students' academic life, it is not surprising that perceptions of an unsatisfactory student-supervisor relationship contribute to doctoral student depression [44]. Several studies cited the supervisor as the primary determinant of students' academic progress. However, effective doctoral supervision consists of academic and personal support and can result in less anxiety and depression for students [31]; there exists a notable gap in research on the impact of supervisor support on the psychological well-being and satisfaction of doctoral students. Therefore, more research is needed to give insight into the impacts of both financial support and the supervisory relationship on doctoral students' well-being.

To summarize, considering the high dropout rate of doctoral students and the abovementioned research on the determinants of student attrition, knowledge about the importance of different types of financial support in doctoral students' social life and their effects on the attrition of doctoral students is needed. Previous research also suggests that investments in financial aid should keep pace with increasing educational expenses to minimize financial pressure and remove financial barriers to program completion. Using data on a large

sample of graduate students in Canada, this study tested three hypotheses based on Girves and Wemmerus's [14] *doctoral student degree progress theoretical model*:

Hypothesis 1. Financial support is positively related to program satisfaction, general satisfaction, and social involvement.

Hypothesis 2. Supervisor support relates to higher program satisfaction, general satisfaction, and social involvement.

Hypothesis 3. Program satisfaction, general satisfaction, and social involvement mediate the associations of supervisor support and financial support with research productivity.

Methods

Present Study

Girves and Wemmerus [14] *doctoral student degree progress theoretical model* identifies financial support and students' perceptions of faculty support as key predictors of doctoral students' progress. They also suggest that these links are explained (or mediated) by student satisfaction with the department, student isolation, and student involvement in the program. We examined doctoral student progress (measured in research publications and presentations) using data from the Canadian Graduate and Professional Student Survey (CGPSS). Specifically, we tested a model that identifies teaching and research assistantships as financial supports, recognizes general satisfaction, program satisfaction, and social involvement as mediators, and the number of publications and presentations as progress (Figure 1). The aim of the study was to examine how the academic and social lives of doctoral students in Canada are related to supervisor support and financial support.

Figure 1

Hypotheses Model of the Study

Note. Hypotheses of the Study Based on the Graduate Student Degree Progress Theoretical Model by Girves, J. E., & Wemmerus, V. (1988)

Participants

The 2016 survey cycle of the CGPSS provided the data for this study. The CGPSS is an ongoing cross-sectional survey of graduate students administered by the Canadian Association of Graduate Studies (https://cags.ca/cgpss). While the initial sample of the CGPSS data included doctoral students (34.5%), master's research students (MA Research; 32.4%), and master's professional students (MA Professional; 33.1%), only doctoral students were included in the current study. The sample included 18822 doctoral students from 53 universities across Canada surveyed in 2016.

Doctoral students were asked to specify the current stage of their program, and 27.1% reported being in the coursework stage, 18.2% completed their coursework, 25.8% were in the comprehensive examination stage, 24.9% were in the dissertation stage, and 3.9% had defended

their dissertation. The sample was composed of 53.1% of female students and 46.9% male students. The majority (78.2%) chose English as their first language, and the rest (21.8 %) stated that French was their primary language. Relationship status was 32.6% not married, 35.8% married, and 14.8% living with partners. Whereas 46.8% mentioned that their primary reason for starting the doctoral program is a career in academia, 20% were not interested in working in academia, and 28% stated that they chose a doctoral program to satisfy their needs in their field. In terms of the year of study, 18% of participants were in the first year of the program, 20.1% in the second year, 20.2% in the third year, 17.3% in the fourth year, 13.4% in the fifth year, and 10.9% in the sixth year or above.

Independent Variables

Financial support

Students were asked to specify if they had received any graduate research assistantship or graduate teaching assistantship during their program. Nearly half of the students reported they had not received a university fellowship (57.4%). A minority indicated that they received financial support through teaching assistantships (38.7%) and research assistantships (49.6%).

Supervisor support

The survey used a 14-item scale that measured supervisor support in a variety of mentoring activities. Response options ranged from 1 = *strongly disagree* to 4 = *strongly agree* ($\alpha = 0.96$; $M = 46.67$, $SD = 8.96$). Scale items assessed different aspects like writing support (e.g., “My advisor was very helpful to me in writing a dissertation prospectus or proposal”), as well as availability (e.g., “My advisor was available for regular meeting”, “My advisor returned my work promptly”).

Dependent Variables

Presentation and publication progress

We assessed doctoral students' productivity and progress in doing research using three items that measured the frequency of presentations and publications (e.g., the number of occurrences of "Deliver any papers or present a poster at national scholarly meetings" and "Published as sole or first author in a refereed journal"). Responses ranged from 0 = *zero time* to 4 = *more than four times* was used to measure; $\alpha = 0.71$ $M = 3.14$, $SD = 3.14$).

Mediators Factors

Social involvement

The frequency of attending social activities on campus was used to measure doctoral students' social involvement (i.e., social life). A 4-item scale ranging from 1 = *never* to 3= *frequently* measured the number of social activities attendances (e.g., "Organized social activities within your advisor/research group"; $\alpha = 0.75$; $M = 7.70$, $SD = 1.98$).

General satisfaction

To evaluate general satisfaction, a 5-item scale ranging from 1 = *definitely not* to 5 = *definitely,* was used to measure whether or not a doctoral student would choose to start over the program (e.g., "If you were to start your graduate/professional career again, would you select the same field of study"; $\alpha = 0.75$; $M = 19.70$, $SD = 3.83$).

Satisfaction with the program

The quality of the coursework, interaction, and satisfaction with the program was assessed by a 13-item scale ranging from 1 = *poor* to 5 = *excellent* (e.g., "Overall quality of graduate level teaching by faculty", "Quality of advising and guidance"; $\alpha = 0.90$, $M = 44.73$, $SD = 9.76$).

Data Analysis

RStudio version 4.1.2 was used for data management and analysis. Correlational analyses were conducted on all continuous variables, including supervisor support, general satisfaction, program satisfaction, social involvement, and progress. One-way analyses of variances (ANOVAs) were utilized to explore potential gender differences in the measured variables. Structural equation modeling (SEM) was used to examine whether general satisfaction, program satisfaction, and social involvement mediated the relationship between teaching and research assistantship and progress (i.e., publications and presentations) as well as the relationship between supervisor support and progress.

Results

Preliminary Analyses

For descriptive purposes, we used one-way ANOVAs to identify gender differences in the measured variables. There were significant gender differences in program satisfaction $F(1, 16230) = 29.43$, $p < 0.001$, supervisor support $F(1, 15390) = 59.05$, $p < 0.001$, social involvement $F(1, 14629) = 79.16$, $p < 0.001$ with males reporting more program satisfaction ($M = 44.99$, $SD = 9.94$), better supervisor support ($M = 3.37$, $SD = 0.61$), and better social involvement ($M = 1.99$, $SD = 0.48$), than female students ($M = 44.15$, $SD = 9.71$; $M = 3.29$, $SD = 0.65$; $M = 1.92$, $SD = 0.48$ respectively).

Correlational analyses were conducted of continuous variables (Table 1). Anticipated supervisor support was strongly and positively correlated with general satisfaction $r(16{,}223) = 0.49$, $p < .001$, satisfaction with program $r(16{,}219) = 0.47$, $p < .001$, and social involvement $r(14{,}093) = 0.18$, $p < .001$. However, supervisor support was only weakly correlated with progress $r(16{,}123) = 0.10$, $p < .001$.

Table 1

Correlations Between Variables (n = 18,822)

	1.	2.	3.	4.	5.
Supervisor support	_				
General Satisfaction	0.49**	_			
Program satisfaction	0.47**	0.64**	_		
Social involvement	0.18**	0.17**	0.19**	_	
Progress	0.10*	-0.02**	0.001	0.12**	_

Note. * $p < 0.05$. ** $p < 0.001$.

Factor analysis and reliability

Following the preliminary analysis, an initial principal component analysis with Oblimin rotation identified a 6-factor solution based on the eigenvalue greater than 1 criterion [45]. In order for factors to be considered important, one factor was removed that had items less than |0.4| (meaning ≥ +.4 or ≤ –.4) [46]. Therefore, factor analysis was conducted again with the extraction method changed to fixed five factors. The Kaiser–Meyer–Olkin MSA was 0.959. The five dimensions explained a total of 59.27 per cent of the variance among the items in the study. Bartlett's Test of sphericity proved to be significant ($p < .001$).

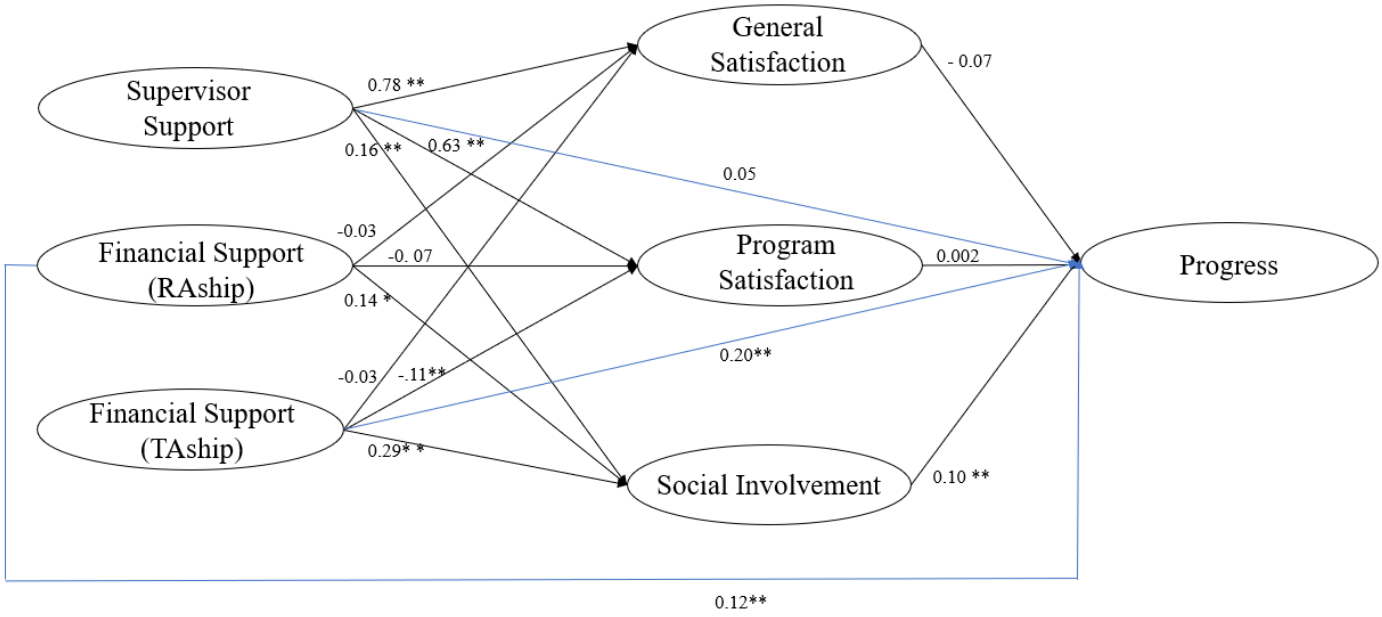
Five constructs (i.e., advisor support, general satisfaction, program satisfaction, social involvement, and progress), and two single items measuring teaching and research assistantship were included in the structural equation modelling. The model fit indices were included the comparative fit index (CFI), Tucker–Lewis Index (TLI), and root mean square error of approximation (RMSEA). A comprehensive CFA analysis including all study measures showed an acceptable fit of the data, $\chi^2 = 7261.65$, df = 741, $p < 0.001$, CFI was 0.95, TLI was 0.95, SRMR was 0.04 and RMSEA was 0.04 (See Appendix A).

Structural Equation Modelling

Our mediational analysis used SEM to test the fit of the model shown in Figure 2. The model shows general satisfaction, satisfaction with the program, and social involvement as mediators between supervisor support, research assistantship, teaching assistantship, and publications and presentations. Indices of goodness-of-fit to the data were acceptable, χ^2 = 4228.895, df = 748, $p < .001$, CFI was 0.95, TLI was 0.94, RMSEA was 0.04, and SRMR was 0.04. Supervisor support was the strongest direct predictor of general satisfaction and satisfaction with the program and was positively associated with general satisfaction (β = 0.78, *SE* = 0.07, $p < 0.001$), program satisfaction (β = 0.63, *SE* = 0.03, $p < 0.001$), and social involvement (β = 0.16, *SE* = 0.02, $p < 0.001$). Moreover, supervisor support indirectly predicted presentations and publications (progress) through social involvement, β = 0.02, *SE* = 0.00, $p <$. 001.Teaching assistantships negatively associated with satisfaction with the program (β = -0.11, *SE* = 0.04, $p = 0.001$), but positively predicted social involvement (β = 0.29, *SE* = 0.05, $p <$ 0.001). The results of indirect analyses suggest a positive association between teaching assistantships and progress mediated by social involvement, β = 0.03, *SE* = 0.01, $p = 0.001$. Research assistantships positively predicted social involvement (β = 0.14, *SE* = 0.04, $p = 0.002$). Also, holding research assistantships was indirectly associated with presentations and publications (progress), mediated by social involvement, β = 0.01, *SE* = 0.01, $p = 0.013$.

Figure 2

Structural Equation Model



Note. Structural equation model showing general satisfaction, satisfaction with the program, and social involvement as the mediators between supervisor support, research assistantship, teaching assistantship, and presentations and publications (progress). Standardized coefficients are shown on each path.

* $p < 0.05$, ** $p < 0.001$.

Discussion

Financial support is critical for many doctoral students to manage the financial burden of higher education, and financial strain has been shown to be a significant stressor for students [10]. Sufficient funding not only allows students to focus on their program requirements and experience shorter trajectory time to degree but also relieves students from the stress of financing their education [23]. In addition to financial support, the role of supervisor support in doctoral students' completion and satisfaction has also been established in previous research

[47]. The supervisory relationship is a central aspect of doctoral students' academic life, and perceptions of an unsatisfactory student-supervisor relationship contribute to doctoral student stress, and emotional exhaustion [48]. Our study aimed to test three hypotheses based on Girves and Wemmerus's [14] Graduate Student Degree Progress theoretical model and that explore the relationship between financial support (i.e., research and teaching assistantship), supervisor support, and research productivity mediated by satisfaction (i.e., general and program satisfaction) and social involvement.

Our results are consistent with previous studies which show that socialization in doctoral students is positively influenced by research and teaching assistantship positions [15, 16]. Financial support provides students with the means to attend departmental events, conferences, and workshops, which can create opportunities for networking and socializing with other students and faculty members. These activities help students feel more connected to their academic community and reduce feelings of isolation [49]. Financial support for doctoral students facilitates opportunities for socialization within their departments [17, 25]. The study results show that financial support for doctoral students facilitates opportunities for social involvement. However, teaching and research assistantships differ in their links to program satisfaction and general satisfaction, probably due to the fact that teaching assistantships divert time and other resources away from students' research and degree completion, especially during the dissertation stage [9, 15]. As a result, this may explain why teaching assistantships lead to decreased general and program satisfaction among doctoral students who receive them.

The results also show that supervisors have significant influence on their doctoral students' general satisfaction, program satisfaction, and social involvement. Supervisors affect their students' academic progress both directly and indirectly by improving students' well-

being. These results also highlight the importance of fostering effective and collaborative relationships between supervisors and students. Supervisors foster a culture beneficial to doctoral students to help them achieve research autonomy [26]. They are the primary determinant of student collaboration and participation in various types of research [25]. Without proper communication, mutual goals, and academic and personal support, students are more prone to mental health issues that could result in performance declines and program withdrawal. Thus, maintaining a strong relationship with supervisors is critical for students since it influences several opportunities for academic integration [25]. These findings encourage students, supervisors, and faculty to initiate better relationships to help doctoral students manage the intense workload and eliminate the lack of socialization experienced during their doctoral training to more effectively dedicate their time to research and persist confidently.

The most significant finding from this study is that supervisor support has a greater association with mediators such as general satisfaction and program satisfaction, compared to the other two predictors, teaching and research assistantship. Supervisors have an impact on students' perceptions of graduate school and its requirements, dissertation subject selection and quality, and future career opportunities [24]. Supervisors also have an effect on how satisfied students are with their program [42]. Consistent with previous research, we found support for hypothesis two— that a greater degree of support from supervisors may significantly boost doctoral student program satisfaction, general satisfaction with life, and social involvement.

Finally, hypothesis three stated that program satisfaction, general satisfaction, and social involvement mediate the associations of supervisor support and financial support with research productivity. The third hypothesis was not entirely supported. General and program satisfaction were not identified as significant mediators of the relationship between supervisor and financial

support and research productivity. However, we did find that social involvement mediated the relationship between research assistantship and academic achievement among doctoral students. Increased financial assistance for students in the form of research assistantships resulted in increased social involvement and, consequently, more productivity.

Strengths and Limitations

The strengths of the study include a large sample of 18,822 doctoral students, which provided a comprehensive understanding of the factors that influence doctoral student achievement. Additionally, this study evaluated a model of student productivity that included both social and structural factors. This model provides a comprehensive understanding of the factors that contribute to doctoral student success. The findings have practical implications for graduate education by providing insights into the determinants of doctoral student success and thereby informing efforts to support graduate studies.

Limitations of the study should also be taken into consideration when interpreting these results. The response rate to the CGPSS survey was also relatively low (32.3 percent), and the study relied on self-report questionnaires to assess supervisor support, social involvement, program satisfaction, and general satisfaction. The survey questionnaire omitted mental health assessments; consequently, this study did not include issues such as depression, anxiety, and stress. It should be noted that even though the organizational context of departmental and supervisor supports influence the process of socialization and psychological well-being, the institution-level characteristics were not measured in the study survey. In addition, well-being greatly influences research productivity and teaching and ultimately the quality of higher education [50].

Further research is needed to further investigate how supervisor and financial support influence doctoral students' psychological well-being. More evidence on the consequences of other forms of financial support, such as scholarships and loans, is also needed. In addition to supervisor support and financial support, it would be interesting to study the function of social support networks, such as peer support groups and counseling services, in promoting doctoral students' well-being and academic achievement. In addition, future research might study the influence of these variables on the career outcomes of doctoral students, such as employment opportunities and job satisfaction. Overall, this is an important area of research that supports efforts to optimize performance and well-being of doctoral students.

Conclusion

The pathway to receive scholarships, like becoming a doctoral student, is competitive and based on academic merit, a high-quality research proposal, and leadership experience [51]. Doctoral students surveyed in the study by Nettles and Millett [52], reported that 44% were offered research assistantships, 60 % were offered teaching assistantships, and 48 % were offered fellowships. Fellowships are counted as the "top prize because they often cover all student expenses and ordinarily come with no work requirements. Research and teaching assistantships, however, which often require students to work with faculty on research projects or instructional activities, can be most valuable for their associations and the apprenticeships they provide to students in preparation for professional careers" (48, p. 74). We found that doctoral students with teaching and research assistantship support will experience less satisfaction with their programs and less desire to start over the same program. According to Lovitts [24], the attrition rates of students who held teaching assistantships and research

assistantships were 24 and 17 percent, respectively. This might explain that lower satisfaction leads students to leave the doctoral program.

Our findings suggest that financial support could improve doctoral students' social and academic lives. Financial aid in the form of assistantships allows doctoral students to be more involved in academic tasks with their peers and faculty members, which is critical in doctoral student retention [20, 53]. One of the responsibilities of graduate deans is to allocate financial resources to their students [24]. The type and amount of funding vary between disciplines [3] and as shown in this study, have different effects on student outcomes. Therefore, financial aid and other departmental and institutional policies and practices should be carefully evaluated in their efficacy in improving doctoral students' lives.

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Supplementary Materials

Canadian Graduate and Professional Student Survey

Prepared for:

NATIONAL DATA - ALL CANADA

Supervisor support

The survey used a 14-item scale that measured supervisor support in a variety of mentoring activities. Response options ranged from 1 = *strongly disagree* to 4 = *strongly agree. For each of the following statements, indicate the extent that it DESCRIBES THE BEHAVIOUR of your advisor.*

1. My advisor was knowledgeable about formal degree requirements
2. My advisor served as my advocate when necessary
3. My advisor gave me constructive feedback on my work
4. My advisor returned my work promptly
5. My advisor promoted my professional development
6. My advisor overall, performed the role well
7. My advisor was available for regular meetings
8. My advisor was very helpful to me in preparing for written qualifying exams
9. My advisor was very helpful to me in preparing for the oral qualifying exam
10. My advisor was very helpful to me in selecting a dissertation topic
11. My advisor was very helpful to me in writing a dissertation prospectus or proposal
12. My advisor was very helpful to me in writing the dissertation
13. My advisor was very helpful to me in selecting the dissertation committee
14. My advisor encouraged discussions about the current job market and various career prospects

Financial support

Students were asked to specify if they had received any graduate research assistantship or graduate teaching assistantship during their program.

Social involvement (social life)

The frequency of attending social activities on campus was used to measure doctoral students' social life. A 4-item scale ranging from 1 = *never* to 3= *frequently* measured the number of social activities attendances.

1. University-wide social activities
2. Social activities within your department
3. Social activities within your advisor/research group
4. Social activities within your residence

General satisfaction

To evaluate general satisfaction, a 5-item scale ranging from 1 = *definitely not* to 5 = *definitely,* was used to measure whether or not a doctoral student would choose to start over the program.

