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MODELING AMERICAN GRADUATE STUDENTS' PERCEPTIONS PREDICTING DROPOUT INTENTIONS

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ABSTRACT

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| Aim/Purpose | Dropout is a critical problem in graduate college programs across disciplines and institutions. Yet relatively little research has assessed graduate students' motivations for dropping out across disciplines, or systematically modeled perceptions that contribute to dropout intentions. |
| Background | Perceptions drive critical decisions that people make about their lives, and a core set of these perceptions consistently predict adults' educational intentions and choices. This study investigates how a set of critical perceptions predict the strength of graduate students' dropout intentions. |
| Methodology | This study models their differential contributions using structural equation modeling, in AMOS®. Participants were 886 masters and doctoral students across programs and colleges in a Southwestern university in the United States. |
| Findings | The best-fitting model demonstrated most significant influences on graduate students' dropout intentions were predicted by: satisfaction with the overall graduate experience (not just program-of-study), self-efficacy for professional success (not just coursework), and the Perceived Graduate Experience Gap (expectations vs. experience in graduate school). Model fit was excellent for the whole group, and demonstrated some nuanced differences for subgroups, notably by degree type and point-in-program. |

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Recommendations for Practitioners These findings illuminate considerations useful to graduate faculty and program administrators concerned about improving retention and completion. They can inform policies and practice for preventing and reducing graduate student dropout.

Keywords graduate education, graduate student retention, dropout intentions, graduate student perceptions, self-efficacy, satisfaction, graduate college experience, graduate experience gap, competence, identity development

INTRODUCTION

Millions of people each year work, save, and strive to get into graduate school, to pursue degrees with the potential to change their lives forever. Yet dropout rates in graduate programs have been estimated at higher than 50% (Council of Graduate Schools, 2008; Nettles & Millett, 2006) and dropout is an higher education issue all over the world (Carlhed, 2017; Soares, Fernandes, Nóbrega, & Nicolella, 2015). Graduate student perceptions and experiences of professional expectations and development, performance standards, and change in the academy complicate their trajectories of success toward and beyond graduation (Rizzolo, DeForest, DeCino, Strear & Landram, 2016).

Human learning and choice are influenced by a complex of factors including timing, health, and life circumstances, past and present experiences, future goals, and success expectations (Friedenberg & Silverman, 2015). Clearly many drop out of graduate education due to external factors beyond their control, such as unforeseeable personal circumstances or financial constraints (DeClou, 2016; Schlemper, 2011). However, these practical and personal problems do not explain every case, and focused research is needed to understand and reduce graduate school dropout. This study investigated, through structural equation modeling, how perceptions—of self, program, and others—contribute to graduate students' development of dropout intentions.

Graduate faculty members and administrators must manage responsibility for a complex network of dynamic factors related to graduate student success. Doctoral and masters' students have both shared and different needs and expectations of graduate school (Hardré & Pan, 2017; Tinto, 1975). Higher education at all levels faces challenges to realign with changing market realities, student needs and life circumstances (Levine, 2005). Academic and social experiences contribute to students' perceptions of and investment in graduate school (Rizzolo et al, 2016; Spaulding & Rockinson-Szapkiw, 2012). Numerous studies have addressed various aspects of graduate students' overall satisfaction with their experience, primarily focused on doctoral students (e.g., Barnes & Randall, 2012; Golde & Dore, 2001). Success in the graduate college experience depends on a complex of factors interacting dynamically across a trajectory of years (Newman, Couturier, & Scurry, 2004). Some of these factors are individual and personal, while others are institutional and organizational, and the ultimate educational outcome for an individual graduate student is degree completion or dropout (Sullivan & Rosin, 2008).