1. If you were to start your graduate/ professional career again, would you select this same university?
2. If you were to start your graduate/ professional career again, would you select the same field of study?
3. Would you recommend this university to someone considering your program?
4. Would you recommend this university to someone in another field?
5. If you were to start your graduate career again, would you select the same faculty supervisor?

Satisfaction with the program

The quality of the coursework, interaction, and satisfaction with the program was assessed by a 13-item scale ranging from 1 = *poor* to 5 = *excellent.* Please rate the following dimensions of your program.

1. The intellectual quality of the faculty
2. The intellectual quality of my fellow students
3. The relationship between faculty and graduate students
4. Overall quality of graduate level teaching by faculty
5. Advice on the availability of financial support
6. Quality of academic advising and guidance
7. Helpfulness of staff members in my program
8. Availability of area courses I needed to complete my program
9. Relationship of program content to my research/professional goals
10. Opportunities for student collaboration or teamwork
11. Opportunities to take coursework outside my own department
12. Opportunities to engage in interdisciplinary work
13. Amount of coursework

Presentation and publication progress

We assessed doctoral students' productivity and progress in doing research using six items that measured the frequency of presentations and publications (e.g., the number of occurrences of "Deliver any papers or present a poster at national scholarly meetings" and "Published as sole or first author in a refereed journal"). Responses ranged from 0 = *zero time* to 4 = *more than four times* was used to measure.

1. Deliver any papers or present a poster at national scholarly meetings
2. Co-authored in refereed journals with your program faculty
3. Seminars/colloquia at which students present their research
4. Published as sole or first author in a refereed journal
5. Departmental funding for students to attend national or regional meetings
6. Attending national scholarly meetings

Appendix A

Measurement Model

The measurement model included latent variables for *General Satisfaction, Program Satisfaction, Social involvement, Presentation and Publication, and Supervisor Support*. The CFA was performed using the lavaan package in R, with maximum likelihood (ML) estimation and NLMINB optimization method. The analysis used data from 5680 participants.

The results of the CFA showed good model fit, with a significant chi-square test statistic of 7261.655, indicating that the model fits the data well. The comparative fit index (CFI) and the Tucker-Lewis index (TLI) were both above the recommended threshold of 0.90, with values of 0.952 and 0.947, respectively, indicating good model fit. The root mean square error of approximation (RMSEA) was 0.042, with a 90% confidence interval ranging from 0.041 to 0.043. The p-value for RMSEA, being less than or equal to 0.05 was 1.000, indicating a good model fit. The standardized root mean square residual (SRMR) was 0.045, also below the recommended threshold of 0.08, indicating a good model fit.

The CFA results (See Table 1) suggest that the measurement model of the data's latent variables has a good fit, indicating that the survey items measure the intended constructs well (See Table 2). These results provide support for the use of the CGPSS survey as a valid measure of the constructs of interest. However, caution should be exercised in generalizing the results to other populations or contexts.

Table 1

Results of Confirmatory Factor Analysis

Estimator	ML
Optimization method	NLMINB
Number of model parameters	116
Used observations	5680
Total observations	207101
Model Test User Model	
Test statistic	7261.655
Degrees of freedom	664
P-value (Chi-square)	0.000
Model Test Baseline Model	
Test statistic	138523.634
Degrees of freedom	741
P-value	0.000
User Model versus Baseline Model	
Comparative Fit Index (CFI)	0.952
Tucker-Lewis Index (TLI)	0.947
Loglikelihood and Information Criteria	
Loglikelihood user model (H0)	-221224.831
Loglikelihood unrestricted model (H1)	NA
Akaike (AIC)	442681.663
Bayesian (BIC)	443452.449
Sample-size adjusted Bayesian (BIC)	443083.835
Root Mean Square Error of Approximation	
RMSEA	0.042
90% CI (lower)	0.041
90% CI (upper)	0.043
P-value RMSEA <= 0.05	1.000
Standardized Root Mean Square Residual	
SRMR	0.045

Table 2

Latent Variables						
	Estimate	Std.Err	z-value	P(>|z|)	Std.lv	Std.all
General Satisfaction						

General Satisfaction V1	1.000				0.687	0.671
General Satisfaction V2	0.515	0.024	21.288	0.000	0.354	0.362
General Satisfaction V3	1.010	0.020	51.305	0.000	0.693	0.690
General Satisfaction V4	0.596	0.020	29.734	0.000	0.409	0.438
General Satisfaction V5	.417	0.034	41.866	0.000	0.973	0.872
Program Satisfaction						
Program Satisfaction V1	1.000				0.596	0.699
Program Satisfaction V2	0.884	0.018	48.827	0.000	0.527	0.591
Program Satisfaction V3	1.344	0.025	53.951	0.000	0.802	0.775
Program Satisfaction V4	1.284	0.021	61.038	0.000	0.765	0.783
Program Satisfaction V5	1.217	0.028	42.963	0.000	0.726	0.611
Program Satisfaction V6	1.422	0.027	52.728	0.000	0.848	0.758
Program Satisfaction V7	1.134	0.025	45.687	0.000	0.676	0.651
Program Satisfaction V8	1.260	0.028	44.757	0.000	0.751	0.637
Program Satisfaction V9	1.286	0.025	50.525	0.000	0.767	0.723
Program Satisfaction V10	1.269	0.027	46.909	0.000	0.756	0.668
Program Satisfaction V11	1.016	0.027	37.314	0.000	0.605	0.528
Program Satisfaction V12	1.130	0.027	41.371	0.000	0.673	0.587
Program Satisfaction V13	0.978	0.022	44.532	0.000	0.583	0.632
Social Involvement						
Social Involvement V1	1.000				0.379	0.645
Social Involvement V2	1.173	0.037	32.109	0.000	0.444	0.711
Social Involvement V3	1.364	0.040	33.867	0.000	0.516	0.759
Social Involvement V4	1.081	0.036	29.715	0.000	0.409	0.563
Presentation and Publication (Progress)						
Progress V1	1.000				0.901	0.607

Progress V2	1.135	0.028	40.161	0.000	1.023	0.822
Progress V3	0.952	0.023	40.670	0.000	0.857	0.785
Supervisor Support						
Supervisor Support V1	1.000				0.408	0.647
Supervisor Support V2	1.251	0.024	51.967	0.000	0.511	0.791
Supervisor Support V3	1.357	0.025	54.012	0.000	0.554	0.832
Supervisor Support V4	1.385	0.028	49.277	0.000	0.566	0.740
Supervisor Support V5	1.464	0.028	53.209	0.000	0.598	0.815
Supervisor Support V6	1.516	0.027	56.697	0.000	0.619	0.885
Supervisor Support V7	1.217	0.025	48.430	0.000	0.497	0.725
Supervisor Support V8	1.560	0.029	53.675	0.000	0.637	0.823
Supervisor Support V9	1.527	0.029	53.084	0.000	0.624	0.811
Supervisor Support V10	1.415	0.027	52.049	0.000	0.578	0.793
Supervisor Support V11	1.509	0.028	53.983	0.000	0.616	0.829
Supervisor Support V12	1.561	0.028	55.174	0.000	0.637	0.853
Supervisor Support V13	1.285	0.026	49.333	0.000	0.525	0.743
Supervisor Support V14	1.592	0.033	48.325	0.000	0.650	0.724

Bridge to Chapter 4

Manuscript 2 focused on factors that influence of the doctoral student academic trajectory, notably the instrumental roles of financial assistance and supervising relationships.

The results identified physical and institutional characteristics that are crucial to the success of a doctoral student. Nonetheless, although these elements provide an important basis for doctoral students, they only account for a small portion of the whole doctoral experience. Building upon the findings in Manuscript 2, Manuscript 3 examines the subtle dynamics of interpersonal interactions and sociocultural engagements inside academic contexts.

Manuscript 2 emphasized the critical roles of financial support and academic mentoring in affecting doctoral students' progress and satisfaction. However, such tangible supports do exist in the context of academic socialization. Manuscript 3 examines this domain more deeply, questioning the methods through which doctoral students integrate into their academic communities, build peer interactions, and, ultimately, how these activities affect their psychological well-being and decision-making.

Manuscript 3 investigates the subtle mechanisms of academic socialization, while Manuscript Two clarifies structural supports and their ramifications. The manuscript three examines the many interactions, informal communication through collaborative efforts, and shared academic experiences. It contends that, in addition to direct resources and assistance, a doctoral student's feeling of belonging and integration into the academic community has a substantial impact on their psychological well-being, motivation, and dedication to the program.

Manuscripts 2 and Three 3, together, provide a multidimensional evaluation of the doctoral experience. While the former describes external supports and their implications, the latter longitudinal study focuses on the internal sociocultural processes that are inherent in the doctoral path. This synthesis emphasizes the need to take structural and sociocultural factors into account when assessing and improving the doctoral student experience.

Chapter 4

Manuscript 3. Navigating Health and Academia: Exploring the Effects of Socialization on Doctoral Students

Feizi, S., & Elgar, F. (2024). Navigating health and academia: Exploring the effects of socialization on doctoral students. Manuscript under preparation.

Abstract

Doctoral education is a journey marked by an elaborate socialization process, shaping students' experiences and professional development. Given the socialization plays a crucial role in combating feelings of isolation and loneliness commonly experienced by doctoral students, it is crucial to examine the influence of socialization on emotional well-being, and retention in doctoral programs. In the first phase of the study, 2,486 doctoral students were recruited from a diverse range of 38 disciplines. Subsequently, students who participated in the first phase were contacted and 1,137 doctoral students were recruited for the second phase of the research. All participants completed a web-based questionnaire including sociodemographic measures and self-report measures assessing socialization, emotional well-being, and intention to quit. This Study draws on Weidman et al.'s Socialization Theory, which sought to understand the role of socialization in doctoral students' well-being and their intention to quit. The findings from the cross-lagged panel analysis provided strong evidence in support of the main aim of our research, which was to understand the changing relationships between the variables of socialization, emotional well-being, and intention to quit over two different time periods. The structural equation modeling (SEM) analysis demonstrated autoregressive effects, indicating a significant level of stability in the variables between Time 1 and Time 2. The observed consistency implies that certain fundamental emotions and perceptions persist significantly as students go through their Ph.D. program. Moreover, the cross-lagged effects revealed substantial associations between the variables.

Keywords: Socialization emotional well-being, anxiety, frustration, intention to quit, doctoral students

Introduction

Doctoral education is a journey marked by an elaborate socialization process, shaping students' experiences and professional development (Golde, 1998). Within the structures of doctoral program, the key channels for student socialization predominantly encompass academic departments and graduate programs relevant to specific disciplines. These educational structures symbolize the student's field of interest, each exhibiting a unique set of knowledge constructs, standards, and research requisites. The unique context of doctoral programs fosters double-layered socialization, encompassing the students' integration into their immediate academic community and preparing them for their future careers (Golde, 1998).

Socialization is the process of inclusion and integration with a community or organization (Austin, 2002). In doctoral education, the scholarly community facilitates knowledge acquisition and professional growth (Pyhältö et al., 2009). This scholarly community typically exists within a department that offers a comprehensive learning environment encompassing supervision, knowledge sharing, learning methods, assessments, and physical spaces for learning. Socialization in graduate students is more than being a part of the academic community. It is a complex process that involves the acquisition of new knowledge, skills, and values and cultural influences of the department, disciplines, and institutions on students' career development (Barnard & Shultz, 2019; Weidman et al., 2001). Doctoral education is a dynamic process in which students learn to socialize into a profession (Golde, 2000) while influencing the learning environment through their own values, experiences, and ideas (Austin, 2002).

Academic departments provide a sense of community and structure for faculty members and doctoral students and play a formative role in students' integration with academic life (Lovitts, 2002). For graduate students, this process takes place when a new student becomes a

member of an academic department in a particular discipline (Golde, 1998). Doctoral students become organizational members by adapting to their new role, in which they are expected to think and act as scholars by observing faculty members, conducting research, and attending professional meetings (Golde, 2000). A higher level of integration into the social and intellectual life of the institution strengthens doctoral students' commitment to the institution and the degree completion (Golde, 2000; Tinto, 1975; West et al., 2011).

Social and academic integration also fosters a sense of belongingness and acceptance, which can predict persistence through doctoral programs in students (Hausmann et al., 2007) and foster a bonding relationship characterized by feelings of safety and trust (Rovai, 2002). Satisfying social connections, or relatedness, is one of the psychological needs that is essential for ongoing psychological growth, integrity, and well-being (Deci & Ryan, 2015). Students who felt disconnected from the academic community or faced challenges in integrating into their department's academic, professional, and social life had a greater risk of not completing their program (Gardner, 2008a; Golde, 2005; Pyhältö et al., 2009). Therefore, doctoral student attrition is a function of the departments' social environment (Lovitts, 2002), which is one factor that explains why different departments show different attrition rates (Gardner, 2008b; Jiranek, 2010).

Socialization plays a crucial role in combating feelings of isolation and loneliness commonly experienced by doctoral students (Pyhältö et al., 2009, 2012). Independent doctoral students, particularly those working on distinct projects not closely associated with their supervisor's research scope, may face an increased risk of academic disengagement (Ali & Kohun, 2006). This isolation might prevent them from fully integrating into the scholarly community, subsequently affecting their academic satisfaction levels (Pyhältö et al., 2009).

Additionally, this divergence not only compounds their feeling of isolation from their peers but also exacerbates their feelings of *intellectual isolation* (Skakni, 2018), in which it "made them feel alone in a process that remains difficult to comprehend from the outside" (Skakni, 2018, p. 933). Moreover, a power imbalance between students and academic institutions could lead to a perception of isolation and lack of integration (Golde, 2000), which in turn contributes to attrition among students (Ali & Kohun, 2006; Gardner, 2008b; Lovitts, 2002).

Academic socialization contributes to the overall well-being of doctoral students (Juniper et al., 2012). Students who have a more negative perception of their learning environment frequently reported experiencing increased levels of stress, exhaustion, anxiety, and disinterest (Juniper et al., 2012; Pyhältö et al., 2009); therefore, socialization is a crucial aspect of graduate students' well-being. Although the body of research that has focused on this relationship among graduate students is limited, studies on adults and students outside doctoral programs indicate that socialization can influence progress and overall well-being (Ali & Kohun, 2006; Gardner, 2008a; Juniper et al., 2012; Pyhältö et al., 2009). A deeper understanding of these associations could support institutional strategies to promote student well-being and success. Moreover, this study explores the cross-lagged and autoregressive effect between socialization, emotional well-being and intentions to quit, employing a longitudinal approach with a diverse sample of Canadian doctoral students. Our aim in the present study was to examine the socialization effect on emotional well-being and intentions to quit, employing a longitudinal approach with a diverse sample of Canadian doctoral students. There were four general hypotheses in this study (see Figure 1):

Hypothesis 1. Socialization in doctoral students positively predicts socialization at Time Two. *1.a.* There is an autoregressive effect between emotional well-being at Time 1 and

Time Two. *1.b.* There is an autoregressive effect between the intention to quit at Time 1 and Time 2.

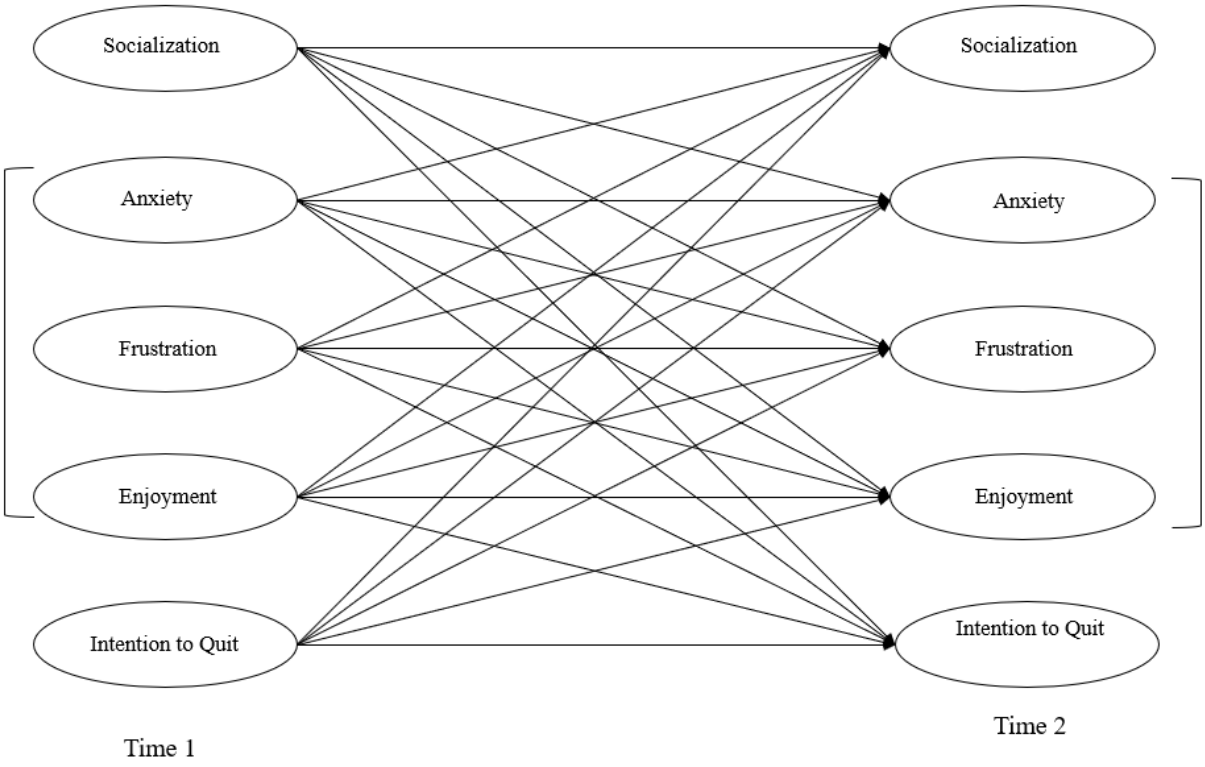
Hypothesis 2. Socialization in doctoral students negatively predicts negative emotional well-being (i.e., anxiety, frustration). *2.a.* Socialization in doctoral students positively predicts positive emotional well-being (i.e., enjoyment). *2.b.* Socialization in doctoral students negatively predicts intention to quit at Time 2.

Hypothesis 3. There is a cross-lagged effect between emotional well-being and intention to quit with socialization. *3.a. There* is a cross-lagged effect between emotional well-being at Time 1 and Time 2. 3.b. There is a cross-lagged effect between emotional well-being at Time 1 and socialization Time 2. 3.c. There is a cross-lagged effect between emotional well-being at Time 1 and intention to quit. 3.d. There is a cross-lagged effect between intention to quit at Time 1 with emotional well-being Time 2.

Hypothesis 4. There is a significant difference in socialization in different stages (e.g., coursework; comprehensive examination, and dissertation stage) of the doctoral program. *4.a.* There is a significant difference in socialization in different years of the doctoral program.

Figure 1

Hypotheses Model of the Study



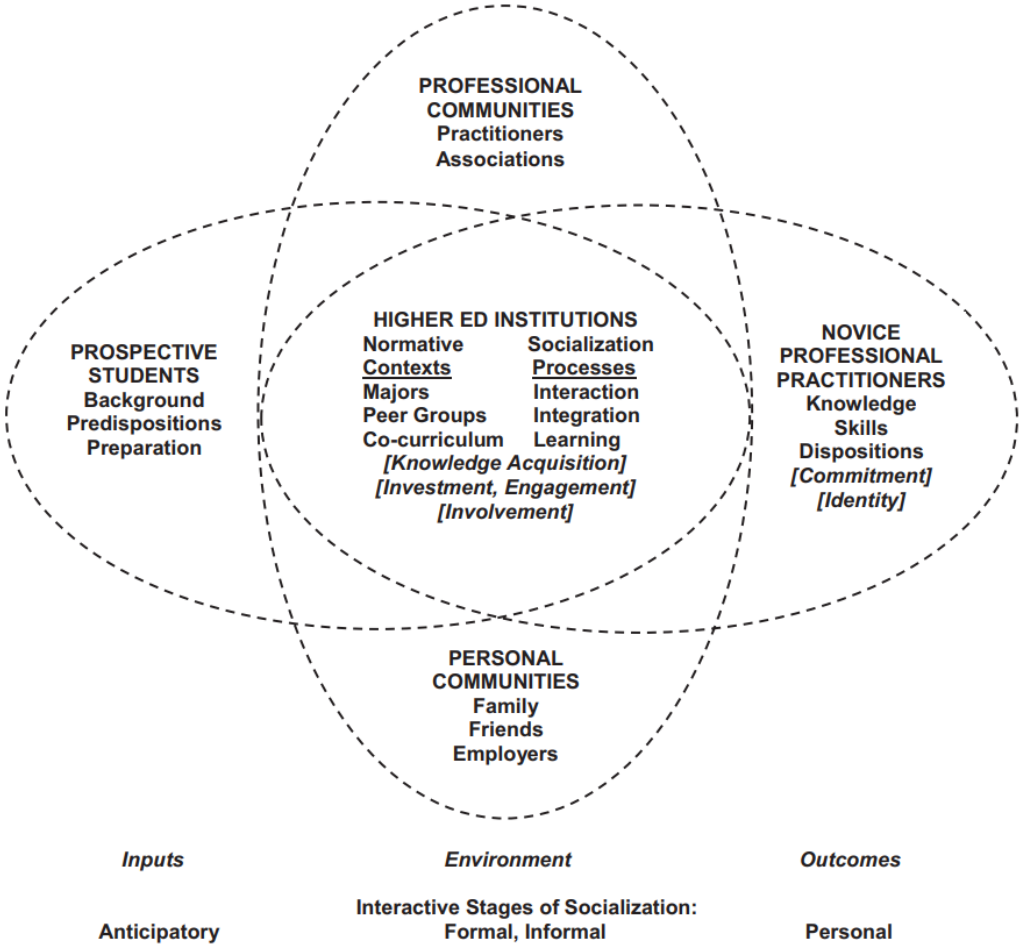
Unfolding the Stages of Socialization

According to Golde (1998), socialization into graduate school happens during four general tasks: (1) Intellectual mastery: gaining intellectual competence through coursework, lab work, and field work. (2) Learning about the realities of graduate student life: deciding whether the struggles of graduate school are worth it. (3) Learning about the future profession: thinking whether this is the right career path. (4) Integrating into the department: determining if the department is a good fit. Moreover, Weidman et al. (2001) conceptualized socialization in graduate programs in a similar structure, in which the process of knowledge acquisition, investment, and involvement into the role identity and professional socialization happens in a

developmental process and sequence of stage. They studied socialization at five stages of a doctoral program (see Figure 2 and Table 1).

Figure 2

Conceptualizing Socialization of Students in Higher Education



The first and preparatory phase is the *anticipatory stage* in which students become aware of the behavioral, attitudinal, and cognitive expectations (Weidman et al., 2001). This stage includes the period leading up to enrollment when students are learning the requirements of the degree (Ali & Kohun, 2006). Second is the *formal stage* in which students communicate through structured coursework and adapt to normative expectations and interactions with

faculty members and peers (Weidman et al., 2001). Doctoral students normally feel more competent during this stage through the feedback received from peers and instructors (Ali & Kohun, 2006; Lovitts, 2002). Ampaw and Jaeger (2012) refer to this stage as the development stage where students acquire specific skills and develop a relationship with faculty. Although most student interaction takes place during this stage, adjustment to a new lifestyle imposes a psychological burden on some students (Ali & Kohun, 2006). Therefore, doctoral students seek support from instructors and interact with their classmates to feel more capable and motivated for learning (Alamri et al., 2020). This social interaction with peers also provides valuable information (Austin, 2002; Weidman et al., 2001).

The third phase of socialization is the *informal stage*, where students' perceived competence is supported by meeting informal role expectations through communication with faculty members and other students within the department (Weidman et al., 2001). This stage might include the candidacy exam, in which students face new challenges and independence and potentially feel isolated, overwhelmed, confused, and stressed (Ali & Kohun, 2006). However, interaction with supervisors can help students reduce this isolation and feel more relatedness (Alamri et al., 2020). In the fourth phase, the *dissertation stage*, students continue to work mostly alone with limited interaction with peers and other faculties (Ali & Kohun, 2006). Despite that, in the *personal stage*, which corresponds to the last stage of socialization, students internalize their professional role and identity, accept the cultural norms of the department, and resolve any interpersonal conflicts that impede formation of a new role that is independent from the department (Weidman et al., 2001).

Table 1

Core Elements of Collaborative Professional Socialization in Higher Education

	Core Elements			
Stages	Knowledge acquisition	Investment	Involvement	Engagement
Anticipatory	Simulations, web sites, videos of institutions and professions	Matriculation, financial investment, tolerance of diversity, inclusiveness	Shadowing professionals, pre-professional experiences, move from outsider to insider, develop favorable self-assessment	Evaluate mental models of professions, develop identification with and dispositions to perform relevant professional roles
Formal	Transformative projects, learning communities, adaptive evaluation strategies, new instructional delivery methods, distance learning courses, new learning models	Team learning, purchase of necessary hardware and software, participation in training activities supplementing courses	Shared vision, cohort groups, experiential activities, collaborative communities (faculty, students, and practitioners), mastery learning	Conference presentations, professional development, joint research projects, participation in professional community, professional collaboration, advancement of profession through practice and/or research
Informal	Academic interactions in addition to formal classes, role learning,	Mutual sharing, group maturity, embrace diversity in class, faculty/	Participation in collaborative communities other than those in formal	Professional interaction, practitioner interaction, appreciate

	cyber-competence, and cyber-receptivity	student bonding, socio-cultural activity, social interactions, dialogue, study groups	settings (faculty, peers, practitioners), observation	diverse colleagues, networking, role identification, self-refection
Personal	Internet, professional bulletin boards, personal vision, and mastery, develop familiarity with new teaching and learning technologies	Formal mentoring by faculty and professional practitioners, volunteer participation in professional activities	Field experiences, internships, assistantships, clerkships, sponsorship	Internalize professional role, connectedness to professionals, independent thinking, self-evaluation, ethical practice, role transformation

Note. Reprint from "Student socialization in higher education: an exploration" by J. C. Weidman & L. DeAngelo, 2020, *Socialization in Higher Education and the Early Career: Theory, Research and Application* (pp. 3-9). Cham: Springer International Publishing.

The doctoral program is a transitional period for students in which they pass through stages of adjustment and internalize a professional role as independent researchers (Laudel & Gläser, 2008). During this time, doctoral students often lack clear direction in their role, new responsibilities, or career path may face ambiguity. Hence, for a successful transition, departments and faculty members should provide clear guidelines in the form of explicit expectations and deadlines and support students in going through the challenges of graduate school (Ellis, 2001; Gardner, 2007).

Departments can offer organized opportunities to facilitate these socialization experiences, such as collaborative opportunities for students and professors to engage in interdisciplinary research projects (Austin, 2002; Boden et al., 2011) and informal social events

(Gardner, 2007). Interdisciplinary programs can create opportunities for students to learn from preeminent scholars from different fields (Boden et al., 2011). It is important for departments to provide social spaces and activities that increase students' interaction and connection with each other (Dixon-Saxon & Buckley, 2020). Additionally, shared workspaces increase doctoral students' formal and informal integration with each other (Boden et al., 2011). Nonetheless, due to the COVID-19 pandemic most courses transitioned to online classes and even though online discussion boards are designed to help students, they fail to help students interact and feel related to others (Alamri et al., 2020). Therefore, an open distance learning (ODL) environment and physical distancing during the pandemic might have increased feelings of isolation and disconnectedness from faculties and peers, both of which could result in doctoral student dropout (Bireda, 2019).

To summarize, doctoral student success requires program directors and faculties to share a vision of supporting students in acquiring institutional values and the academic standards of the doctoral degree. The regular and guided reflection from advisors and faculty members (e.g., "attention to regular mentoring, advising, and feedback) can increase doctoral students' socialization (Austin, 2002). Therefore, the literature suggests there is a role for departments in promoting socialization in doctoral students.

Factors that Impact Socialization

Golde's (2000) study explored the crucial role of advisors in students' socialization and likelihood of dropping out. This qualitative research drew from in-depth semi-structured interviews with 68 ex-doctoral students and showed the importance of integration within their respective programs and departments to student dropout. An integral finding was that graduate students' relationships with their faculty, particularly advisors, are key, even though students

frequently reported communication issues due to power dynamics. This observation aligns with Weidman et al. (2001) findings which suggested that a power imbalance in student-faculty relationships may even exacerbate mental health issues among students, particularly if they experience physical or social isolation.

Barnes et al. (2010) explored the dynamics association between graduate students and their advisors in a study involving 564 participants, including 396 Ph.D. students. The respondents identified socialization as one of the crucial aspects they expected from their advisors, alongside accessibility, assistance, and empathy. The students, particularly at the graduate level, expected their advisors to support their professional growth and networking. When this socialization support was provided, students felt more self-assured, showed gratitude towards their advisers for the knowledge and skills imparted, and experienced the development of a beneficial social network.

The multifaceted role of supervisor and faculties, encompassing responsibilities such as teaching, mentoring, advising, conducting research, supervising academics, and participating in dissertation committees, is critical to successful socialization in the doctoral journey. As pointed out by Ali and Kohun (2006), a lack of communication and support from advisors can negatively impact doctoral students, leading to feelings of isolation and higher attrition rates. The consequences are especially acute if this support is lacking during the early stages of the Ph.D. program, such as the coursework phase, leading to social isolation and vulnerability to psychological stress and mental health issues.

The aforementioned research indicates that several factors have a substantial impact on the socialization of doctoral students. The process of socialization not only has a significant impact on their general well-being but also makes a significant influence on their academic

progress. However, there is a significant gap in the current study. The majority of research has not investigated the process of socialization among doctoral students using a longitudinal approach. In order to examine the impact of socialization on students throughout their program, it is crucial to use a comprehensive approach that can provide valuable insights into the lasting consequences of socialization on their overall wellbeing and academic progress. By addressing this gap we may be able to make significant suggestions for enhancing doctoral education and support systems.

Methods

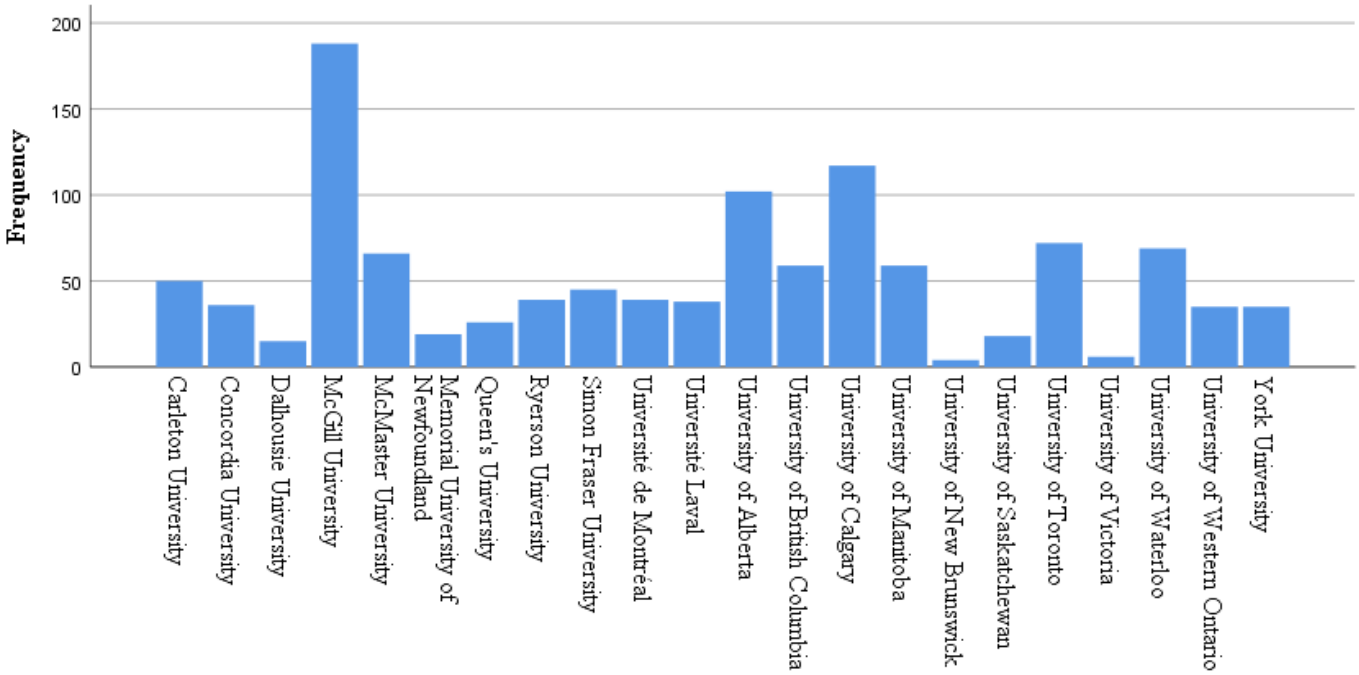
To conduct this study with a large and diverse sample of Canadian doctoral students, following approval by the Research Ethics Board Office of McGill University, we contacted 20 universities in Canada and obtained approval from research ethics offices at 20 universities. Students from 20 universities who were enrolled in a doctoral program were recruited via mass emails sent by university departments in Spring 2021. Prior to the participation, students read and accepted the terms of a consent form and then spent 20 minutes on average to complete the questionnaire. Participants were entered into a prize draw for one of twenty-five $50 CAD Amazon gift card prizes as compensation for participating in the study.

In the first phase of the study, 2,486 doctoral students were recruited from a diverse range of 38 disciplines. These students were drawn from twenty of Canada's premier research-intensive universities. Subsequently, we reached out to these participants via email for the second phase of the research. In this stage, students who participated in the first phase were contacted and 1,137 doctoral students were recruited (see Figure 3 and Table 2). All participants completed a web-based questionnaire including sociodemographic measures (e.g., age, gender,

academic discipline, Ph.D. stage) and self-report measures assessing socialization, emotional well-being and intention to quit (see Table 3).

Figure 3

Distribution of the Sample Across Canadian Universities



Note. Twenty research intensive universities in Canada were included in the final analyses.

Concerning background variables, 14.4% of the students were in the coursework stage, 20.9% in the comprehensive examination stage (e.g., literature search, review, writing), 58.9% in the dissertation stage (e.g., dissertation proposal, data analyses, writing), and 4.8% in other stages. Regarding the year of doctoral program, 17.9% were in the first year, 23.7% second year, 20.8% third year, 17.3% fourth year, and 12.0% fifth year. Participants were primarily female (64.7%) with an average age of 31 (*SD* = 6.62) years.

Table 2

Demographic Characteristics of Students Enrolled in Doctoral Program

	N (%)	Mean	*SD*
Gender			
Female	736 (64.7)		
Male	362 (31.8)		
Non-conforming	30 (2.6)		
Neither	8 (0.7)		
Age		30.78	6.62
English as the First Language			
Yes	687 (60.4)		
No	449 (39.5)		
International Student			
Yes	372 (32.7)		
No	763 (67.1)		
Stage in the Program			
Coursework	164 (14.4)		
Comprehensive Examination	238 (20.9)		
Dissertation	670 (58.9)		
Other	55 (4.8)		
Year in the Program		2.80	0.80
First Year	203 (17.9)		
Second Year	269 (23.7)		
Third Year	237 (20.8)		
Fourth Year	197 (17.3)		
Fifth Year	136 (12.0)		
Full-time			
Yes	1102 (96.9)		
No	23 (2.0)		

Study Measures

Socialization

A 14-item questionnaire (Weidman & Stein, 2003) was used to assess students' perceptions of the departmental climate for academic socialization. Each of its 14 items have response options that ranged from 1 = *strongly disagree to* 5 = *strongly agree*. Sample items included: "An environment that promotes scholarly interchange between students and faculty"; "This department emphasizes engaging students in scholarly activities (research, writing other than dissertation/thesis, etc.)"; "My department offers sufficient enrichment activities (seminars, colloquia, social events, etc.) in addition to regular classes", and "The faculty are accessible for scholarly discussions outside of class". Confirmatory factor analyses (CFA) were conducted and showed an acceptable fit, $\chi^2 = 453.96$, $df = 66$, $p < .001$, CFI was 0.95, TLI was 0.94, SRMR was 0.05 and RMSEA was 0.07.

Dependent Variables

Psychological well-being

To measure emotional well-being, we used the *Epistemic Emotions Scale*. Each of its 9 items have response options that ranged from 1 = *not at all* to 5 = *very strong* (Pekrun & Mieier, 2011). Epistemic emotions scale items assessed anxiety, frustration, and enjoyment by asking participants to indicate the strength of these emotions by selecting the number that best described the intensity of their emotion while learning.

Intention to quit was measured using a 4-item scale adapted from Hackett et al. (2001). Two items ranged from 1 = *never* to 5 = *constantly* (e.g., "I am disappointed that I ever entered the doctoral program, and I think about quitting my doctoral program"; "I think about finding a different doctoral program"), and two others ranged from 1 = *very unlikely* to 5 = *certain* (e.g.,

"I intend to search for another graduate supervisor"; "I plan to quit my doctoral program"). Also, confirmatory factor analyses (CFA) showed an acceptable fit, $\chi^2 = 453.96$, $df = 66$, $p < .001$, CFI was 0.95, TLI was 0.94, SRMR was 0.04 and RMSEA was 0.07.

Table 3

Psychometric Properties of Study Variables

Variable	*n*		*M*		*SD*		*α*	
	T1	T2	T1	T2	T1	T2	T1	T2
Socialization	1072	1072	47.43	45.48	10.52	10.76	.92	.92
Anxiety	1072	1072	10.07	10.17	3.24	3.22	.89	.89
Frustration	1072	1072	8.49	8.76	2.90	2.95	.82	.82
Enjoyment	1072	1072	9.41	9.22	2.56	2.54	.87	.84
Intention to Quit	1072	1072	6.21	6.43	2.47	2.54	.70	.68

Note. T1 = Time 1; T2 = Time 2.

Results

Preliminary Analyses

Pearson correlation coefficients were computed to assess the linear relationships between continuous variables. As shown in Table 4, anticipated socialization positively correlated with enjoyment and negatively with anxiety, frustration, and intention to quit.

Table 4

Correlations Between Variables (n = 1137)

	1	2	3	4	5	6	7	8	9	10
1.Socialization	-									
2.Anxiety	-.19 **	-								

3.Frustration	-.38**	.61**	-							
4.Enjoyment	.34**	-.08**	-.23**	-						
5.Intention to Quit	-.45**	.23**	.37**	-.37**	-					
6.Socialization Time 2	.67**	-.18**	-.32**	.28**	-.33**	-				
7.Anxiety Time 2	-.20**	.56**	.38**	-.12**	.23**	-.23**	-			
8.Frustration Time 2	-.35**	.40**	.60**	-.21**	.34**	-.40**	.64**	-		
9.Enjoyment Time 2	.31**	-.13**	-.26**	.62**	-.29**	.39**	-.07*	-.21**	-	
10.Intention to Quit Time 2	-.20**	.13**	.16**	-.21**	.46**	-.25**	.16**	.20**	-.26**	-

Note. * $P < 0.05$, ** $P < 0.001$

One-way ANOVAs were performed to examine the potential differences in study variables between different years and stages of doctoral program. The results showed significant differences in different years of the program in socialization Time 1, $F(4, 962) = 3.30$, $p = .011$. Specifically, first-year students showed more perceptions of the departmental climate for academic socialization in comparison to their fourth-year counterparts (see supplementary materials; Table 1; Figure 1). Furthermore, there were significant differences in frustration between the dissertation and coursework stages at both Time 1, $F(4, 974) = 4.66$, $p = .001$, and Time 2, $F(4, 744) = 9.46$, $p < .001$ (see supplementary materials; Table 2). The observed trend showed a progressive increase in student frustration as they advance through the academic

program. Specifically, first-year students showed lower levels of frustration when compared to those in the third, fourth, and fifth years of the program (see Figure 2 and 3). The mean differences between stages of the program are reported in Table 2 in supplementary materials.

The results also showed significant differences in different stages of the program in frustration Time 1, $F(2, 1013) = 6.95$, $p = .001$, and frustration Time 2, $F(2, 988) = 4.61$, $p = .010$ (see supplementary materials; Figure 4 and 5). No significant difference in the stages of the program was observed in other variables of the study. The results show significant differences between the dissertation and coursework stages at both Time 1 and Time 2, with students demonstrating higher levels of frustration during the dissertation stage compared to the coursework stage. The mean differences between stages of the program are reported in Table 2 in the supplementary materials.

Several one-sample *t*-tests were conducted to determine potential differences in time one and time two variables. Results showed a significant difference between Socialization Time 1 and Time 2 (see supplementary materials; Table 3), with students in Time 1 ($M = 47.32$, $SD = 10.53$) reporting better perceptions of the departmental climate for academic socialization than students in Time 2 ($M = 45.32$, $SD = 10.86$). Furthermore, the result revealed the statistically significant differences between anxiety, frustration, enjoyment, and intention to quit Time 1 and Time 2 (see supplementary materials; Tables 4 to 7).

Additionally, an independent samples *t*-test was conducted to determine potential gender differences among measured variables (see Table 5). Results showed a significant gender difference in *socialization* Time 1, $t(1002) = 2.25$, $p = .024$, with males ($M = 48.47$, $SD = 10.13$) reporting better perceptions of the departmental climate for academic socialization than females ($M = 46.89$, $SD = 10.65$). This suggests that gender may play a role in how

departmental climate is perceived, possibly pointing to differential experiences or expectations between genders. The data showed significant differences in anxiety levels between male and female participants at both Time one and Time two, with females displaying higher anxiety than males. This suggests a gender-related variance in anxiety experiences across the study period.

Table 5

Independent Samples t-test

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig.	Mean Difference	Std. Error Difference	Lower	Upper
Socialization T1	1.27	.260	-2.25	1002	.024	-1.58	.70	-2.95	-.20
			-2.29	705.367	.022	-1.58	.69	-2.93	-.23
Anxiety T1	2.35	.126	4.08	977	.000	.89	.22	.46	1.32
			3.98	614.307	.000	.8	.22	.45	1.33
Anxiety T2	7.40	.007	3.20	952	.001	.71	.22	.27	1.14
			3.07	560.128	.002	.71	.23	.25	1.16

Note. Only *t*-test results that showed significant differences between male and female in measured variables are reported in the table.