SATISFACTION WITH GRADUATE EXPERIENCE AND ACADEMIC PROGRAM

While it is less technically profound than other psychological constructs, a factor that carries tremendous weight and credibility with students is their personal satisfaction with their educational experiences (Hardré & Hackett, 2015c). Previous research has linked satisfaction with the academic program to other variables, such as teaching and learning strategies used by faculty (e.g., Choi, 2016; Svinicki, 2004); mentoring style and communication (e.g., Orellan, Darden, Perez, & Salinas, 2016; Yang, Dunleavy, & Phillips, 2016); and disciplinary culture (e.g., Bair, Haworth, & Sandforth, 2004; Lovitts, 2001). Graduate students' perceptions of the quality of their academic programs influence their integration into their academic programs and relationships with faculty (Solem, Hopwood, & Schlemper, 2011), which can, in turn, influence their academic effort and attitudes (Sun & Richardson, 2012). Though concrete resources like facilities matter, graduate students' perceptions of pro-

gram quality are less influenced by the built environment than by academic curriculum and resources, and personnel resources such as faculty and staff (de Zarobe et al., 2011). Satisfaction, in turn, is related to dropout and retention among graduate students (Hardré & Hackett, 2015c; Rizzolo et al., 2016), so keeping graduate student satisfaction high is one strategy to support retention and reduce dropout.

Building on and connected to graduate students' satisfaction with their academic programs is their commensurate satisfaction with the overall graduate college experience. The two are closely related, and the overall graduate experience extends to students' perceptions of resources and services beyond the department and program (these vary by type of institution, but include institutional-level centers, facilities and resources, and may include responses to institutional policy and constraints as well) (Hardré & Hackett, 2015b). Diversity between disciplines and colleges, and between needs and goals of different levels of students, creates tensions (between individual and collective needs, factors such as structure and flexibility, and with regard to expectations and goals), making it difficult to create overall graduate college resources and policies that best serve the needs of all students (Manning, 2013). This complexity in needs and perceptions means defining and assessing satisfaction with the graduate experience is challenging; however, previous research has demonstrated that it is strongly related to critical factors such as professional identity development and commitment to degree completion (vs. dropout) (e.g., Hardré & Hackett, 2015c).

SATISFACTION WITH GRADUATE FACULTY TEACHING AND ACADEMIC ADVISING

Relationships and satisfaction with faculty mentoring and advising are highly influential on graduate students' success and completion (Barnes, Williams, & Archer, 2010; Golde, 2000) and their post-graduation professional expectations (Rizzolo et al., 2016). Perceived lack of adequate mentoring or guidance leads to educational dissatisfaction for graduate students (Wadsworth, Hecht, & Jung, 2008). Some studies have found value in explicit strategies like match of supervisors with graduate students' needs (e.g., Orellan et al., 2016), and design of interventions for empowerment and particular skills (e.g., Mullen, Fish, & Hutinger, 2010). Students depend on faculty relatedness, interpersonal supportiveness, and sense of acceptance for initially developing a sense of belonging (Reeve, 2009) and for support when they experience challenges reaching their educational goals (Hardré & Pan, 2017; Niemec, Soenens, & Vansteenkiste, 2014). Satisfaction with their academic program faculty and advising further influences graduate students' satisfaction with their overall graduate experience (Hardré & Hackett, 2015b). Across independent qualitative studies, graduate students indicate that faculty characteristics such as credibility and trustworthiness (individually and collectively), accessibility and caring, helpfulness, and interest in students' individual and collective success are positive and important attributes that also support student development and satisfaction (e.g., Barnes et al., 2010; Hardré & Pan, 2017; Rizzolo et al., 2016). In addition, departmental and disciplinary cultures critically influence students' satisfaction and success (Bair et al., 2004; Lovitts, 2001).

COMPETENCE AND IDENTITY DEVELOPMENT WITH DEGREE VALUE IN GRADUATE EDUCATION

Competence and identity development are two key components of professional growth and development for graduate students in any discipline or field (Charness, Tuffiash, & Jastrzembski, 2004; Hardré & Burris, 2012). Personal or perceived competence consists primarily of the individual's self-awareness and perceived development of knowledge and skill (Deci & Ryan, 1985). It includes beliefs that a person's actions will bring about desired outcomes and that one has sufficient ability and expectations to master upcoming challenges (Weinstein & DeHaan, 2014). In graduate and postgraduate training and development experiences, competence beliefs are linked to positive outcomes such as participation and engagement, learning and skill development, and socialization into professional

communities (e.g., Hardré & Burris, 2012; Hardré & Kollmann, 2013; Nihira, Quiroz, Hardré, Allen, & Shobeiri, 2014).