Main Analyses

Cross-Lagged Panel Results

This study aimed to investigate the progressive dynamics among the constructs of socialization, emotional well-being, and intention to quit across two-time points. Structural equation modelling (SEM) was conducted to examine the cross-lagged relations between socialization and three measures of emotional well-being namely anxiety, frustration, and enjoyment, and one measure of dropout intention at Time 1 and Time 2 (see Figure **4**).

The cross-lagged showed an acceptable fit to the data, $\chi^2 = 3638.89.4$, df = 1297, $p <$ .001, CFI was 0.92, TLI was 0.91, SRMR was 0.05 and RMSEA was 0.05. Autoregressive paths between the same latent variable of the study (e.g., Socialization from Time 1→ Time 2) were included to assess construct stability. In order to address the possibility of response bias, we ran the model by the error terms associated with identical items assessed at both time points to correlate.

Autoregressive effects

The autoregressive effects indicate substantial stability in each variable from Time 1 to Time 2. High autoregressive coefficients were obtained for all variables: socialization Time 1 →Time 2 (β = 0.75, $p < .001$), anxiety Time 1 → Time 2 (β = 0.69, $p < .001$), frustration Time 1 →Time 2 (β = 0.68, $p < .001$), enjoyment Time 1 → Time 2 (β = 0.64, $p < .001$), and intention to quit Time 1 → Time 2 (β = 0.75, $p < .001$).

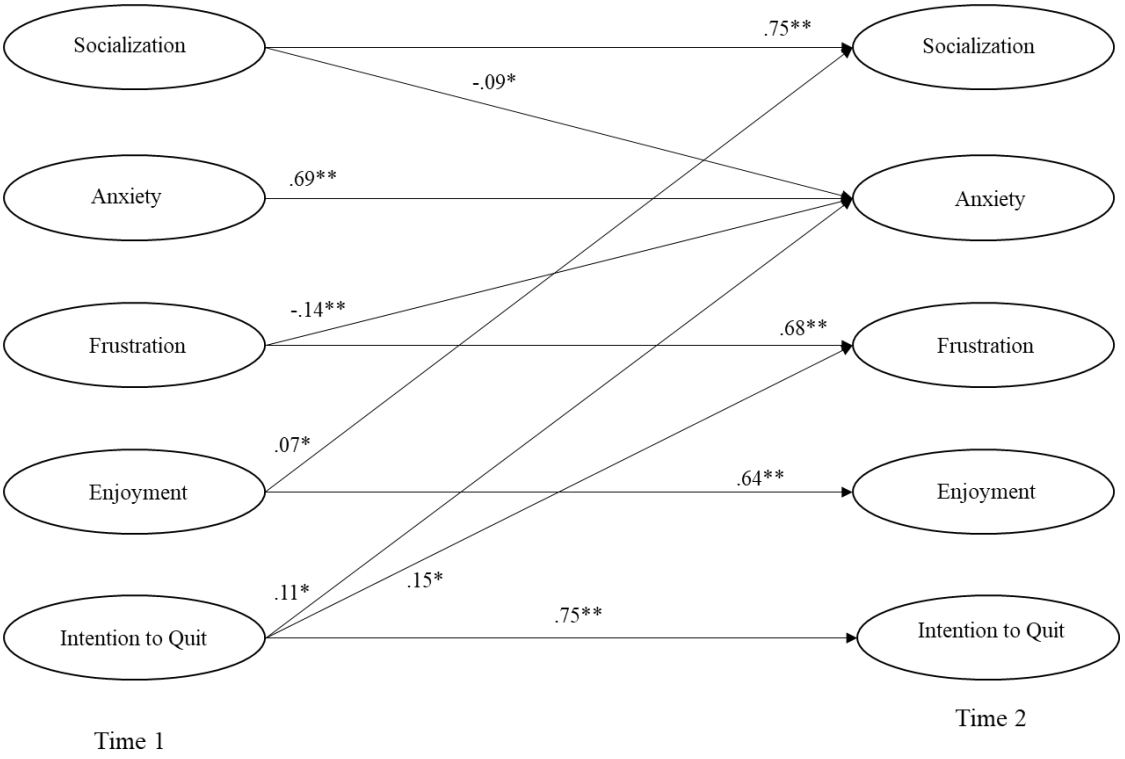
Cross-lagged effects

The cross-lagged effects represent the ability of each variable at Time 1 to predict the other variables at Time 2, controlling for the stability of the constructs. Socialization at Time 1 had a statistically moderate negative effect on anxiety at Time 2 (β = -0.09, $p = .031$), but did not significantly predict frustration enjoyment, intention to quit at Time 2. Anxiety at Time 1 did not statistically predict any of the other variables at Time 2. Frustration at Time 1 had a statistically significant negative effect on anxiety (β = -0.14, $p = .029$). Enjoyment at Time 1 had a significant positive effect on socialization at Time 2 (β = 0.07, $p = .034$). Intention to quit at Time 1 had a significant positive effect on anxiety (β = 0.11, $p = .038$), and on frustration (β = 0.15, $p = .006$) at Time 2.

The results (see Figure 4) demonstrate a degree of stability in the variables across the two-time points. Additionally, the cross-lagged effects highlight certain predictive relationships among the variables. For example, the positive impact of socialization on enjoyment and the negative impacts of anxiety on socialization and frustration are notable. These findings could provide insight into the dynamics among these psychological variables over time.

Figure 4

Cross-lagged Analyses



Note. Results of cross-lagged analyses with only significant paths were presented

** p < .05, ** p < .001.*

Discussion

The primary objective of this study was to examine the complex interplay between socialization and its subsequent impacts on emotional well-being and intention to quit among Canadian doctoral students. It was hypothesized that the first stage of socialization (Time 1) is a predictor of the following stages of socialization (Time 2). The autoregressive effects proposed between emotional well-being and intention to quit across the two time points support this hypothesis, implying a continuity or advancement in students' emotional states and their feelings toward their doctoral endeavors. In terms of emotional well-being, the findings suggest that higher levels of socialization can significantly minimize negative emotional experiences such as anxiety and frustration. On the other hand, increasing socialization may be a sign of positive emotional states, as seen by increased levels of enjoyment in academic pursuits. Beyond individual emotional states, this study aimed to uncover the progress of socialization experiences throughout the doctoral path. The degree and nature of socialization may vary significantly depending on the stage and year of the doctoral program, implying that certain stages may be more favorable or problematic for student's socialization. These abovementioned hypotheses were formulated based on the professional socialization model by Weidman et al. (2001) and Gold's (2000) stages of socialization into graduate school, both of which emphasize the crucial role of socialization in the academic journey (Austin, 2002; Weidman & Stein, 2003). The results of this study can shed light on the dynamic relationship between socialization, emotional well-being, and the intention to quit among doctoral students over time.

The autoregressive effects confirmed the stability of the constructs of socialization, well-being, and intention to quit across the two-time points. This suggests that these characteristics in doctoral students remain relatively stable over time. The findings indicate a strong and positive

relationship between socialization at the program's beginning and a later time point. Such a relationship underscores the significance of the early phase of doctoral studies. The initial experiences, interactions, and networks that students form or are exposed to become foundational, influencing their subsequent social interactions and engagements (Gardner & Mendoza, 2023; Pike & Kuh, 2006; Tinto, 1997). This suggests that early investments in fostering positive social environments could have lasting implications for a student's entire doctoral journey. The sub-hypothesis 1.a highlighted the potential stability of emotional well-being over time. The autoregressive effect implies that a student's emotional state at the beginning of their doctoral program tends to remain consistent or exert influence as they progress. According to the research findings, the early stages of doctoral programs present a strategic opportunity for universities to institute interventions designed to support and enhance the mental health and overall well-being of their doctoral students (Jackman et al., 2022). Sub-hypothesis 1.b brings to the forefront an essential aspect of doctoral studies such as the intention to quit. The strong autoregressive effect shown between intention to quit Time 1 and 2 suggests that students who have early thoughts of leaving the program may continue to struggle with these thoughts as they advance. Such early indications can be critical signals for academic institutions, pointing to the need for timely interventions, be it in the form of counseling, mentorship, or academic support, to ensure student retention. Although the intention to quit is negatively correlated related to socialization and enjoyment while being positively correlated to anxiety and frustration, it is essential to acknowledge that addressing the intention to quit alone may not fully address the dropout issue. Our study's findings suggest that the intention to quit persists among students. Therefore, in addition to addressing the intention to quit, it is imperative to simultaneously consider other aspects of students' well-being.

The findings from our study offer a partial confirmation of Hypothesis 2. Specifically, we observed that doctoral students who experienced higher levels of socialization at Time 1 felt less anxious at Time 2. This suggests that social interactions and connections during their doctoral journey can play a role in reducing anxiety. However, our data did not find significant evidence to suggest that socialization influences other aspects of emotional well-being, such as frustration or enjoyment. Additionally, there was no significant relationship between socialization and students' intentions to quit at Time 2. This implies that while socialization might help mitigate feelings of anxiety, its effects on other emotional outcomes remain inconclusive based on our current study. Furthermore, there exist other alternatives, such as unmeasured third factors, that might potentially influence or moderate this association. Given the close proximity of Time 1 and Time 2, it is possible that anxiety is the initial outcome of inadequate socializing, with subsequent effects on other areas. Therefore, it is important for future research to explore these nuances further, and potentially identify other factors that could influence the emotional well-being of doctoral students.

The results lend partial support to hypothesis, as they postulated cross-lagged effects between emotional well-being and socialization, as well as between intention to quit at Time 1 and emotional well-being at Time 2. Notably, anxiety levels reported at Time 1 did not demonstrate a predictive influence over any variables evaluated at Time 2. This suggests that initial indicators of anxiety might not necessarily foreshadow other emotional or behavioral responses in subsequent phases of the doctoral journey. A significant negative relationship was observed between frustration levels at Time 1 and anxiety at Time 2. This indicates that students who initially experience heightened frustration may subsequently report decreased feelings of anxiety, highlighting an intriguing emotional counterbalance.

Furthermore, our data pointed to a significant positive relationship between enjoyment levels at Time 1 and socialization at Time 2. This suggests that initial positive emotions, such as enjoyment, might foster greater social engagement as students advance in their studies. Lastly, intentions to quit in doctoral students, as expressed at Time 1, held a meaningful predictive value for heightened feelings of anxiety and frustration at Time 2. Such a connection underscores the emotional ramifications of early-stage doubts or considerations about leaving a doctoral program. These results (i.e., Hypothesis 2) suggest that as students navigate through their doctoral journey, the interactions they engage in, both academically and socially, tend to change, potentially reflecting the evolving nature of their academic tasks and social environment. The phenomenon is consistent with the Interactive model stages of socialization proposed by Weidman et al. (2020), which view the socialization of students in higher education institutions as a fluid and iterative process. In light of these findings, it becomes apparent that some elements of Hypothesis Three were supported, while others require more investigation. The findings presented in this study underscore the need of understanding and resolving early emotional states because they may have a significant impact on how students experience, as they may have profound effects on students' subsequent experiences and choices within doctorate programs.

The findings of this study provide noteworthy insights into the role of socialization in different stages and years of a doctoral program. It was hypothesized that significant differences in socialization would be observed at various stages of the doctoral program (Hypothesis 4 and 4.a). The results showed notable differences across varying years of the program regarding socialization at Time 1. Specifically, first-year students demonstrated a more pronounced perception of the departmental climate conducive for academic socialization in comparison to

their fourth-year counterparts. This observation indicates that as students go through their academic journey, their initial impressions of the department's academic socialization environment tend to diminish. The change in socialization perception could potentially be attributed to a variety of factors including, but not limited to, an intensified academic workload (Kurtz-Costes et al., 2006; Maslach, 2003; Rummell, 2015) as well as other significant factors, such as strained relationships with academic supervisors or advisors and financial concerns (Feizi & Elgar, 2023). The declining perception of socialization, specifically from the first year to the fourth year, highlights an important area that warrants additional research and potential institutional intervention. This could be explained by transition from the *formal stage of* socialization, in which students communicate through structured coursework and adapt to normative expectations, to the *informal stage* (See Weidman et al., 2001*).* In the *formal stage* students' perceived competence is supported by meeting informal role expectations (Weidman et al., 2001). While the majority of interactions among students occur during this informal phase, it is imperative to emphasize that the transition can exert psychological stress on some students (Ali & Kohun, 2006). This is necessary to establish a consistent and favorable socialization environment that promotes academic development and collaborative interaction throughout the entire program (Austin, 2002; Boden et al., 2011). In terms of the annual progression in the program, students appear to become increasingly engaged in scholarly activities and interactions with both faculty and peers as they advance (Weidman & Stein, 2003). This could indicate their growing academic competence and social involvement as they spend more years in the program. This could potentially reflect growing awareness or experience of departmental dynamics or a sense of dissatisfaction that accumulates over the years (Lovitts, 2001).

Furthermore, early analysis revealed that the observed pattern shows a steady rise in student discontent as they go through the program. First-year students, in particular, were less frustrated than those in the third, fourth, and fifth years of the program. This trend is consistent with the idea that as students go deeper into the program, encounter more advanced challenges, and face heightened expectations, the potential for experiencing frustration escalates. This apparent transition from the initial to the latter stages of the academic journey may warrant a closer examination of the academic support structures in place, aiming to mitigate the adverse impacts of accumulated frustration over time.

Socialization serves as a fundamental aspect of a student's experience in a doctoral program and could significantly impact their mental health, satisfaction, and decisions regarding their academic commitment (Nutov & Hazzan, 2011; Weidman, 2020; Yadav et al., 2023; Yeh & Inose, 2003) by fostering social connections, combating isolation (Ali et al., 2007), providing emotional support (Li & Collins, 2014), and promoting intellectual growth (O'Meara et al., 2014). Creating an inclusive and supportive environment that encourages socialization is essential for nurturing the success and well-being of these aspiring scholars (Gardner, 2010).

Conclusion

The academic journey of doctoral students is undeniably multifaceted, with socialization playing a significant role in shaping their emotional well-being and persistence within the program. This study, researched on Canadian doctoral students, sought to unravel the nuanced relationship between socialization, emotional well-being, and intentions to quit. Our findings underscore the formative role of early-stage socialization. Initial interactions, networks, and experiences serve as a foundation, potentially dictating subsequent social engagements and academic perceptions. Moreover, the relationship between socialization and emotions, such as

anxiety and frustration, suggests that fostering a positive social environment early on could have influential implications for the doctoral journey.

It is noteworthy to see how impressions of departmental socialization change as students go through their degree. The observed decrease in socialization over the course of four years highlights the possibility of existing deficiencies or changes in the provision of academic and social assistance that educational institutions have to acknowledge and resolve. Furthermore, the increasing dissatisfaction and frustration experienced by students as they go further in their pursuit of Ph.D. degrees highlight the need for improved support systems. It is evident that a supportive and inclusive environment, one that encourages sustained and productive socialization especially early in the program, is indispensable for fostering the success and mental well-being of doctoral students.

Nevertheless, despite the valuable insights provided by this study, it also underscores the need for further research. It is crucial to gain a deeper understanding of the complex dynamics of how socialization impacts the experiences of doctoral students to develop effective support interventions. Institutions should prioritize understanding and addressing the unique needs of doctoral students at every stage of their journey, ensuring their academic success, well-being, and retention. This study contributes significantly to the discourse on doctoral student experiences, highlighting the interplay between socialization, emotional well-being, and academic commitment. As the academic environment evolves, it becomes ever more important to prioritize students' well-being and performance in institutional initiatives.

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Supplementary Materials

Table 1

Multiple Comparisons Results

Dependent Variable	(I) What year are you in the program?	(J) What year are you in the program?	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Socialization Time 1	First Year	Second Year	1.98223	1.01817	.293	-.8004	4.7648
		Third Year	1.41002	1.04077	.657	-1.4344	4.2544
		Fourth Year	3.66772*	1.09272	.007	.6814	6.6541
		Fifth Year	2.99203	1.20108	.093	-.2905	6.2745
	Second Year	First Year	-1.98223	1.01817	.293	-4.7648	.8004
		Third Year	-.57221	.95879	.976	-3.1925	2.0481
		Fourth Year	1.68550	1.01494	.459	-1.0883	4.4593
		Fifth Year	1.00981	1.13077	.900	-2.0805	4.1002
	Third Year	First Year	-1.41002	1.04077	.657	-4.2544	1.4344
		Second Year	.57221	.95879	.976	-2.0481	3.1925
		Fourth Year	2.25770	1.03762	.190	-.5781	5.0935
		Fifth Year	1.58202	1.15117	.644	-1.5641	4.7281
	Fourth Year	First Year	-3.66772*	1.09272	.007	-6.6541	-.6814
		Second Year	-1.68550	1.01494	.459	-4.4593	1.0883
		Third Year	-2.25770	1.03762	.190	-5.0935	.5781
		Fifth Year	-.67569	1.19834	.980	-3.9507	2.5993
	Fifth Year	First Year	-2.99203	1.20108	.093	-6.2745	.2905
		Second Year	-1.00981	1.13077	.900	-4.1002	2.0805
		Third Year	-1.58202	1.15117	.644	-4.7281	1.5641
		Fourth Year	.67569	1.19834	.980	-2.5993	3.9507
Frustration Total (Epistemic Emotions)	First Year	Second Year	-.59415	.28033	.213	-1.3603	.1720
		Third Year	-.54014	.28702	.328	-1.3246	.2443
		Fourth Year	-1.16201*	.30110	.001	-1.9849	-.3391
		Fifth Year	-1.13126*	.33203	.006	-2.0387	-.2238
	Second Year	First Year	.59415	.28033	.213	-.1720	1.3603
		Third Year	.05401	.26515	1.000	-.6707	.7787
		Fourth Year	-.56786	.28033	.254	-1.3340	.1983
		Fifth Year	-.53711	.31332	.426	-1.3934	.3192
	Third Year	First Year	.54014	.28702	.328	-.2443	1.3246
		Second Year	-.05401	.26515	1.000	-.7787	.6707
		Fourth Year	-.62187	.28702	.193	-1.4063	.1626
		Fifth Year	-.59112	.31932	.345	-1.4638	.2816
	Fourth Year	First Year	1.16201*	.30110	.001	.3391	1.9849
		Second Year	.56786	.28033	.254	-.1983	1.3340
		Third Year	.62187	.28702	.193	-.1626	1.4063
		Fifth Year	.03075	.33203	1.000	-.8767	.9382
	Fifth Year	First Year	1.13126*	.33203	.006	.2238	2.0387
		Second Year	.53711	.31332	.426	-.3192	1.3934
		Third Year	.59112	.31932	.345	-.2816	1.4638
		Fourth Year	-.03075	.33203	1.000	-.9382	.8767

Frustration_T2	First Year	Second Year	-.46745	.28914	.487	-1.2577	.3228
		Third Year	-.83769*	.29736	.040	-1.6504	-.0249
		Fourth Year	-.88609*	.31217	.037	-1.7393	-.0329
		Fifth Year	-1.10260*	.34417	.012	-2.0433	-.1619
	Second Year	First Year	.46745	.28914	.487	-.3228	1.2577
		Third Year	-.37023	.27511	.663	-1.1222	.3817
		Fourth Year	-.41864	.29105	.603	-1.2141	.3768
		Fifth Year	-.63514	.32513	.290	-1.5238	.2535
	Third Year	First Year	.83769*	.29736	.040	.0249	1.6504
		Second Year	.37023	.27511	.663	-.3817	1.1222
		Fourth Year	-.04841	.29922	1.000	-.8662	.7694
		Fifth Year	-.26491	.33247	.932	-1.1736	.6438
	Fourth Year	First Year	.88609*	.31217	.037	.0329	1.7393
		Second Year	.41864	.29105	.603	-.3768	1.2141
		Third Year	.04841	.29922	1.000	-.7694	.8662
		Fifth Year	-.21651	.34577	.971	-1.1616	.7286
	Fifth Year	First Year	1.10260*	.34417	.012	.1619	2.0433
		Second Year	.63514	.32513	.290	-.2535	1.5238
		Third Year	.26491	.33247	.932	-.6438	1.1736
		Fourth Year	.21651	.34577	.971	-.7286	1.1616

*. The mean difference is significant at the 0.05 level.