Related to competence, identity development is two-fold. It builds over time and experience, as the integrated—and critical—socialization and self-perception of becoming a capable student and professional, of measuring up to the standards and expectations, first, of the graduate enterprise, and, second, of the intended profession (Barnes & Randall, 2012; McCoy & Gardner, 2011). Identity development has been linked to success for graduate students during the graduate experience, as a function of their graduate identity (e.g., Emmioglou, McAlpine, & Amundsen, 2017; Rizzolo et al., 2016). It has further been linked to their longer-term professional success, to strong degree completion, and to good job placement, as demonstrating their development of socialization and identification with the professional community that is their eventual destination on graduation (e.g., Gardner & GoPaul, 2012; McAlpine & Turner, 2012). Studies of interdisciplinary graduate students returning from professional practice have extended elements of graduate student identity development to factors such as metacognitive and conceptual self-awareness, linked to graduate school identities such as scholar-researcher (Davis & Lester, 2016), as well as specific alignment with professional preparation (e.g., Hardré & Chen, 2006; Mevorach & Miron, 2011).

To whatever extent graduate students see their academic programs achieving personal goals, helping them learn and gain the professional skills necessary to become competent professionals and to achieve goals like getting sought-after professional jobs, they will see higher value in their degree programs (Peters & Daly, 2013). This logic is consistent with several related factors borne out in previous research, such as the value graduate students place on professors with current and active professional connections such as contracts and extracurricular applied grants and projects (Dollarhide, Gibson, & Moss, 2013). An important element of program value is socialization to professional identity and field-of-practice, supporting students' identity development, through out-of-class as well as in-class experiences (Liddell, Wilson, Pasquesi, Hirschy, & Boyle, 2014). Various subgroups, such as non-traditional students, who return for advanced degrees after years in professional practice, and students in racial and ethnic minority subgroups, have been identified as having particular challenges with dissonance and identity development in the graduate experience (e.g., Levin, Jaeger, & Haley, 2013; McCoy & Gardner, 2011; Peters & Daly, 2013; Rayner, Lord, Parr, & Sharkey, 2015).

PROCESS AND TRAJECTORY OF DEVELOPMENT

Intellectual and personal change are linked to growth and identity development through the graduate experience (Hardré & Hackett, 2015c; Mullen et al., 2010). Identity development, academic and professional, is both a cognitive and a social process, formed through opportunity and experiences (DeLahunty, 2012), including socialization into their intellectual and professional communities (Gardner, 2010). Identity development is influenced by students' self-assessments (such as developing competence and efficacy) and perceptions (Hall & Burns, 2009). Learning and subsequent transitioning to new work and career goals is an integrative social and cognitive process, involving learners in the practices of a new professional community and its expectations (Charness et al., 2004; Ibarra, Kidoff, & Tsai, 2005). Graduate students' perceptions of their educational experiences differ across degree types (masters & doctoral) and change developmentally over their degree completion trajectory (Hardré & Hackett, 2015c).

Identity development and motivation both occur through organic, integrative processes (Dai & Sternberg, 2004). As individuals have sets of related experiences, they progressively develop more refined, elaborated, and internalized personal, cognitive, and motivational structures related to those goals and experiences (Weinstein & DeHaan, 2014). To the extent their experiences support positive connections, growth is upward in complexity, to greater strength in motivation and coherence in identity; however, if experiences thwart connections, they can diminish motivation and identity development (Ryan, Deci, Grolnick, & LaGuardia, 2006). As graduate students progress along profes-

sional identity trajectories, they balance managing academic goals with social and personal constraints in their lives (McAlpine & Turner, 2012).