Figure 1

Socialization Time 1

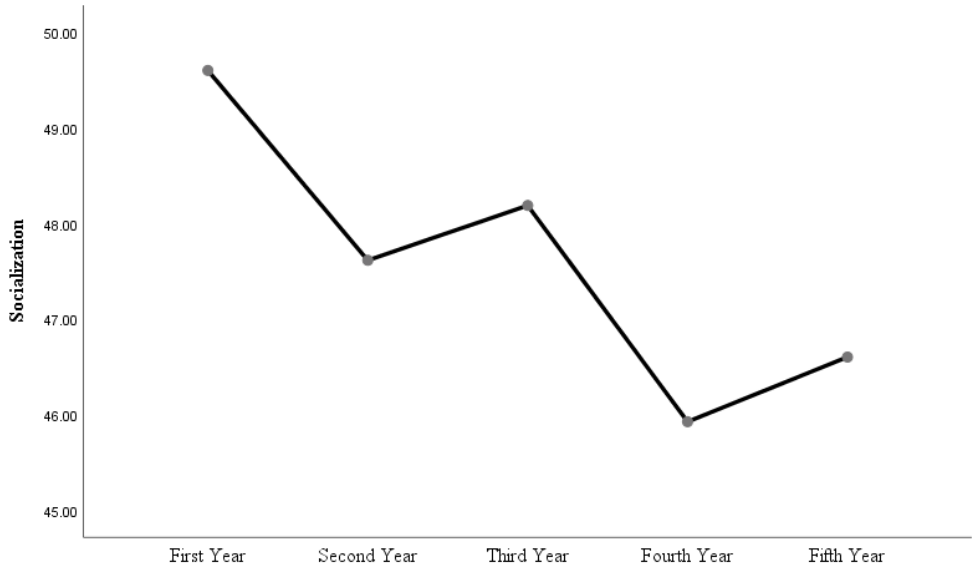


Table 2

Multiple Comparisons in Frustration Time 1 and Time 2

	Stage in the doctoral program	Stage in the doctoral program	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Frustration_T1	Coursework	Comprehensive/ Qualification examination	-.35924	.29965	.454	-1.0626	.3441
		Dissertation	-.87059*	.25687	.002	-1.4735	-.2677
	Comprehensive/ Qualification examination	Coursework	.35924	.29965	.454	-.3441	1.0626
		Dissertation	-.51136	.22361	.058	-1.0362	.0135
	Dissertation	Coursework	**.87059***	.25687	.002	.2677	1.4735
		Comprehensive/ Qualification examination	.51136	.22361	.058	-.0135	1.0362
Frustration_T2	Coursework	Comprehensive/ Qualification examination	-.48368	.30746	.258	-1.2054	.2380
		Dissertation	-.78693*	.26531	.009	-1.4097	-.1642
	Comprehensive/ Qualification examination	Coursework	.48368	.30746	.258	-.2380	1.2054
		Dissertation	-.30325	.22908	.382	-.8410	.2345
	Dissertation	Coursework	**.78693***	.26531	.009	.1642	1.4097
		Comprehensive/ Qualification examination	.30325	.22908	.382	-.2345	.8410

Note. *. The mean difference is significant at the 0.05 level.

Figure 2

Frustration Time 1

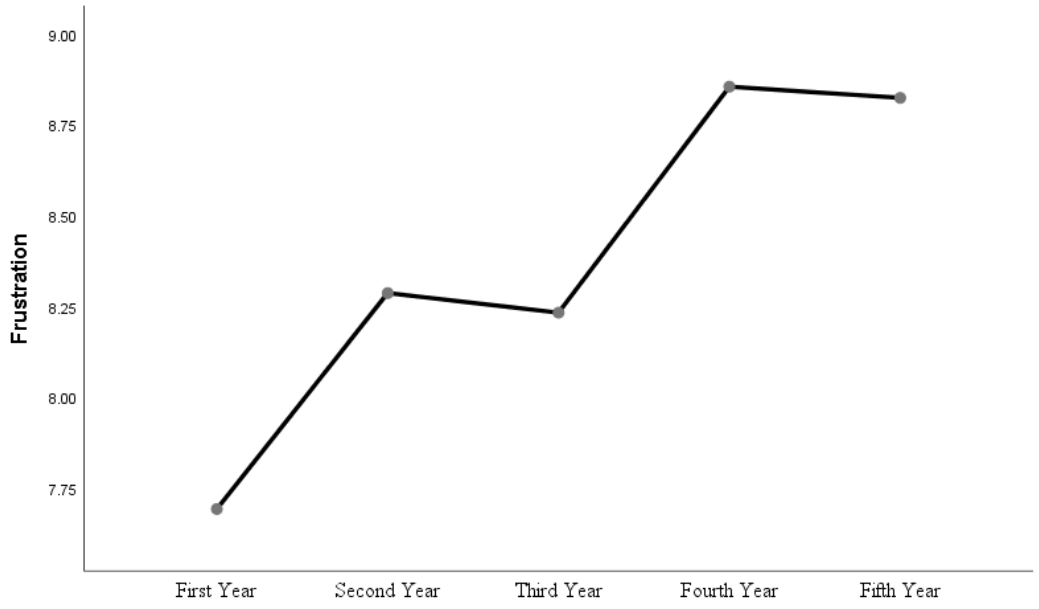


Figure 3

Frustration Time 2

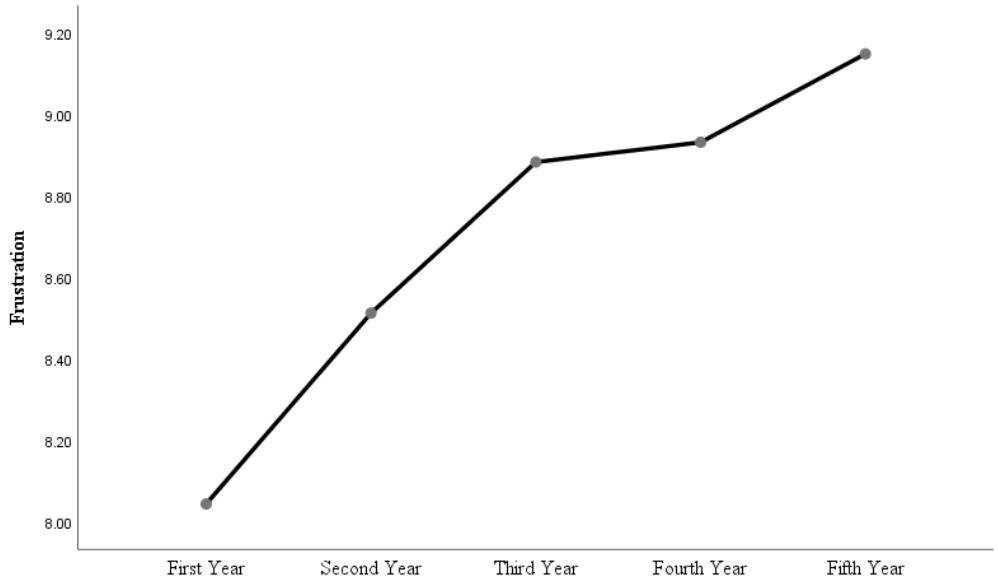


Figure 4

Frustration Time 1 in Different Stages of Doctoral Program

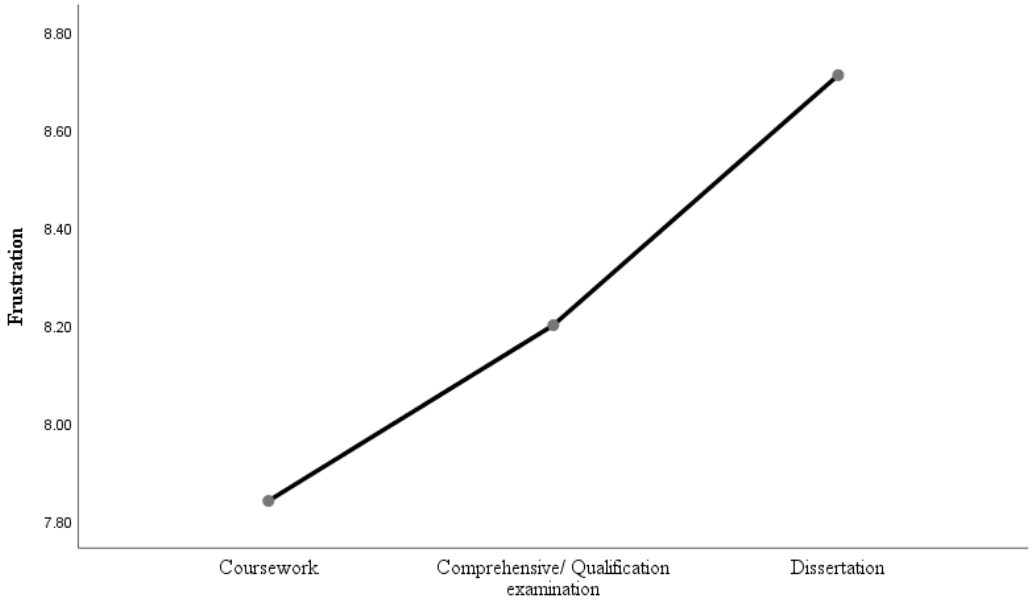


Figure 5

Frustration Time 2 in Different Stages of Doctoral Program

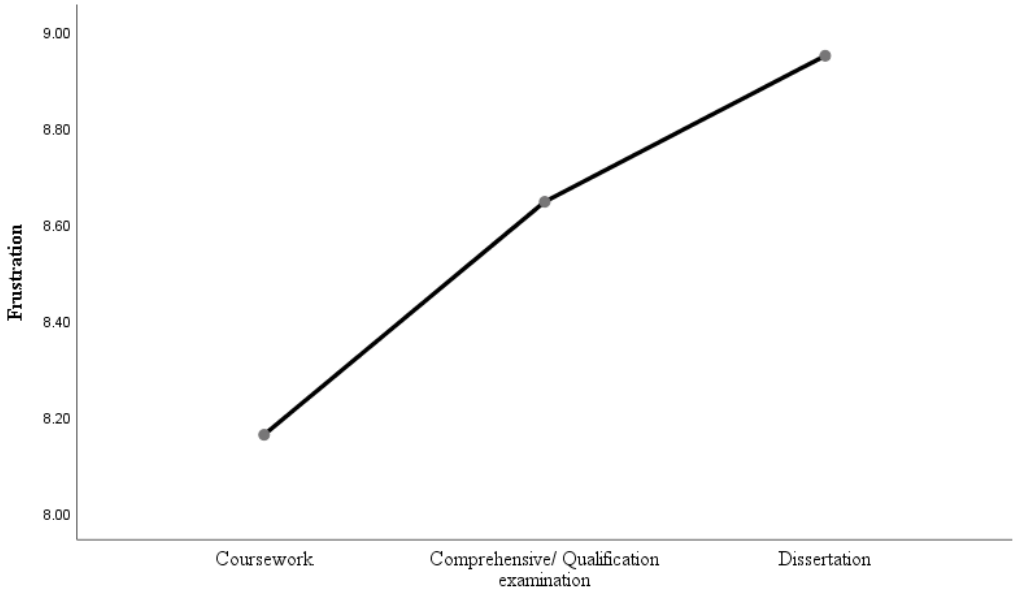


Table 3

One-Sample t-test Socialization T1 and T2

					95% Confidence Interval of the Difference	
	t	df	*p* value	Mean Difference	Lower	Upper
Socialization T1	144.984	1039	.000	47.32308	46.6826	47.9636
Socialization T2	133.683	1025	.000	45.32164	44.6564	45.9869

Note. T1: Time1; T2: Time 2.

Table 4

One-Sample t-test Anxiety T1 and T2

					95% Confidence Interval of the Difference	
	t	df	*p* value	Mean Difference	Lower	Upper
Anxiety T1	101.614	1064	.000	10.08732	9.8925	10.2821
Anxiety T2	100.982	1045	.000	10.15296	9.9557	10.3503

Note. T1: Time one; T2: Time two.

Table 5

One-Sample t-test Frustration T1 and T2

					95% Confidence Interval of the Difference	
	t	df	*p* value	Mean Difference	Lower	Upper
Frustration T1	95.560	1065	.000	8.49719	8.3227	8.6717
Frustration T2	95.735	1046	.000	8.79561	8.6153	8.9759

Note. T1: Time one; T2: Time two.

Table 6

One-Sample t-test Enjoyment T1 and T2

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	*p* value	Mean Difference	Lower	Upper
Enjoyment T1	118.987	1064	.000	9.39343	9.2385	9.5483
Enjoyment T2	117.642	1047	.000	9.22233	9.0685	9.3762

Note. T1: Time one; T2: Time two.

Table 7

One-Sample t-test Intention to Quit T1and T2

					95% Confidence Interval of the Difference	
	t	df	*p* value	Mean Difference	Lower	Upper
Intention to Quit T1	81.048	1033	.000	6.16828	6.0189	6.3176
Intention to Quit T2	81.317	1043	.000	6.40709	6.2525	6.5617

Note. T1: Time one; T2: Time two.

Chapter 5

General Discussion

Findings and Significance

In this chapter, a concise overview of the three studies is provided. These studies, encapsulated in the manuscripts of this dissertation, are centered around investigating the multifaceted aspects of well-being—emotional, social, and psychological well-being—in doctoral students across Canada, alongside their intention to quit and progress towards completing their academic programs. The objective of this research was to explore a spectrum of factors potentially influencing doctoral students during their academic journey. The approach undertaken in these manuscripts involved an in-depth examination of various dimensions: internal factors (i.e., perceived stress), external factors (i.e., supervisor support, financial support), and departmental elements (i.e., socialization). In this chapter I discuss the key findings and their practical significance of each of these studies. This is followed with a discussion of methodological considerations, strengths and weakness of each study. Finally, I discuss potential lines of further investigation, and the practical significance of the findings for universities.

Summary of Findings

Manuscript 1

The first manuscript in my dissertation focuses on how stress can negatively impact doctoral students' well-being and their intention to quit. Stress poses a significant challenge to students, negatively impacting their well-being and ability to succeed (Moate et al., 2019; Rummell, 2015). In this manuscript, I developed the study based on Núñez-Regueiro's (2017) theoretical model that explores the impact of stress on school dropout behavior. Based on the definition of stress by Lazarus and Folkman (1984), stress is the negative internal experience

that occurs when the threat or challenge exceeds the individual's ability to cope with the demands of their environment, thus endangering their well-being.

The study findings revealed a clear link between perceived stress, program satisfaction, and emotional, social, and psychological well-being. It was evident that as stress levels increased, program satisfaction decreased - not only directly but also indirectly through a decline in students' well-being (i.e., emotion and social well-being). A similar mediated path was found between stress and the intention to quit through emotion wellbeing, social well-being, and program satisfaction. This suggests that students experiencing higher stress levels may, as a result, experience lower emotional and social well-being, leading to decreased satisfaction with their program and thereby increasing their likelihood of quitting.

The study's findings suggest that academic institutions need to prioritize the mental health and well-being of their doctoral students by implementing strategies and resources aimed at reducing stress levels and enhancing students' emotional, social, and psychological well-being. By doing so, they can improve program satisfaction and reduce the likelihood of students dropping out in the early stages of their program. Universities and departments should provide mental health resources, create supportive academic environments, and make efforts to reduce potential stressors, such as providing clear guidelines for dissertation progress and improving feedback mechanisms. The lack of clarity in the structure and policies of the doctoral program for new students can elicit stress and dissatisfaction during the program (Lovitts, 2002). Future research should further investigate these relationships, potentially expanding the focus to other demographic variables such as age, ethnicity, and discipline, and exploring additional factors that may impact stress, well-being, and program satisfaction. This research is a critical step

towards understanding and addressing the complexities of stress and its impact on doctoral students, and paves the way for creating healthier, more supportive academic environments.

Manuscript 2

The second manuscript draws on the theoretical model of graduate student degree progress by Girves and Wemmerus (1988) and focuses on financial support and perceptions of faculty support as key predictors of progress. The findings from the present study significantly contribute to the literature on doctoral student success. The multivariate approach used in this study provides a comprehensive understanding of the factors that significantly influence doctoral student productivity. The results of the study are significant, as they outline the key roles of supervisor support, financial support, program satisfaction, general satisfaction, and social involvement in doctoral student success.

The results of analyses showed that supervisor support is the strongest predictor of general satisfaction, program satisfaction, and social involvement among doctoral students. A positive relationship between supervisors and students can provide emotional support, guidance, and motivation, leading to better student well-being (Curtin et al., 2013; Gu et al., 2017; Kuo et al., 2017; Schlosser & Gelso, 2001). A good relationship can also enhance students' self-efficacy, self-esteem, and overall satisfaction with the program, contributing to a more positive doctoral experience (Chami-Malaeb, 2022; de Kleijn et al., 2012). These relationships highlight the crucial role supervisors play in doctoral students' academic experiences and underscore the importance of fostering effective and collaborative relationships between supervisors and students. The study finding reinforces the existing knowledge that strong, supportive supervisor-student relationships can improve student outcomes and productivity and offers guidance for institutions and supervisors seeking to bolster doctoral students' success.

Moreover, the study revealed the complex interplay between financial support, satisfaction, and social involvement. It showed that financial support, particularly in the form of research assistantships, is indirectly associated with productivity through its influence on social involvement. This knowledge could potentially shape the way institutions allocate financial resources, providing evidence that funding plays a significant role not only in relieving the financial stress of students but also in enhancing their academic experience and productivity. This study also showed that social involvement is a significant mediator of the relationship between both supervisor support and financial support, and research productivity. This finding underscores the importance of social involvement in doctoral students' academic success, suggesting that creating opportunities for students to engage socially within their departments could contribute to higher productivity.

The study sheds light on the complex dynamics involved in doctoral students' success. It suggests that a multifaceted approach, focusing on financial support, supervisor support, and fostering social involvement, can greatly enhance the doctoral students' experience, satisfaction, and productivity levels. The findings carry practical implications for graduate education by informing efforts to better support doctoral students and enhance their overall performance and well-being. The fact that the study was carried out on in a large sample (18,822 doctoral students) gives greater credibility to the findings and their generalizability. These results will be crucial in informing policy making in graduate education and providing targeted support to doctoral students. However, it is important to recognize that the study model does not explain all variations in doctoral students' success, suggesting that other factors not included in this study might play a role. These findings have the potential to improve doctoral education by providing a clear understanding of the factors that significantly contribute to doctoral students'

success. This study offers a roadmap for institutions, supervisors, and policymakers seeking to enhance the support structures and resources available to doctoral students, ultimately helping to foster their academic success and well-being.

Manuscript 3

The third manuscript draws on Weidman et al.'s *Socialization Theory* (2001,2003, 2020), which sought to understand the role of socialization in doctoral students' well-being and their intention to quit. The results offered a nuanced perspective on the relationships between these variables.

The result demonstrated a direct positive relationship between the initial socialization of doctoral students and their reported well-being at a later point in their programs. This result, while somewhat anticipated, nevertheless provides important empirical evidence confirming our first hypothesis. It highlights the role of socialization not merely as an initiation process into the academic community, but also as a mechanism influencing students' mental health. The processes of engaging in scholarly dialogues, developing academic and professional relationships, and negotiating the norms of the academic community, as part of socialization, contribute to enhancing a sense of belonging among doctoral students (Curtin et al., 2013; Miller & Orsillo, 2020; Weidman, 2020). Such a sense of belonging plays a critical role in their emotional health and overall satisfaction with their doctoral journey (Miller & Orsillo, 2020).

This study provided critical insights into the role of socialization at various stages and years of a doctoral program. As hypothesized, significant differences were observed in socialization at different stages of the doctoral program. Variations were seen in socialization across different stages and years of the program. The nature and extent of academic tasks and social interactions evolved over time as students navigated their doctoral journey. As students

progressed through their program, they became more engaged in scholarly activities and student-faculty and student-peer interactions (Tinto, 1975, 1977, 2006, 2012a). This indicates a likely increase in their academic competence and social involvement. However, the result of our study showed that students' perception of the departmental climate declined over time. This could reflect their growing awareness or experience of departmental dynamics, or it might point to a gradual sense of disenchantment that accumulates over the years (Golde, 2005). This research also highlighted gender differences in the perception of departmental climate. Male doctoral students reported a better departmental climate for socialization than their female counterparts. This finding suggests a potential role of gender in shaping experiences or expectations within the academic environment.

The findings of this study present a nuanced understanding of the role of socialization in the well-being and intentions of doctoral students to quit their program. However, given the complex dynamics observed, future research is required to explore these relationships further and uncover effective strategies to enhance socialization, well-being, and satisfaction among doctoral students. This knowledge could be instrumental in developing strategies to support doctoral students' success and reduce dropout rates. Creating a supportive environment can enhance graduate students progress (Dericks et al., 2019), and lead to increased chances for teamwork, mentorship, and academic contributions (de Valero, 2001; Weidman & Stein, 2003). On the other hand, a negative departmental environment can amplify feelings of isolation (Ali & Kohun, 2006, 2007), foster a more competitive academic backdrop (Virtanen et al., 2017), and result in diminished faculty assistance in areas like academic, emotional, and cultural aspects (Posselt, 2018).

Methodological Considerations

Manuscript 1

In the first manuscript of my dissertation, I collected data from the Canadian research-intensive universities and performed a range of statistical analyses, including independent sample *t*-tests, one-way ANOVAs, Pearson correlation coefficients, and structural equation modeling (SEM).

First, the independent-sample *t*-test conducted in the preliminary analyses showed significant gender differences in perceived stress. Specifically, female students reported higher stress levels than their male counterparts. This signifies a unique stress experience for female students, potentially influenced by a variety of factors including balancing academic obligations with personal life responsibilities, societal expectations, and implicit biases in academia. This result is in line with previous studies, suggesting that female doctoral students face more stress and mental fatigue compared to males (Brown & Watson, 2010; Dahlin et al., 2005), and further underscores the importance of tailored interventions and support systems within academic settings to cater to these differentiated experiences.