EXPECTATIONS VERSUS REALITY: THE GRADUATE EXPERIENCE GAP

A number of authors have asserted the importance of mismatch between graduate students' expectations of graduate school and the reality they discover there (e.g., Austin et al, 2009; Baker & Lattuca, 2010; Gardner, 2010). Previous work has demonstrated the existence, assessment and correlations and predictive effects of the Graduate Experience Gap: the difference between what students thought graduate school "should be" and what they found it "is" in their actual experience (Hardré & Hackett, 2015a). That gap was found to correlate negatively with positive perceptions (of program, self, academic unit, faculty) and satisfaction (with program, faculty, overall experience). This concept of the mismatch between expectations and experience is also theoretically a powerful potential predictor for graduate student dropout, which is included in this study's prediction model. Even in the same disciplines and programs, graduate students report different perceptions by degree type (doctoral and masters) and at different points along their trajectory toward the degree (Hardré & Hackett, 2015c), underscoring the importance of inclusiveness and attention to these varying perspectives in studies intended to inform graduate policy and practice.

SELF-EFFICACY FOR GRADUATE PROGRAM AND PROFESSIONAL SUCCESS

Self-efficacy consists of people's beliefs that their actions influence critical performance outcomes and control issues that matter in their lives, and it depends on mastery and vicarious experiences, as well as expert modeling and social support from trusted peers and others (Bandura, 1994, p. 71; Bandura, 1997). Self-efficacy effects cognitive processing, goal-setting, persistence, and resilience in the face of setbacks and failure (Bandura, 1994, 1997), all of which are critical considerations for graduate student success (Linnenbrink & Pintrich, 2004). Self-efficacy predicts participation, engagement, satisfaction, and success on a range of graduate student activities across disciplines and subgroups, including research and scholarship (Filipova, 2016), teaching and learning (Svinicki, 2004), and task and work-related success (Alexander, 2004). Self-efficacy for professional success determines to a large degree what career tracks students choose, including how high they aim, and how much challenge they seek post-graduation (Bandura, 1997).

DROPOUT AND DROPOUT INTENTIONS

After working hard, sacrificing much, and striving to be accepted into graduate schools and programs, an estimated 50% of students drop out and fail to complete their degrees (Council of Graduate Schools, 2008; Nettles & Millett, 2006). Some authors have argued that dropout at all levels comes down to an issue of mismatch between what students are seeking or needing and what colleges are offering and delivering (e.g., Levine, 2005). Many papers report the problem of actual graduate student dropout, but few have studied it systematically in large groups of graduate students, and fewer still model it across disciplines including students' self-reported dropout intentions. One systematic quantitative comparative study in Finland that included dropout intentions (using the X^2 test) found the two most significant influences on doctoral students' dropout intentions were support from the supervisor and the research community (Peltonen, Vekkaila, Rautio, Havernen, & Pyhältö, 2017). Another systematic quantitative study in Canada assessed influential socio-cultural factors determining graduate student dropout as outside colleges' direct administrative control, but recommends social support strategies (DeClou, 2016). A third study used logistic regression from archived datasets (collected in 2003) to predict graduate continuation and persistence of undergraduate completers, and identified significant influences of academic, financial, and social variables (Xu, 2015).

One qualitative study demonstrated that doctoral students' persistence (versus dropout) is enhanced by both academic match and social-personal match between students and their academic community (Spaulding & Rockinson-Szapkiw, 2012). Another small-scale qualitative study (16 doctoral students)

underscored the danger of disengagement and its relationship to dropout intentions (Vekkaila, Pyhäntö, & Lonka, 2013). Yet another qualitative study articulates the complex relationships among doctoral students' social supports, their tendency to burnout under stress, require additional time to complete degrees, and potentially develop dropout intentions (Peltonen et al., 2017). It is clear that multiple variables and complex interactions contribute to graduate students' choices to drop out (Bloomer & Hodkinson, 2000; Golde, 2000). Some important practical challenges to graduate completion include time and time management, academic demands, and finances (Schlemper, 2011). Less tangible development, like integration and socialization, are critical parts of the graduate experience and also influential on retention and degree completion (Foote, 2010; Pontius & Harper, 2006).

Intentions have been used as proxy for actual behavior, because they reflect the motivations that influence and drive actual behavior (Ajzen, 1991, 2001). For this reason, intentions represent the best single predictor of planned human behaviors (Souitaris, Zerbinati, & Al-Laham, 2007). They are "especially suitable for researching behaviors that are rare, difficult to observe or include unforeseen time lags" (Mijoč, Stanić, & Horvat, 2016, p. 334). With regard to school dropout specifically, Vallerand, Fortier, & Guay (1997) demonstrated that measuring high school students' dropout intentions predicted their actual dropout behavior one year later. In addition, Litalien and Guay (2015) demonstrated that a prospective (predictive) study of doctoral students' intentions was confirmed by a retrospective study of the same factors among actual completers and non-completers. Together this body of theoretical and empirical scholarship supports the use of dropout intentions as proxy for actual dropout behavior.

While graduate student dropout is a concern in the literature, very few published studies assess and model graduate students' dropout intentions across disciplines and degree types. Dropout intentions are not random and do not occur instantly, but develop over time. To better understand that development, we sampled students' intentions at various stages in their progress-toward-degree (early, midway, and near exit). Retaining students must be investigated longitudinally and include characteristics that interact in students' experience and perceptions (Rizzolo et al., 2016; Tinto, 1975). We included factors that had previously and consistently been found significantly and meaningfully related to the key positive outcomes of satisfaction with the graduate program and experience, as well as with dropout.

RESEARCH QUESTION

The primary question for this investigation was:

What are the differential contributions of a set of perceptions of self, program, profession, and others to the satisfaction of graduate students with their graduate experience and to their intentions to dropout (vs. complete) their graduate degrees?

The analysis to address this question used Structural Equation Modeling with AMOS.

METHODS

MULTI-LEVEL, MULTI-DISCIPLINARY PARTICIPANT DESIGN

A literature search in graduate education yields many times more studies focused on doctoral students than on masters or professional students, and many more studies in single disciplines than across institutions. Yet master students not only outnumber doctoral students by a factor of three-to-one (or more, depending on the institution), but also form the substantive bread-and-butter income base of many graduate institutions' subsistence, at least in the United States. Thus, for our research on graduate student perceptions and perspectives to meaningfully inform needs of graduate college staff and advisors, it needs to broadly represent the range of students across degree types (masters and doctoral) and disciplines, holding constant timing and measures (see Johnson & Christensen,

2017). This design strategy makes the findings potentially much more useful for stakeholders with an interest in supporting the success of the majority of graduate students.

PROCEDURE

Lists of eligible students for all of the target groups were provided to the researchers by the university’s Graduate College, and they were individually recruited by email. A representative sample of graduate students in a research university in the United States was sent (via email) the hyperlink to the multi-subscale digital questionnaire instrument. The Graduate College Experience (GCE) questionnaire instrument (Hardré & Hackett, 2015b) had been developed and previously tested using Qualtrics® assessment software. The asynchronous administration system was designed to de-identify participant responses, while retaining system information on which participants had completed (to enable reminders). Participation in the study was voluntary. Participants were offered the incentive of being entered into a drawing for a popular digital device (one winner only). All activities followed the university’s institutional review board policies.

PARTICIPANTS

Participant group consisted of 886 graduate students, in different programs and academic units in a United States research university. Their ages ranged from 16-66 (M = 32.13, SD = 8.57). As to degree type, 662 (74.7%) were in masters programs and 224 (25.3%) in doctoral programs. As to point-in-progress toward degree: 406 (45.8%) were at entrance; 292 (33.0%) were at midpoint, and 188 (21.2%) were at exit. The overall response rate was about 83%, and Table 1 shows more detailed demographics.