Second, one-way ANOVAs were performed to assess the variations in study variables across different years and stages. Significant differences were found in program satisfaction across different years of the program, with first-year doctoral students showing significantly higher satisfaction than third (*M* difference = 1.52, $p = .04$), fourth (M difference = 2.79, $p < .001$), and fifth-year students (*M* difference = 3.43, $p < .001$). This downward trend of satisfaction could be due to the increasing complexity and autonomous nature of doctoral programs as students' progress, shifting from structured coursework to the challenging dissertation phase.

Further supporting this point, program satisfaction was significantly lower in the dissertation stage than in the coursework stage, suggesting a major shift in student experience and satisfaction as they transition into the dissertation phase. This is reflective of the literature that states that doctoral students often experience stress and a lack of "*breathing space*" during the dissertation stage due to the shift to independent work with limited interaction and feedback from peers and faculty (Ali & Kohun, 2006; Offstein et al., 2004).

Moreover, the study also used Pearson correlation coefficients to gauge the linear relationships between continuous variables. The results highlighted anticipated perceived stress as negatively correlating with emotional, social, and psychological well-being, as well as program satisfaction. On the contrary, a positive correlation was found between stress and intention to quit. This pattern of associations indicates that stress levels not only have a negative association with students' well-being and satisfaction but also contribute to the likelihood of their discontinuation of the program.

In the main analyses, SEM was employed to test the theoretical models and hypotheses of the study. These models presented emotional, social, and psychological well-being as mediators between perceived stress and program satisfaction, with program satisfaction also serving as a mediator between these well-being variables and the intention to quit. The model revealed an acceptable fit, indicating that higher levels of stress were associated with lower levels of well-being (emotional, social, psychological), which, in turn, negatively influenced program satisfaction. Furthermore, lower program satisfaction was associated with higher intentions to quit.

Manuscript 2

In second manuscript in my dissertation, I used data from the Canadian Graduate and Professional Student Survey (CGPSS). The study incorporates a sample of 18822 doctoral students from 53 universities across Canada, collected in 2016. Information about the students' demographics, stage of program, financial support, and supervisor support was collected. Students' productivity was measured in terms of research presentations and publications. Social involvement was gauged through the frequency of attending social activities, while program satisfaction was evaluated using a 13-item scale.

I used RStudio for data management and analysis. Correlational analyses and one-way analyses of variances (ANOVAs) were utilized to examine potential relationships and differences within the data. Structural equation modeling (SEM) was employed to understand whether general satisfaction, program satisfaction, and social involvement mediated the relationships between financial support, supervisor support, and research progress.

The initial findings showed significant gender differences in program satisfaction, supervisor support, and social involvement, with males reporting more in all three domains. Supervisor support was strongly and positively correlated with general satisfaction, satisfaction with the program, and social involvement, but only weakly correlated with progress.

Factor analysis identified five key constructs: supervisor support, general satisfaction, program satisfaction, social involvement, and progress. These constructs, alongside single items measuring teaching and research assistantship, were included in the structural equation modeling. The model indicated a good fit, showing general satisfaction, satisfaction with the program, and social involvement as mediators between supervisor support, research assistantship, teaching assistantship, and progress in presentations and publications. The study

offers a robust methodological approach using a large sample size and in-depth statistical analysis, enabling it to generate detailed insights into the factors affecting doctoral students' research progress.

Manuscript 3

The third manuscript in my dissertation succeeded in securing a robust sample size, with 2,486 doctoral students participating in the first phase and 1,137 of these participating in the second phase. This large and diverse sample enhanced the generalizability of the findings to the broader population of doctoral students in Canada. Further, it should be noted that 64.7% of the participants were female, indicating a possible gender bias in the sample that could affect the findings' representativeness. The longitudinal design of the study, with data collected at two time points, enabled the investigation of temporal dynamics among the constructs. This was a significant strength of the study, as it allowed for the testing of autoregressive effects and cross-lagged effects, providing insights into the stability of the constructs over time and their predictive influence on one another. A variety of analytical techniques, including Pearson correlation coefficients, one-way ANOVAs, independent-sample t-tests, and cross-lagged panels, were employed to provide depth to the insights.

Pearson correlation coefficients, a cornerstone in my analysis, revealed that anticipated socialization was positively correlated with enjoyment. This positive association might suggest that as students feel more integrated within their academic environment, they derive more enjoyment from their studies. Conversely, anticipated socialization negatively correlated with anxiety, frustration, and the intention to quit. These findings echo the fundamental role of early academic integration in shaping students' emotional trajectories and their potential future decisions within the doctoral program.

One-way ANOVAs played a crucial role in the clarification of disparities in important research variables across different years and stages of the doctoral program. The results indicated a significant divergence in frustration levels during different stages of the program, both at Time 1 and Time 2. A noteworthy observation was that students manifested heightened levels of frustration during the dissertation stage, a stark contrast to the coursework stage. This aligns with the widely accepted notion that the dissertation phase, marked by independent research and reduced structured guidance, can be a particularly taxing period for students. Moreover, there were significant variations in socialization perceptions across program years.

The results of the study indicate that first-year doctoral students had more positive views of the departmental atmosphere for academic socialization in comparison to their peers in the fourth year of their Ph.D. program. The decline in enthusiasm seen in the latter years might be ascribed to several factors, including heightened academic expectations and evolving dynamics within the department. Moreover, gender differences were salient in our study, especially in the perception of the departmental climate for academic socialization. Males seemed to have a more positive view in both Time 1 and Time 2 compared to their female counterparts. This gender discrepancy, further emphasized by females' heightened anxiety levels at both time points, accentuates the need to be conscious of gender-specific challenges and experiences in doctoral programs.

The findings from the cross-lagged panel analysis provided strong evidence in support of the main aim of our research, which was to understand the changing relationships between the variables of socialization, emotional well-being, and intention to quit over two different time periods. The structural equation modeling (SEM) analysis demonstrated autoregressive effects, indicating a significant level of stability in the variables between Time 1 and Time 2. The

observed consistency implies that certain fundamental emotions and perceptions persist significantly as students go through their Ph.D. program. Moreover, the cross-lagged effects revealed substantial associations between the variables. For example, the early socialization experienced by the student had a negative impact on their anxiety levels. These results highlight the significance of early academic experiences and surroundings in influencing the emotional states and goals of doctorate candidates. This manuscript employs a variety of analytical methods to provide a comprehensive analysis of the complex relationship between socialization, emotional well-being, and the intention to quit among doctoral students. It sheds light on the diverse factors that impact their academic journey.

Contributions to Knowledge

Manuscript 1

While previous studies have recognized that stress exists within doctoral studies, this research further examines the quantitative impact of stress on the emotional, social, and psychological well-being of doctoral students. This adds depth to our understanding of how stress affects doctoral students on multiple dimensions of well-being. A unique aspect of this research is the exploration of emotional and social well-being as mediators between perceived stress and program satisfaction, as well as the intention to quit. This introduces the novel idea that by improving emotional and social well-being, we could potentially mitigate the negative effects of stress on program satisfaction and attrition rates. A notable finding of the study is the gender difference in perceived stress, with female doctoral students reporting higher stress levels. This significant result emphasizes the need for gender-sensitive strategies in doctoral program support systems, contributing to a more inclusive understanding of the doctoral experience.

The study also extends the knowledge on the temporal aspect of the doctoral journey, revealing a decline in program satisfaction from the first year to the dissertation stage. This temporal perspective enriches our understanding of how doctoral students' experiences and satisfaction evolve throughout their journey, emphasizing the need for stage-specific support mechanisms. From a methodological standpoint, the study also contributes to the field by employing Structural Equation Modeling (SEM) to test a comprehensive mediational model that links perceived stress, well-being, program satisfaction, and intention to quit. This rigorous methodology and the developed model could guide future research in this area. These unique contributions significantly broaden our understanding of the doctoral student experience, highlighting the critical roles of stress and well-being. The study underscores the importance of stress management and well-being support in doctoral programs to enhance student satisfaction and reduce attrition rates, laying the groundwork for more effective strategies in managing the doctoral journey.

Manuscript 2

While prior studies have separately considered the influence of supervisor support and financial support (e.g., research and teaching assistantships) on student outcomes, our study is one of the few to analyze both factors together. This comprehensive approach allowed us to identify how each type of support contributes differently to student satisfaction and progress. In particular, I found that while both types of support are important, supervisor support seems to have a stronger influence on general satisfaction, program satisfaction, and social involvement than does financial support. This study highlighted the key mediating role of social involvement in the relationship between assistantship support (both teaching and research) and progress (i.e., presentations and publications). This emphasizes the critical role of a supportive and inclusive

academic community in facilitating doctoral students' research productivity. My study utilized a large sample of 18,822 doctoral students, contributing a substantial amount of empirical data to the literature on doctoral education. Our findings add weight to previous studies on the positive effects of supervisor and financial support and provide new insights into the role of social involvement and satisfaction as mediators in the relationship between support and student productivity.

Manuscript 3

Prior research in the field was limited in scope, focusing on individual elements such as socialization or intention to quit in isolation and they relied on cross-sectional study designs, which make it difficult to distinguish the direction of influences on student wellbeing and program characteristics, given that more distressed students could give more negative or cynical appraisals of their learning environment. This research enhances our understanding of these elements by examining them in an interconnected manner. The significant associations between socialization, well-being, and the intention to quit among doctoral students clarifies a broader, more comprehensive picture of the doctoral experience, revealing a complex interplay of factors affecting student outcomes.

Using a cross-lagged panel model analysis provided empirical evidence for predictive relationships among the three primary constructs. It demonstrated that socialization at one point in time could predict well-being and socialization at a later point. Additionally, the intention to quit at one point strongly indicated the intention to quit at time two. Collectively, this evidence strengthens the case for a potential causal relationship, adding a new dimension to understanding these dynamics in academic settings.

The study's findings have valuable implications for how doctoral programs are structured and operated. By highlighting the potential impact of socialization on doctoral students' well-being and intention to quit, this research underscores the need for effective socialization practices within these programs. Therefore, it contributes practical knowledge that can be applied to improve doctoral student experiences and outcomes. This research offers substantial contributions to the knowledge base in this area, providing novel insights into the interconnected nature of socialization, well-being, and intention to quit in the doctoral student experience. It also underscores the potential value of effective socialization practices within doctoral programs and paves the way for future research on this important topic.

Future Directions

The results obtained from this dissertation suggest a renewed direction for research and practice within the domain of doctoral education. Nevertheless, there remain several opportunities for future exploration and enhancements that can further optimize the doctoral experience.

First, the gender disparity observed in stress perception among doctoral students as noted in Manuscript One signals an avenue for further research. It would be interesting to explore the underlying reasons for this divergence, and to investigate whether other demographic variables such as ethnicity, age, or socio-economic status affect the stress levels and experiences of doctoral students. This could result in the development of more personalized and effective support systems for different subsets of students, thus enhancing inclusivity in doctoral programs. Additionally, the mediating role of emotional and social well-being between perceived stress and program satisfaction or intention to quit, as identified in Manuscript One, opens doors to further explore the specific mechanisms of these mediating effects. Future

research could aim to explore these relationships, with an emphasis on the development and testing of interventions that promote emotional and social well-being to enhance program satisfaction and reduce attrition rates. Since the first study measured perceived stress via a questionnaire, future research could focus on clinical stress as the primary variable and conduct an experimental study to explore this aspect more thoroughly.

In Manuscript Two, the central role of social involvement in fostering satisfaction and research productivity underscores the importance of cultivating a vibrant and supportive doctoral community. However, the means to cultivate such an environment are still under-researched. Future studies could evaluate different strategies for fostering social involvement, as well as identifying barriers that doctoral students may face in participating in social activities. The longitudinal aspect of Manuscript Three invites further exploration into the dynamic nature of the doctoral experience over time. It would be beneficial to conduct longer-term studies to capture the evolution of students' experiences across different stages of the doctoral journey, and how interventions at different stages could effectively optimize their experience and outcomes.

In terms of practical applications, all three manuscripts suggest that universities and program administrators should take proactive steps in creating an inclusive, supportive, and stimulating environment. Future work could focus on designing and implementing interventions that not only enhance well-being and social involvement, but also strengthen the quality of supervisor support and optimize financial assistance systems. Finally, as all the manuscripts in this dissertation used quantitative methods, future research could benefit from integrating qualitative methods to capture the nuances of the doctoral experience. This could include in-depth interviews or focus groups, allowing a more holistic understanding of the lived

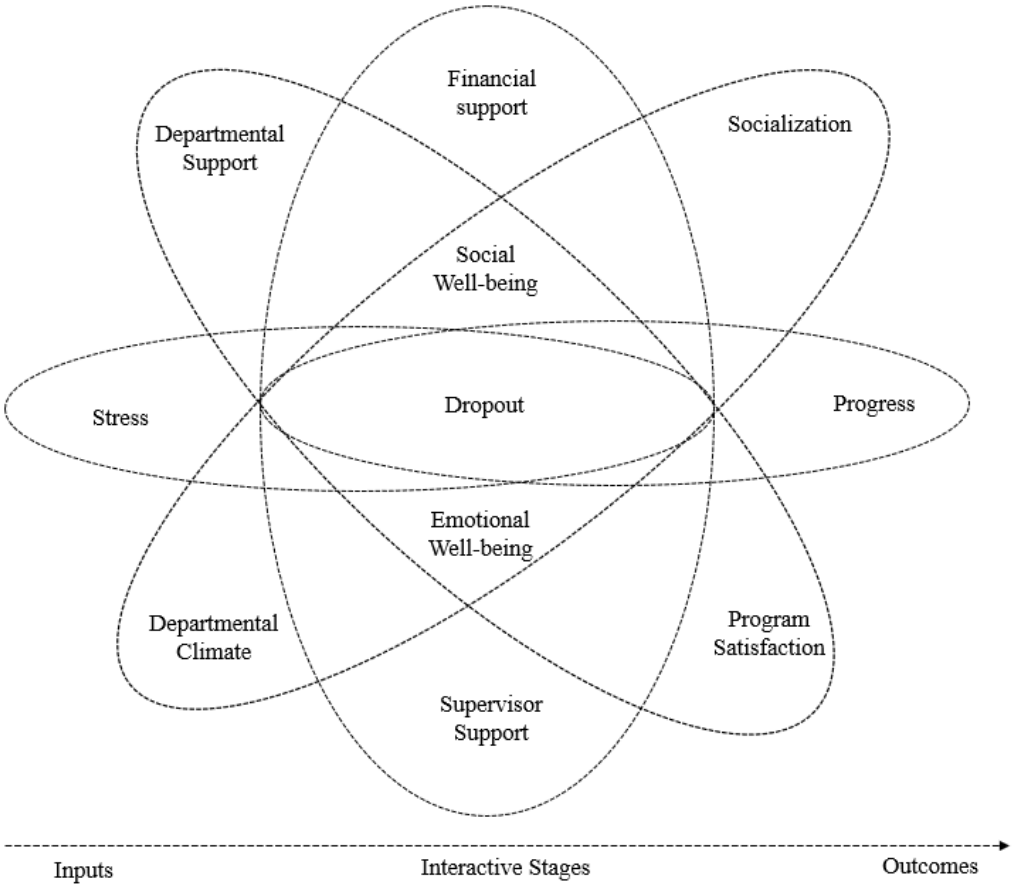
experiences of doctoral students. In conclusion, while this dissertation has offered valuable insights and contributions to the field of doctoral education; however, it is imperative to recognize that the exploration within this domain remains ongoing. The need for ongoing research and evolution in the field is evident, with the ultimate aim of improving the doctoral experience for all students.

Concluding Statement

The comprehensive research journey undertaken through this dissertation sheds new light on the multifaceted nature of doctoral experience. It underscores the critical roles of stress and well-being, the importance of social involvement and supportive systems, and the dynamic interplay of various factors influencing doctoral students' productivity, and intention to quit (see Figure 1).

Figure 1

Proposed Model of Doctoral Students Progress



These findings have provided valuable insights into the complexities of the doctoral journey and broadened our understanding of doctoral students' diverse experiences. However, our work does not end here. The path ahead is rich with opportunities for further exploration and innovation. From the insights gathered, fostering a supportive, inclusive, and stimulating doctoral experience requires a sustained commitment to understanding and addressing doctoral students' unique needs and challenges.

Departments and policymakers must consistently strive to create an environment that promotes academic growth and upholds emotional and social well-being. In such an environment, doctoral students can not only persevere but also thrive. They can experience satisfaction and achievement throughout their journey while ensuring that the seeds of curiosity,

resilience, and innovation are regularly sown and nurtured.

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Appendix A

McGill University Research Ethic Certificate

McGill

Research Ethics Board Office
James Administration Bldg.
845 Sherbrooke Street West. Rm 325
Montreal, QC H3A 0G4

Tel: (514) 398-6831

Website: www.mcgill.ca/research/research/compliance/human/

Research Ethics Board 2
Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 20-12-025

Project Title: The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic

Principal Investigator: Samira Feizi

Department: Psychology

Status: Ph.D. Student

Supervisor: Professor Francis Jason Elgar

Funding: Canadian Research Chair (Tier 2)

Approval Period: January 6, 2021 – January 5, 2022

The REB 2 reviewed and approved this project by delegated review in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Participants and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.

Georgia Kalavritinos
Ethics Review Administrator

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* Approval is granted only for the research and purposes described.
* Modifications to the approved research must be reviewed and approved by the REB before they can be implemented.
* A Request for Renewal form must be submitted before the above expiry date. Research cannot be conducted without a current ethics approval. Submit 2-3 weeks ahead of the expiry date.
* When a project has been completed or terminated, a Study Closure form must be submitted.
* Unanticipated issues that may increase the risk level to participants or that may have other ethical implications must be promptly reported to the REB. Serious adverse events experienced by a participant in conjunction with the research must be reported to the REB without delay.
* The REB must be promptly notified of any new information that may affect the welfare or consent of participants.
* The REB must be notified of any suspension or cancellation imposed by a funding agency or regulatory body that is related to this study.
* The REB must be notified of any findings that may have ethical implications or may affect the decision of the REB.

Appendix B

Carlton University Research Ethic Certificate

Carleton
UNIVERSITY
Canada's Capital University

Office of Research Ethics
4500 ARISE Building | 1125 Colonel By Drive
Ottawa, Ontario K1S 5B6
613-520-2600 Ext: 4085
ethics@carleton.ca

CERTIFICATION OF INSTITUTIONAL ETHICS CLEARANCE

The following research has been granted clearance by the Carleton University Research Ethics Board-B (CUREB-B). CUREB-B is constituted and operates in compliance with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2).

Ethics Clearance ID: Project # 115345

Project Team Members: Mrs. Samira Feizi (Primary Investigator)
Frank Elgar (Research Supervisor)

Study Title: The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic

Funding Source: (If applicable):

Effective: March 01, 2021 **Expires:** March 31, 2022

This certification is subject to the following conditions:

1. Clearance is granted only for the research and purposes described in the application.
2. Any modification to the approved research must be submitted to CUREB-B via a Change to Protocol Form. All changes must be cleared prior to the continuance of the research.
3. An Annual Status Report for the renewal or closure of ethics clearance must be submitted and cleared by the renewal date listed above. Failure to submit the Annual Status Report will result in the closure of the file. If funding is associated, funds will be frozen.
4. During the course of the study, if you encounter an adverse event, material incidental finding, protocol deviation or other unanticipated problem, you must complete and submit a Report of Adverse Events and Unanticipated Problems Form.
5. It is the responsibility of the student to notify their supervisor of any adverse events, changes to their application, or requests to renew/close the protocol.
6. Failure to conduct the research in accordance with the principles of the *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans 2nd edition* and the *Carleton*

University Policies and Procedures for the Ethical Conduct of Research may result in the suspension or termination of the research project.

IMPORTANT: Special requirements for COVID-19:

If this study involves **in-person research interactions with human participants,** whether on- or off-campus, the following rules apply:

1. Upon receiving clearance from CUREB, please seek the approval of the relevant Dean for your research. Provide a copy of your CUREB clearance to the Dean for their records. See Principles and Procedures for On-campus Research at Carleton University and note that this document applies both to on- and off-campus research that involves human participants. Please contact your Dean's Office for more information about obtaining their approval.
2. Provide a copy of the Dean's approval to the Office of Research Ethics prior to starting any in-person research activities.
3. If the Dean's approval requires any significant change(s) to any element of the study, you must notify the Office of Research Ethics of such change(s).

Upon reasonable request, it is the policy of CUREB, for cleared protocols, to release the name of the PI, the title of the project, and the date of clearance and any renewal(s).

Please email the Research Compliance Coordinators at ethics@carleton.ca if you have any questions.

CLEARED BY: **Date: March 01, 2021**

Bernadette Campbell, PhD, Chair, CUREB-B

Natasha Artemeva, Co-Chair, PhD, Vice Chair, CUREB-B

Appendix C

Concordia University Research Ethic Certificate

UNIVERSITÉ Concordia UNIVERSITY

CERTIFICATION OF ETHICAL ACCEPTABILITY
FOR RESEARCH INVOLVING HUMAN SUBJECTS

Name of Applicant:	Samira Feizi
Department:	McGill University \ Psychology
Agency:	N/A
Title of Project:	The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic
Certification Number:	30014811

Valid From: March 01, 2021 To: February 28, 2022

The members of the University Human Research Ethics Committee have examined the application for a grant to support the above-named project, and consider the experimental procedures, as outlined by the applicant, to be acceptable on ethical grounds for research involving human subjects.