Table 1. Demographic information for all participants and five groups

| | All | | Entrance | | Midpoint | | Exit | | Master | | Doctoral | |
|-------------------------------------|-------|------|----------|------|----------|------|-------|------|--------|------|----------|------|
| | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| Current College | | | | | | | | | | | | |
| Architecture | 22 | 2.5 | 12 | 3.0 | 9 | 3.1 | 1 | .5 | 21 | 3.2 | 1 | .4 |
| Arts and Science | 297 | 33.5 | 135 | 33.3 | 93 | 31.8 | 69 | 36.7 | 187 | 28.2 | 110 | 49.1 |
| Atmospheric and Geographic Sciences | 28 | 3.2 | 9 | 2.2 | 11 | 3.8 | 8 | 4.3 | 12 | 1.8 | 16 | 7.1 |
| Business | 54 | 6.1 | 24 | 5.9 | 21 | 7.2 | 9 | 4.8 | 50 | 7.6 | 4 | 1.8 |
| Earth and Energy | 32 | 3.6 | 18 | 4.4 | 8 | 2.7 | 6 | 3.2 | 25 | 3.8 | 7 | 3.1 |
| Education | 131 | 14.8 | 63 | 15.5 | 46 | 15.8 | 22 | 11.7 | 99 | 15.0 | 32 | 14.3 |
| Engineering | 65 | 7.3 | 33 | 8.1 | 23 | 7.9 | 9 | 4.8 | 49 | 7.4 | 16 | 7.1 |
| Fine Arts | 32 | 3.6 | 20 | 4.9 | 7 | 2.4 | 5 | 2.7 | 20 | 3.0 | 12 | 5.4 |
| Journalism and Mass Communication | 10 | 1.1 | 5 | 1.2 | 3 | 1.0 | 2 | 1.1 | 7 | 1.1 | 3 | 1.3 |
| International Studies | 14 | 1.6 | 3 | .7 | 5 | 1.7 | 6 | 3.2 | 13 | 2.0 | 1 | .4 |
| Liberal Studies | 113 | 12.8 | 52 | 12.8 | 31 | 10.6 | 30 | 16.0 | 108 | 16.3 | 5 | 2.2 |

Predicting Dropout Intentions

| | All | | Entrance | | Midpoint | | Exit | | Master | | Doctoral | |
|---------------------------------|-------|------|----------|------|----------|------|-------|------|--------|------|----------|------|
| | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| Graduate College | 88 | 9.9 | 32 | 7.9 | 35 | 12.0 | 21 | 11.2 | 71 | 10.7 | 17 | 7.6 |
| Missing | 0 | 0 | 41 | 14.6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 886 | 100 | 279 | 100 | 292 | 100 | 188 | 100 | 662 | 100 | 224 | 100 |
| Enrollment Status | | | | | | | | | | | | |
| Full-time Student | 633 | 71.4 | 310 | 76.4 | 201 | 68.8 | 122 | 64.9 | 449 | 67.8 | 184 | 82.1 |
| Part-time Student | 245 | 27.7 | 93 | 22.9 | 91 | 31.2 | 61 | 32.4 | 207 | 31.3 | 38 | 17.0 |
| Missing | 0 | 0 | 3 | .7 | 0 | 0 | 5 | 2.7 | 6 | .9 | 2 | .9 |
| Total | 886 | 100 | 406 | 100 | 292 | 100 | 188 | 100 | 662 | 100 | 224 | 100 |
| Gender | | | | | | | | | | | | |
| Male | 388 | 43.8 | 167 | 41.1 | 130 | 44.5 | 91 | 48.4 | 278 | 42.6 | 110 | 49.1 |
| Female | 496 | 56.0 | 238 | 58.6 | 161 | 55.1 | 97 | 51.6 | 383 | 57.9 | 113 | 50.4 |
| Others | 1 | .1 | 0 | 0 | 1 | .3 | 0 | 0 | 0 | 0 | 1 | .4 |
| Missing | 1 | .1 | 1 | .2 | 0 | 0 | 0 | 0 | 1 | .2 | 0 | 0 |
| Total | 886 | 100 | 406 | 100 | 292 | 100 | 188 | 100 | 662 | 100 | 224 | 100 |
| Ethnicity | | | | | | | | | | | | |
| African American/Black | 52 | 5.9 | 20 | 4.9 | 13 | 4.5 | 19 | 10.1 | 50 | 7.6 | 2 | .9 |
| Asian/Asian American | 85 | 9.6 | 47 | 11.6 | 28 | 9.6 | 10 | 5.3 | 60 | 9.1 | 25 | 11.2 |
| Pacific Island/Native Hawaiian | 2 | .2 | 2 | .5 | 0 | 0 | 0 | 0 | 1 | .2 | 1 | .4 |
| Hispanic/Latino | 51 | 5.8 | 26 | 6.4 | 13 | 4.5 | 12 | 6.4 | 35 | 5.3 | 16 | 7.1 |
| Native American/American Indian | 52 | 5.9 | 25 | 6.2 | 23 | 7.9 | 4 | 2.1 | 36 | 5.4 | 16 | 7.1 |
| White/Caucasian | 608 | 68.6 | 269 | 66.3 | 202 | 69.2 | 137 | 72.9 | 457 | 69.0 | 151 | 67.4 |
| Other | 36 | 4.1 | 17 | 4.2 | 13 | 4.5 | 6 | 3.2 | 23 | 3.5 | 13 | 5.8 |
| Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 886 | 100 | 406 | 100 | 292 | 100 | 188 | 100 | 662 | 100 | 224 | 100 |