Richard DeMont

Dr. Richard DeMont, Chair, University Human Research Ethics Committee

Appendix D

Dalhousie University Research Ethic Certificate

REB # 2021-5488 Acknowledgement Letter

ethics@dal.ca <ethics@dal.ca>
Thu 2/18/2021 9:30 AM
To: Samira Feizi, Ms <samira.feizi@mcgill.ca>
Cc: Frank Elgar, Dr. <frank.elgar@mcgill.ca>; ethics@dal.ca <ethics@dal.ca>

DALHOUSIE UNIVERSITY
Research Services

Social Sciences and Humanities Research Ethics Board
Letter of Acknowledgement

February 18, 2021

Samira Feizi
McGill University

Dear Samira,

File #: **2021-5488**
Project Title: **The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic**

On behalf of the Social Sciences and Humanities Research Ethics Board, I am writing to acknowledge receipt of your approved research ethics submission and the associated REB approval letter. Dalhousie University has authorized me to recognize the McGill University REB as the board of record for this research involving humans on the condition that this research complies with Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans and that this research will be undertaken under the oversight of the McGill University REB.

If at any point the scope of this research involving humans is not overseen by the board of record named above, you must immediately advise the Dalhousie University research ethics board. In such instances, an application to the Dalhousie REB will be required and no research involving humans may be undertaken without active REB approval from the board of record or the Dalhousie University research ethics board.

For the duration of the research project involving humans, you are expected to comply with the oversight requirements of the board of record, including documenting changes, reporting incidents or adverse events and annual/final reporting responsibilities. Additional ethical review by the Dalhousie University REB is therefore not required.

Sincerely,

Dr. Karen Foster
Chair, Social Sciences and Humanities Research Ethics Board

Appendix E

McMaster University Research Ethic Certificate

McMaster University | Research Ethics Board

McMaster University Research Ethics Board (MREB)
c/o Research Office for Administrative Development and Support
MREB Secretariat, GH-305
1280 Main St. W.
Hamilton, Ontario, L8W 4L8
email: ethicsoffice@mcmaster.ca
Phone: 905-525-9140 ext. 23142

CERTIFICATE OF ETHICS CLEARANCE TO INVOLVE HUMAN PARTICIPANTS IN RESEARCH

Today's Date: May/31/2021

Supervisor: Dr. Frank Elgar
Student Investigator: Ms. Samira Feizi
Applicant: Samira Feizi
Project Title: The Role of Social and Departmental Support in the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic
MREB#: 5343

Dear Researcher(s)

The ethics application and supporting documents for MREB# 5343 entitled "The Role of Social and Departmental Support in the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic" have been reviewed and cleared by the MREB to ensure compliance with the Tri-Council Policy Statement and the McMaster Policies and Guidelines for Research Involving Human Participants.

The application protocol is cleared as revised without questions or requests for modification. The above named study is to be conducted in accordance with the most recent approved versions of the application and supporting documents.

If this project includes planned in-person contact with research participants, then procedures for addressing COVID-19 related risks must be addressed according to the current processes communicated by the Vice-President (Research) and your Associate Dean (Research). All necessary approvals must be secured before in-person contact with research participants can take place.

Ongoing clearance is contingent on completing the Annual Report in advance of the yearly anniversary of the original ethics clearance date: May/31/2022. If the Annual Report is not submitted, then ethics clearance will lapse on the expiry date and Research Finance will be notified that ethics clearance is no longer valid (TCPS, Art. 6.14).

An Amendment form must be submitted and cleared before any substantive alterations are made to the approved research protocol and documents (TCPS, Art. 6.16).

Researchers are required to report Adverse Events (i.e. an unanticipated negative consequence or result affecting participants) to the MREB secretariat and the MREB Chair as soon as possible, and no more than 3 days after the event occurs (TCPS, Art. 6.15). A privacy breach affecting participant information should also be reported to the MREB secretariat and the MREB Chair as soon as possible. The Reportable Events form is used to document adverse events, privacy breaches, protocol deviations and participant complaints.

Document Type	File Name	Date	Version
External Review Documents	reb_application_FE (Last revision - January 6)	Jan/06/2021	1
External Review Documents	Appendix A - Consent Form	Jan/06/2021	1
External Review Documents	Appendix B&C - Recruitment Announcements	Jan/06/2021	1
External Review Documents	Appendix D - Questionnaires	Jan/06/2021	1
External Review Documents	McGill University - REB Approval Certifcate	Jan/06/2021	1
External Review Documents	Ethics Correspondence	Jan/06/2021	1
External Review Documents	University of Manitoba REB Approval	Feb/09/2021	1
External Review Documents	STFX REB Approval	Feb/09/2021	1
External Review Documents	Université de Sherbrooke REB Approval	Feb/10/2021	1
External Review Documents	Appendix A - Consent Form	Apr/12/2021	1
External Review Documents	Appendix B - Recruitment Email	Apr/12/2021	1
External Review Documents	Appendix C - Online Recruitment	Apr/12/2021	1
Response Documents	Summary of Revisions_V1_20210525	May/25/2021	1

Dr. Violetta Igneski

V Igneski

Appendix F

Memorial University of Newfoundland University Research Ethic Certificate

MEMORIAL UNIVERSITY

Interdisciplinary Committee on
Ethics in Human Research (ICEHR)

St. John's, NL Canada A1C 5S7
Tel: 709 864-2561 icehr@mun.ca
www.mun.ca/research/ethics/humans/icehr

ICEHR Number:	**20211445-EX**
Approval Period:	April 16, 2021 – April 30, 2022
Funding Source:	
Responsible Faculty:	Dr. Frank Elgar McGill University
Title of Project:	*The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic*

April 16, 2021

Mrs. Samira Feizi
McGill University

Dear Mrs. Feizi:

Thank you for your submission to the Interdisciplinary Committee on Ethics in Human Research (ICEHR) with McGill University Research Ethics Board application #20-12-025 and their approval for your project entitled *"The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic."* The Committee has reviewed the documents and agrees that the proposed project is consistent with the guidelines of the *Tri-Council Policy Statement on Ethical Conduct for Research Involving Humans (TCPS2)*. Full ethics clearance is granted to *recruit Memorial University doctoral students by asking the School of Graduate Studies, Graduate Student Union, or other Memorial University departments to forward the recruitment materials on your behalf; and to conduct an online survey,* provided all approved protocols are followed. Please be advised that ICEHR approval applies to the ethical acceptability of the research, as per Article 6.3 of the *TCPS2*, and does not constitute agreement on behalf of any department(s) and/or unit(s) to facilitate your research here at Memorial.

The *TCPS2* **requires** that you submit an Annual Update to ICEHR before April 30, 2022. If you plan to continue the project, you need to request renewal of your ethics clearance and include a brief summary on the progress of your research. When the project no longer involves contact with human participants, is completed and/or terminated, you are required to provide an annual update with a brief final summary and your file will be closed. If you need to make changes during the project which may raise ethical concerns for the Memorial component of the project, you must submit an Amendment Request with a description of these changes for the Committee's consideration prior to implementation.

All post-approval event forms noted above can be submitted from your Researcher Portal account by clicking the *Applications: Post-Review* link on your Portal homepage. We wish you success with your research.

Yours sincerely,

Russell J. Adams, Ph.D.
Chair, Interdisciplinary Committee on
Ethics in Human Research
Professor of Psychology and Pediatrics
Faculties of Science and Medicine

RA/bc

Appendix G

Queen's University Research Ethic Certificate

February 22, 2021

Mrs. Samira Feizi
Ph.D. Candidate
Institute for Health and Social Policy
McGill University
Charles Meredith House
1130 Avenue Des Pins Ouest
Montreal, PQ H3A 1A3

GREB Ref #: GEXT-070-21; TRAQ 6032025
Title: "GEXT-070-21 The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic"

Dear Mrs. Feizi:

The General Research Ethics Board (GREB), by means of a delegated board review, has cleared your proposal entitled **"GEXT-070-21 The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic"** for ethical compliance with the Tri-Council Guidelines (TCPS 2) and Queen's ethics policies. In accordance with the Tri-Council Guidelines (Article 6.14) and Standard Operating Procedures (405), your project has been cleared for one year.

You are reminded of your obligation to submit an annual renewal form prior to the annual renewal due date (access this form at http://www.queensu.ca/traq/signon.html/; click on "Events;" under "Create New Event" click on "General Research Ethics Board Annual Renewal/Closure Form for Cleared Studies"). Please note that when your research project is completed, you need to submit an Annual Renewal/Closure Form in Romeo/traq indicating that the project is 'completed' so that the file can be closed. This should be submitted at the time of completion; there is no need to wait until the annual renewal due date.

You are reminded of your obligation to advise the GREB of any adverse event(s) that occur during this one-year period (access this form at http://www.queensu.ca/traq/signon.html/; click on "Events;" under "Create New Event" click on "General Research Ethics Board Adverse Event Form"). An adverse event includes, but is not limited to, a complaint, a change or unexpected event that alters the level of risk for the researcher or participants or situation that requires a substantial change in approach to a participant(s). You are also advised that all adverse events must be reported to the GREB within 48 hours.

You are also reminded that all changes that might affect human participants must be cleared by the GREB. For example, you must report changes to the level of risk, applicant characteristics, and implementation of new procedures. To submit an amendment form, access the application by at http://www.queensu.ca/traq/signon.html; click on "Events;" under "Create New Event" click on "General Research Ethics Board Request for the Amendment of Approved Studies." Once submitted, these changes will automatically be sent to the Ethics Coordinator, GREB, at University Research Services for further review and clearance by GREB or the Chair, GREB.

On behalf of the General Research Ethics Board, I wish you continued success in your research.

Sincerely,

Chair, General Research Ethics Board (GREB)
Professor Dean A. Tripp, PhD
Departments of Psychology, Anesthesiology & Urology Queen's University

c: Dr. Frank J. Elgar, Supervisor

Appendix H

Toronto Metropolitan (Ryerson) University Research Ethic Certificate

Ryerson University Research Ethics Board

To: Samira Feizi
Re: REB 2021-074: The Role of Social and Departmental Support in the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic
Date: April 16, 2021

Dear Samira Feizi,

The review of your protocol REB File REB 2021-074 is now complete. The project has been approved for a one year period. Please note that before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required.

This approval may be extended after one year upon request. Please be advised that if the project is not renewed, approval will expire and no more research involving humans may take place. If this is a funded project, access to research funds may also be affected.

Please note that REB approval policies require that you adhere strictly to the protocol as last reviewed by the REB and that any modifications must be approved by the Board before they can be implemented. Adverse or unexpected events must be reported to the REB as soon as possible with an indication from the Principal Investigator as to how, in the view of the Principal Investigator, these events affect the continuation of the protocol.

Finally, if research subjects are in the care of a health facility, at a school, or other institution or community organization, it is the responsibility of the Principal Investigator to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the REB prior to the initiation of any research.

Please quote your REB file number (REB 2021-074) on future correspondence.

Congratulations and best of luck in conducting your research.

Dr. Asher Alkoby, LL.B., LL.M., S.J.D.
Chair, Ryerson University Research Ethics Board
(416)979-5000 ext. 2491
aalkoby@ryerson.ca
rebchair@ryerson.ca
http://www.ryerson.ca/research

Appendix I

University of Western Ontario Research Ethic Certificate

Western Research

Western University
Room 5150 Support Services Building, 1393 Western Road
London, Ontario, Canada, N6G 1G9
Tel: 519-661-2161
ethics@uwo.ca

Date: February 17, 2021
To: Samira Feizi, McGill University
Study Title: The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic
Review Type: Administrative Review

Dear Ms. Samira Feizi,

The Office of Human Research Ethics, on behalf of Western University's Research Ethics Boards, has conducted an administrative review of the McGill University approved study documents, and has determined that this research can be conducted at Western University as outlined in the following documents:

- reb_application_FE (Last revision - January 6).pdf
- Approval Certifcate (FEIZI)#20-12-025.pdf
- Email to ethics@uwo.ca dated Feburary 7, 2021 describing the plan to recruit through Western's Society of Graduate Students and School of Graduate and Postdoctoral Studies

Please note that Western University's REBs are not approving this research, as a local Principal Investigator is not directly involved in this research. As such there is no local oversight on the conduct of this research. McGill University's REB remains responsible for overseeing the conduct of this study.

For your information, please note that Western University's REBs typically recommend that:

- Participants' names and email addresses be collected separately from survey data (i.e., that data be collected in a de-identified form at the outset if possible, rather than de-identifying survey datasets afterwards).
- Western's REBs do not permit the use of language regarding REB approval.

Nonetheless, Western's REBs acknowledge that this research is taking place and that there are no major objections to the manner in which it will be conducted as described in the documents listed above.

Please note that there should be no references to Western University's REBs in your communications with participants (including, but not limited to, the consent form) as the REBs do not provide oversight for this project.

If, during the course of this study, there are changes to the project or new information comes to light, which would affect the determination stipulated above, these should be brought to the immediate attention of the Office of Human Research Ethics for re-assessment.

If Western's Office of Human Research Ethics is contacted to confirm Western's REBs' position on this external study, we will confirm that it has been reviewed and acknowledged.

Best wishes for the successful completion of your project.

Sincerely,
The Office of Human Research Ethics, on behalf of Western University's Research Ethics Boards

Appendix J

Laval University Research Ethic Certificate

UNIVERSITÉ LAVAL | Vice-rectorat à la recherche, à la création et à l'innovation
Comité d'éthique de la recherche

APPROBATION DE L'ÉTHIQUE

Projet de recherche impliquant des êtres humains ou
la consultation de renseignements personnels

Ce projet de recherche a été examiné en conformité avec les
Modalités de gestion de l'éthique de la recherche sur des êtres humains de l'Université Laval,
par le Comité sectoriel d'éthique de la recherche en psychologie et en sciences de l'éducation

Projet intitulé :	*The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic*
Nom de la chercheure :	Madame Samira Feizi
Nom du directeur de recherche :	Monsieur Francis Jason Elgar
Numéro d'approbation :	2021-066/21-04-2021
Date de décision :	21 avril 2021
Date d'expiration de l'approbation :	1er mai 2022

Après examen des informations et des documents qui lui ont été transmis, le Comité a constaté que ce projet respecte les principes d'éthique de la recherche avec des êtres humains. Il prend acte de la confirmation écrite de la chercheure à l'effet qu'elle a pris connaissance des mesures de suivi[1] associées à l'émission de l'approbation éthique de son projet et qu'elle accepte de les appliquer. Par conséquent, le Comité approuve ce projet pour un an.

Claude Goulet, président
Comité d'éthique de la recherche en psychologie
et en sciences de l'éducation

22 avril 2021
Date

[1] Rappel des mesures de suivi au verso

Maison Michael-John-Brophy 418-656-2131, poste 404506
2241, chemin Sainte-Foy cer@vrr.ulaval.ca
Québec (Québec) G1V 0A6 www.cerul.ulaval.ca
Canada

Appendix K

University of Alberta Research Ethic Certificate

UNIVERSITY OF ALBERTA

RESEARCH ETHICS OFFICE

2-01 North Power Plant (NPP)
11312 - 89 Ave NW
Edmonton, Alberta, Canada T6G 2N2
Tel: 780.492.0459
www.uab.ca/reo

Notification of Approval

Date:	April 8, 2021
Study ID:	Pro00108379
Principal Investigator:	Samira Feizi
Study Title:	The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic
Approval Expiry Date:	April 7, 2022
Sponsor/Funding Agency:	Canada Research Chairs

Thank you for submitting the above study to the Research Ethics Board 2. Your application has been reviewed and approved on behalf of the committee.

Approved Documents:

Letter of Initial Contact
Recruitment Announcements V2 - April 7, 2021.docx
Consent Forms
Consent Form V2- April 7, 2021.docx
Questionnaires, Cover Letters, Surveys, Tests, Interview Scripts, etc.
Questionnaires.docx, Version 1, February 13, 2021
Protocol/Research Proposal
The research proposal approved by McGill University, Version 1, February 13, 2021

Any proposed changes to the study must be submitted to the REB for approval prior to implementation. A renewal report must be submitted next year prior to the expiry of this approval if your study still requires ethics approval. If you do not renew on or before the renewal expiry date, you will have to re-submit an ethics application.

Approval by the Research Ethics Board does not encompass authorization to access the staff, students, facilities or resources of local institutions for the purposes of the research.

Approval by the Research Ethics Board does not encompass authorization to recruit and/or interact with human participants at this time. Researchers still require operational approval as applicable (e.g., AHS, Covenant Health, ECSD, etc.), and where in-person interactions are proposed, institutional and operational requirements outlined in the Resumption of Human Participant Research - June 24, 2020, must be met.

Sincerely,

Anthony S. Joyce, Ph.D.
Associate Chair, Research Ethics Board 2

Note: This correspondence includes an electronic signature (validation and approval via an online system).

Appendix L

University of Waterloo Research Ethic Certificate

Research Ethics - Initial application # 43120 has ethics clearance

no-reply=kuali.co@mx3.kuali.co <no-reply=kuali.co@mx3.kuali.co>
on behalf of
Kuali Notifications <no-reply@kuali.co>
Mon 4/12/2021 2:46 PM
To: Samira Feizi, Ms <samira.feizi@mcgill.ca>

Dear Frank Elgar and other members of the research team:

Your application has been reviewed by Delegated Reviewers. We are pleased to inform you the **Initial application for 43120 The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic** has been given ethics clearance.

Note: Under the provincial lockdown/stay at home measure, all in-person (face-to-face) research involving human participants is to be suspended until further notice, including ongoing research and studies that have recently received research ethics clearance. This includes research with approved safety plans, as well as studies that recently received approval of a safety plan. Scheduled visits with participants must be postponed. If additional study visits are needed to preserve the safety and well-being of the participants, or you are carrying out essential COVID-19 related research, contact researchethics@uwaterloo.ca.

This research must be conducted in accordance with the most recent version of the application in the research ethics system and the most recent versions of all supporting materials.

Ethics clearance for this study is valid until Wednesday, April 13th 2022.

The research team is responsible for obtaining any additional institutional approvals that might be required to complete this Expedited study.

University of Waterloo Research Ethics Committees operate in compliance with the institution's guidelines for research with human participants, the Tri-Council Policy Statement for the Ethical Conduct for Research Involving Humans (TCPS, 2nd edition), Internalization Conference on Harmonization: Good Clinical Practice (ICH-GCP), the Ontario Personal Health Information Protection Act (PHIPA), and the applicable laws and regulations of the province of Ontario. Both Committees are registered with the U.S. Department of Health and Human Services under the Federal Wide Assurance, FWA00021410, and IRB registration number IRB00002419 (Human Research Ethics Committee) and IRB00007409 (Clinical Research Ethics Committee).

Renewal: Multi-year research must be renewed at least once every 12 months unless a more frequent review has been specified on the notification of ethics clearance. This is a requirement as outlined in Article 6.14 of the Tri-Council Policy Statement for the Ethical Conduct for Research Involving Humans (TCPS2, 2014). The annual renewal report/application must receive ethics clearance before Monday, March 21st 2022. Failure to receive ethics clearance for a study renewal will result in suspension of ethics clearance and the researchers must cease conducting the study. Research Finance will be notified ethics clearance is no longer valid.

Amendment: Changes to this study are to be submitted by initiating the amendment procedure in the research ethics system and may only be implemented once the proposed changes have received

ethics clearance.

Adverse event: Events that adversely affect a study participant must be reported as soon as possible, but no later than 24 hours following the event, by contacting the Director, Research Ethics. Submission of an adverse event form is to follow the next business day.

Deviation: Unanticipated deviations from the approved study protocol or approved documentation or procedures are to be reported within 7 days of the occurrence using a protocol deviation form.

Incidental finding: Anticipated or unanticipated incidental findings are to be reported as soon as possible by contacting the Director, Research Ethics. Submission of the incidental findings form is to follow within 3 days of learning of the finding. Participants may not be contacted regarding incidental findings until after clearance has been received from a Research Ethics Committee to contact participants to disclose these findings.

Study closure: Report the end of this study by submitting a study closure report through the research ethics system.

Coordinated Reviews: If your application was reviewed in conjunction with Wilfrid Laurier University, Conestoga College, Western University or the Tri-Hospital Research Ethics Board, note the following: 1) Amendments must receive prior ethics clearance through both REBs before the changes are put in place, 2) PI must submit the required annual renewal report to both REBs and failure to complete the necessary annual reporting requirements may result in Research Finance being notified at both institutions, 3) In the event that there is an unanticipated event involving a participant that adversely affects them, the PI must report this to both REBs within 24 hours of the event taking place and any unanticipated or unintentional changes which may impact the research protocol shall be reported within seven days of the deviation to both REBs.

Initial application ethics clearance notification: Your clearance notification will be added to the record within 24 hours. Go to "Admin Notes and Files" in the research ethics system (right-hand side) to print a copy of the initial application ethics clearance notification.

****

Best wishes for success with this study.

If you have any questions concerning this notification, please contact the Research Ethics Office or email researchethics@uwaterloo.ca.

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Appendix M

University of Calgary Research Ethic Certificate

UNIVERSITY OF CALGARY

Conjoint Faculties Research Ethics Board (CFREB)
Research Services Office
University of Calgary
Telephone: (403) 220-6289 or (403) 220-8640
Fax: (403) 289-0693
Email: cfreb@ucalgary.ca

Date: Feb. 27, 2021

To: Dr. Frank Elgar, Samira Feizi
Department of Psychology
McGill University

From: Jenny Godley, PhD, Chair
Conjoint Faculties Research Ethics Board (CFREB)
University of Calgary

Re: Research Project:" The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic"

Dear Dr. Elgar and Ms. Feizi:

Thank you for contacting the Conjoint Faculties Research Ethics Board (CFREB) at the University of Calgary about this study. As Chair of the CFREB, I have examined the documents you have provided including the ethics approval certificate (Study ID: REB20-12-025) from McGill University's Research Ethics Board Office. I am pleased to inform you that this research meets the CFREB's requirements and standards for ethical research. We would just like to request that you add the following line to your informed consent form for the survey that is distributed to doctoral students at the University of Calgary: "This research project has been reviewed and approved by the Conjoint Faculties Research Ethics Board at the University of Calgary."

I wish you success with this project.

Sincerely,

Jenny Godley

Jenny Godley, PhD
Chair, Conjoint Faculties Research Ethics Board
Associate Professor, Department of Sociology

Cc: Lauren McDougall, Senior Research Ethics Analyst, Research Ethics

Appendix N

University of Manitoba Research Ethic Certificate

University of Manitoba | Research Ethics and Compliance

Human Ethics - Fort Garry
208-194 Dafoe Road
Winnipeg, MB R3T 2N2
T: 204 474 8872
humanethics@umanitoba.ca

PROTOCOL APPROVAL

To: **Samira Feizi** **(Advisor: Francis Jason Elgar)**
Principal Investigator, McGill University

From: **Jonathan Marotta, Chair**
Research Ethics Board 1 (REB 1)

Re: **Protocol # R1-2021:017 (HS24698)**
The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic

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Effective: February 9, 2021 **Expiry:** February 9, 2022

Research Ethics Board 1 (REB 1) has reviewed and approved the above research.

REB 1 is constituted and operates in accordance with the current *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans – TCPS 2 (2018)*.

This approval is subject to the following conditions:

i. Approval is granted for the research and purposes described in this application only.

ii. Any changes to this research must be approved by the Human Ethics Office (HEO) before implementation.

iii. Any deviations to the research or adverse events must be reported to the HEO immediately.

iv. This approval is valid for one year only. A Renewal Request Form must be submitted and approved prior to the above expiry date.

v. A Study Closure Form must be submitted to the HEO when the research is complete prior to the above expiry date, or if the research is terminated.

vi. The University of Manitoba (UM) may request to audit your research documentation to confirm compliance with this approved protocol, and with the UM *Ethics of Research Involving Humans* policies and procedures.

Funded Protocols: Email a copy of this Protocol Approval, with the corresponding UM Project Number, to ResearchGrants@umanitoba.ca

Appendix O

University of Saskatchewan Research Ethic Certificate

UNIVERSITY OF SASKATCHEWAN

Research Ethics Board (REB)
Letter of Acknowledgement

Name of Institution conducting Primary REB Review: McGill University	**Name of Researcher's Home Institution:** McGill University
McGill University REB File #: 20-12-025	**University of Saskatchewan REB File #:** 2563
Title of Research Project: The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic	
Sponsor or Funding Agency: Canadian Research Chair (Tier 2)	
Supervisor: Francis Jason Elgar **Student:** Feizi, Samira	**Local University of Saskatchewan Investigator, if applicable:** N/A

This letter serves as acknowledgement that the University of Saskatchewan is in receipt of the above named research project application and associated Certificate of Ethics Approval from McGill University Research Ethics Board (REB).

The University of Saskatchewan REB has issued a Letter of Acknowledgement in lieu of a Certificate of Approval. All post-approval research activities including continuing ethics review or the review of amendments to the project will be conducted by McGill University REB. It should be noted that you are also responsible for bringing any project specific deviations, unanticipated problems, or new project information related to the research project to the attention of McGill University REB.

When the research project completion report is filed with McGill University REB, you must also provide a copy to the University of Saskatchewan Research Ethics Office (ethics.office@usask.ca).

The University of Saskatchewan will retain this Letter of Acknowledgement and would ask that you provide a copy to McGill University REB.

This agreement is limited to and applicable only to the above named research project.

Acknowledgement:

Digitally Approved by Patricia Simonson, Vice-Chair
Behavioural Research Ethics Board
University of Saskatchewan

March 5, 2021

Appendix P

Consent Form

McGill

Department of Psychology/Département de psychologie

McGill University

2001 McGill College

Montréal, Québec

H3A1G1

Title of Study: The Role of Social and Departmental Support on the Physical and Psychological Well-being of Doctoral Students in Canada during the COVID-19 Pandemic (REB file number: _____)

Research Team

Samira Feizi (PhD student, McGill University)

samira.feizi@mcgill.ca

Dr. Frank Elgar (faculty supervisor, McGill University)

frank.elgar@mcgill.ca

Funding

Canada Research Chairs program.

Purpose of the Study

The purpose of this study is to explore the factors that shape doctoral students' experiences and their influence on doctoral students' physical and psychological well-being.

Participants

You are being asked to participate in the study because you are a doctoral student currently enrolled as a post-secondary institution.

Procedures

The study is conducted online to facilitate accessibility and consists of questionnaire items that measure sociodemographic information, social support, financial support, departmental factors, COVID-19 anxiety, and psychosocial factors—emotional and physical well-being. This study consists of two assessments approximately 6 months apart, and each assessment will take approximately 30 minutes to complete (questions at both time points will be identical).

Benefits of Participation

The possible indirect benefits you may experience from participating in this study include an opportunity to reflect on your social support, financial support, departmental factors into your well-being as a doctoral student.

Risks of Participation

This study is anticipated to include only minimal risks. A possible risk of participation in this study is mild anxiety that may be associated with completing a questionnaire on emotion-related topics (e.g., anxiety).

Cost /Compensation

Participants who complete the questionnaire could opt-in to be entered into a prize draw for one of twenty five $50 CAD Amazon e-gift certificates as compensation (estimated odds of winning: 1 in 8). Participants who complete both questionnaires will be entered into a second draw for one of twenty five $50 CAD Amazon e-gift certificates (estimated odds of winning: 1 in 8). Participants who complete both parts are thus eligible to win a combined total of $100 CAD for their participation. If you wish to be considered for these prizes, you need to answer a skill-testing question correctly in order to qualify a chance to win the draw. The draws will take place within two weeks of the end dates of data collection. At each phase, if someone wins and is contacted but does not come forward within 4 weeks, another name will be drawn.

Contact Information

If you have any questions or concerns about the study, you may contact the principal investigator Samira Feizi at samira.feizi@mcgill.ca, or the supervisor Dr. Frank Elgar at frank.elgar@mcgill.ca. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you

may contact the McGill Research Ethics Officer by email at lynda.mcneil@mcgill.ca or by phone at (514) 398-6831 (REB #XXXXXX).

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study and may decline to answer any question in the survey. You may withdraw at any time up until the point that identifying information exists, without prejudice to your relations with your institution. If you choose to withdraw during or right after the study, all information obtained up until that point will be destroyed unless you specify otherwise at the time of withdrawal. Once data have been combined for publication, it will not be possible to withdraw your data in its entirety, we can only remove your dataset from further analysis and from use in future publications. Identifiable data will be kept until the end of second phase of data collection, and once anonymized, withdrawal will no longer be possible. You are encouraged to ask questions about this study of the research team at any time before or during the study. *Please feel free to print this consent page for your records.*

Confidentiality

All information gathered in this study will be kept completely confidential, with all identifying information obtained removed upon completion of the study to ensure anonymity of responses. No reference will be made in written or oral materials that could link you to this study. All digital records will be saved in password-encrypted files stored on the researchers' computers for 7 years following the first publication at which time it will be destroyed. To protect your confidentiality, all personal information such as your name and email address will be replaced with a number. A list linking the number with this information will be kept in a secure place, away from your file. The data will be securely stored in a locked folder. Only the research team (Samira Feizi, Dr. Frank Elgar) will have access to the identified records. Access to participants' anonymized data will be limited to members of the research laboratory of Dr. Frank Elgar.

Participant Consent:

I have read the above information and indicate my agreement to participate in this study by entering the identifying information below and clicking "next".

First Name: _____

Last Name: _____

Email Address: _____ (please enter the email address provided to you by your post-secondary institution)

Secondary Email Address: _____ (if desired, please enter a second personal email address in case of difficulties with your institutional email account)

Appendix Q

Recruitment Email

This email is to inform you of an opportunity to participate in a two-time point study on behalf of researchers at McGill University.

We are conducting a study on psychosocial factors' influences on psychological well-being in doctoral students. It is a two-time point survey in English.

Participants have the chance to enter a draw to win up to $**100 CAD** Amazon gift certificate (odds of winning are approx. 1 in 8). The study is completed entirely over the Internet requiring the completion of the same questionnaire in two different time points (~20-30 mins).

Who can participate?

Doctoral students who are still enrolled in the program.

You can access the survey from this link:

(to be added)

This study has been approved by McGill's Research Ethic Board for compliance with policies and guidelines involving the use of human participants in the research. If you have any questions or concerns about the study, you may contact the principal investigator Samira Feizi at samira.feizi@mcgill.ca, or the supervisor Dr. Frank Elgar at frank.elgar@mcgill.ca.

Thank you for your time and support.

Samira Feizi, Principal Investigator (PhD student)

Department of Psychology McGill University samira.feizi@mail.mcgill.ca

Dr. Frank Elgar (faculty supervisor, McGill University) frank.elgar@mcgill.ca

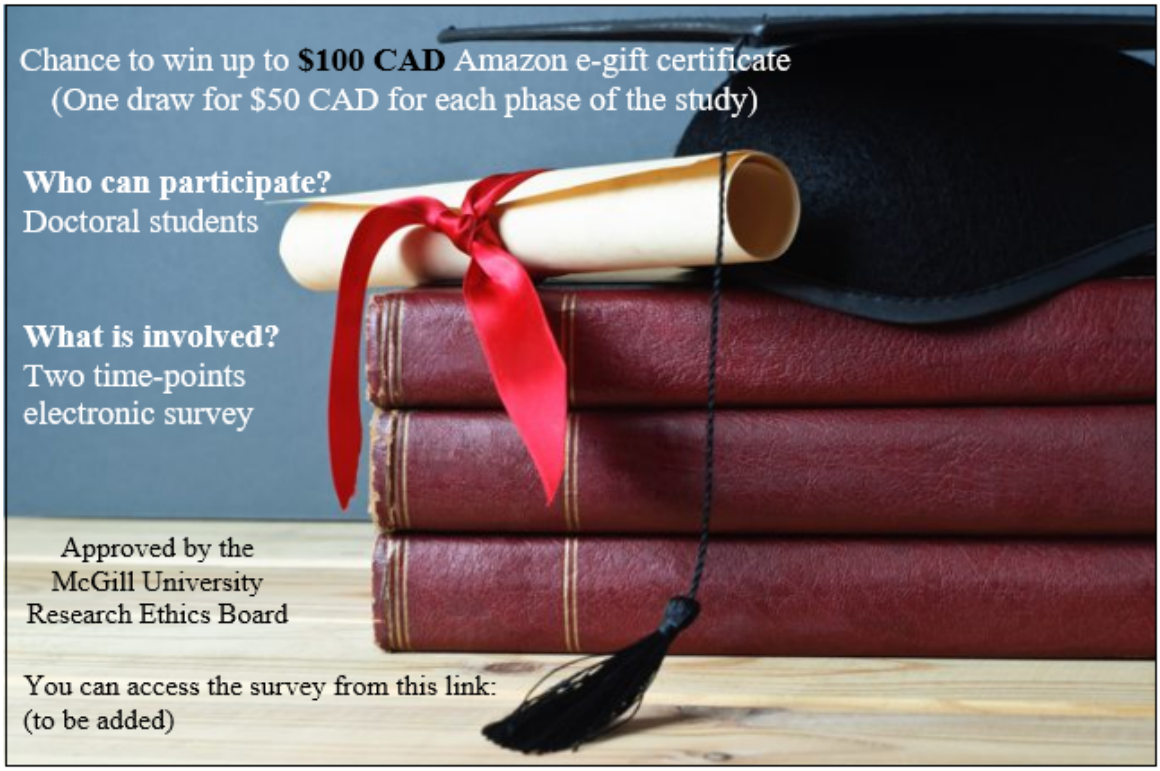
Appendix R

Online Recruitment

A chance to participate in a study by @researcheraccount and @collaboratoraccount from department of psychology at McGill University on doctoral students' socialization and psychological well-being: https://ww.limesurvey.org/xxx

To participate in a study on socialization and psychological well-being by @researcheraccount and @collaboratoraccount from department of psychology at McGill University, please click here: https://ww.limesurvey.org/xxx

Doctoral students --> Chance to win up to $100 CAD Amazon e-gift certificates (one draw for $50 CAD for each phase of the study) by participating in a study on socialization and psychological well-being by @researcheraccount and @collaboratoraccount from department of psychology at McGill University: https://ww.limesurvey.org/xxx



Appendix S

Questionnaire Items

DEMOGRAPHICS

Age in Years _____ (open-ended)

Which of the following best describes your **gender**? (drop-down menu)

- Female
- Male
- Gender Variant/Non-Conforming
- Not listed, please specify _____ (open-ended)

How do you describe your **supervisor's gender**? (drop-down menu)

- Female
- Male
- Gender Variant/Non-Conforming
- Other Please specify _____ (open-ended)

Relationship status (drop-down menu)

- Single
- Married/civil union
- In serious relationship
- Other _____ (open-ended)

Is English your first **language** (yes/no)? If not, what is? _____ (open-ended)

Are you an **international** student? (yes/no)

At **what institution** are you completing your graduate studies? (Please enter the full name of your university, avoiding acronyms) (open-ended)

Do you have **children? (**yes/no)

In what general **discipline** is your graduate program? <drop-down menu>

Humanities

- --- Human history
- --- Linguistics
- --- Literature
- --- Arts
- --- Philosophy
- --- Religion

Social sciences

- --- Anthropology
- --- Archaeology
- --- Area studies
- --- Cultural and ethnic studies
- --- Economics
- --- Gender and sexuality studies
- --- Geography
- --- Political science
- --- Psychology
- --- Sociology

Natural sciences

- --- Biology
- --- Chemistry
- --- Earth sciences
- --- Physics
- --- Space sciences

Formal sciences

- --- Mathematics
- --- Computer sciences
- --- Logic
- --- Statistics
- --- Systems science

Professions

- --- Agriculture
- --- Architecture and design
- --- Business
- --- Divinity
- --- Education
- --- Engineering
- --- Environmental studies
- --- Family and consumer

- --- Human physical performance
- --- Journalism, media
- --- Law
- --- Library and museum
- --- Medicine
- --- Military sciences
- --- Public administration
- --- Social work
- --- Transportation

Other <open-ended response>

What is your **current stage** in the doctoral program?

- coursework
- comprehensive/ qualification examination (e.g., literature search/review, writing)
- dissertation (e.g., dissertation proposal, data collection, data analysis, writing)
- other _____ (please specify)

What **year** are you in the **program**? (drop-down menu)

- First Year
- Second Year
- Third Year
- Fourth Year
- Fifth Year
- Other _____ (open-ended)

SOCIALIZATION (14 ITEMS)

Reference:

Weidman, J. C., & Stein, E. L. (2003). Socialization of doctoral students to academic norms. *Research in higher education*, 44(6), 641-656.

DEPARTMENTAL CLIMATE (14 items)

For each of the following items, circle the number on the scale that most nearly expresses your

level of agreement.

Response Format:

1	2	3	4	5
Strongly Agree	Agree	Neutral	Disagree	Strongly disagree

1. I identify more with my professors than with my fellow students.
2. This department emphasizes engaging students in scholarly activities (research, writing other than dissertation/thesis, etc.).
3. The faculty are accessible for scholarly discussions outside of class.
4. I feel free to call on the faculty for academic help.
5. My department offers sufficient enrichment activities (seminars, colloquia, social events, etc.) in addition to regular classes.
6. The faculty are aware of student problems and concerns.
7. I can depend on the faculty to give me good academic advice.
8. I am treated as a colleague by the faculty.
9. The faculty see me as a serious scholar.
10. The faculty seem to treat each other as colleagues.
11. An environment that promotes scholarly interchange between students and faculty.
12. An environment that fosters and develops scholarly self-confidence in students.
13. An educational climate that encourages the scholarly aspirations of all students.
14. Sufficient opportunities for students to participate in the scholarly activities of the faculty.

Scoring:

Supportive Faculty Environment = 1, 2, 3, 4, 5, 6
Department Collegiality = 7, 8, 9
Student Scholarly Encouragement = 10, 11, 12, 13

EPISTEMIC EMOTIONS (21 Items)

Reference:

Pekrun, R., & Meier, E. (2011). *Epistemic Emotion Scales (EES).* Unpublished manuscript, Department of Psychology, University of Munich, Munich, Germany.

1	2	3	4	5
Not at all	Very little	Moderate	Strong	Very strong

We are interested in the emotions you experience while learning in your graduate program (e.g., during lectures, while reading, etc.). For each emotion, please indicate its strength by selecting the number that best describes the intensity of that emotion while learning.

1. Curious
2. Bored
3. Confused
4. Surprised
5. Interested
6. Anxious
7. Frustrated
8. Inquisitive
9. Dull
10. Amazed
11. Worried
12. Happy
13. Muddled
14. Irritated
15. Monotonous
16. Excited
17. Astonished
18. Dissatisfied
19. Nervous
20. Joyful
21. Puzzled

Mental Health Continuum Short Form (MHC-SF, 14 items)

Reference:

Keyes, C. L. M. (2009). Atlanta: Brief description of the mental health continuum short form (MHC-SF)

Please answer the following questions which are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

1	2	3	4	5	6
Never	Once or twice	About once a week	About 2 or 3 times a week	Almost every day	Every day

During the past month, how often did you feel

1. Happy
2. Interested in life
3. Satisfied with life
4. That you had something important to contribute to society
5. That you belonged to a community (like a social group, or your neighborhood)
6. That our society is a good place, or is becoming a better place, for all people
7. That people are basically good
8. That the way our society works makes sense to you
9. That you liked most parts of your personality
10. Good at managing the responsibilities of your daily life
11. That you had warm and trusting relationships with others
12. That you had experiences that challenged you to grow and become a better person
13. Confident to think or express your own ideas and opinions
14. That your life has a sense of direction or meaning to it

Scoring:

Cluster 1; Items 1-3 = Hedonic, Emotional Well-Being

Cluster 2; Items 4-8 = Eudaimonic, Social Well-Being

Item 4 = Social Contribution

Item 5 = Social Integration

Item 6 = Social Actualization (i.e., Social Growth)

Item 7 = Social Acceptance

Item 8 = Social Coherence (i.e., Social Interest)

Cluster 3; Items 9-14 = Eudaimonic, Psychological Well-Being

Item 9 = Self-Acceptance

Item 10 = Environmental Mastery

Item 11 = Positive Relations with Others

Item 12 = Personal Growth

Item 13 = Autonomy

Item 14 = Purpose in Life

PERCEIVED STRESS SCALE (10 items)

Reference:

Cohen, S., Kamarck, T., and Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior*, 24, 386-396.

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate by circling how often you felt or thought a certain way.

0	1	2	3	4
Never	Almost Never	Sometimes	Fairly Often	Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and "stressed"?
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
5. In the last month, how often have you felt that things were going your way?
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
7. In the last month, how often have you been able to control irritations in your life?
8. In the last month, how often have you felt that you were on top of things?
9. In the last month, how often have you been angered because of things that were outside of your control?
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

PROGRAM SATISFACTION (5 items)

Reference:

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of personality assessment, 49*(1), 71-75.

Please read each statement carefully and respond by using the following scale from 1 to 7.

Response Format:

1	2	3	4	5	6	7
Strongly disagree			Neutral			Strongly agree

1. In most ways my program is close to my ideal.
2. The conditions of my program are excellent.
3. I am satisfied with my program.
4. So far, I have gotten the important things I want out of my program.
5. If I could do my program over, I would change almost nothing.
6. The conditions of my program are excellent.

➔ Asking the cognitive/direct judgement on overall program

7. I am satisfied with my program.

➔ Emotional/direct judgement on overall program

8. So far, I have gotten the important things I want out of my program.

➔ What did you obtain? Ask the cognitive/direct judgement on program

9. If I could do my program over, I would change almost nothing.

➔ Ask the cognitive/indirect judgement on overall program

INTENTION TO QUIT (4 items)

Reference:

Adapted from Hackett, R. D., Lapierre, L. M., & Hausdorf, P. A. (2001). Understanding the links between work commitment constructs. Journal of Vocational Behavior, 58, 392-413.

1. I am disappointed that I ever entered the doctoral program, and I think about quitting my doctoral program.

1	2	3	4	5
Never				Constantly

2. I think about finding a different doctoral program.

1	2	3	4	5
Never				Constantly

3. I intend to search for another graduate supervisor.

1	2	3	4	5
Very unlikely				Certain

4. I plan to quit my doctoral program.

1	2	3	4	5
Very unlikely				Certain