INSTRUMENTS

The Graduate College Experience (GCE) questionnaire was developed specifically to assess the perceptions of graduate students related to their academic development and professional success (Hard-

ré & Hackett, 2015a). It consists of 10 self-report multi-item subscales, which participants respond to on Likert-type 1-8 numeric response scales.

All of these subscales were developed and previously utilized in this population of U.S. graduate students across disciplines (e.g., Hardré & Hackett, 2015a; 2015b; 2015c). All subscales previously demonstrated high reliability and consistency for all subgroups. Each section is described and its target construct defined in Table 2. We respectively assigned an acronym to each subscale for convenient model coding.

ANALYSIS STRATEGY

Based on the literature review, we hypothesized a model representing the relationship among graduate students' self-perception, satisfaction with their graduate experience, and career-related perception. Specifically, we investigated how six predictor variables (Perc_GradExpGap, Satisf_Advisor, Satisf_Faculty, Seffic_ProgStudy, Perc_DegreeValue, and Perc_CompIdent) predicted three outcome variables (Satisf_GradExp, Seffic_ProfSuccess, and DropoutIntent). Structural equation modeling was employed to test the fit of the hypothesized model. Based on the number of potentially nuanced and reciprocal relationships among the perceptual variables, it was appropriate to use an iterative, exploratory modeling approach, rather than a singular, confirmatory approach (Byrne, 2016).

Table 2. Subscales of the Graduate College Experience (GCE) questionnaire

| Name of Subscales | Acronym | Definitions | Sample Items | N of Items | Cronbach Alpha |
|---|---------------------|---|--|------------|----------------|
| Satisfaction with program of study | Satisf_ProgStudy | Satisfaction with their own academic program of study, whether it addresses their needs effectively | I believe that the level of difficulty in my coursework is appropriate. | 9 | .78 |
| Satisfaction with graduate experience | Satisf_GradExp | Overall satisfaction with their graduate experiences, whether they perceive that it addresses their needs effectively | My advisor gives me constructive feedback in a timely manner. | 7 | .88 |
| Self-efficacy for profession success | Sef-fic_ProfSuccess | Perceptions that they can and will succeed in the career for which they are preparing | I often communicate with my professors outside of the classroom concerning course related matters. | 5 | .65 |
| Satisfaction with academic advising | Satisf_Advisor | Satisfaction with advising and mentoring by the advisor in their own academic program | I often socialize with graduate students from my program of study. | 8 | .98 |
| Satisfaction with academic program faculty | Satisf_Faculty | Satisfaction with teaching and mentoring by the academic faculty in their home program | The faculty members here are strongly interested in students' academic problems. | 9 | .97 |
| Self-efficacy for graduate program of study | Seffic_ProgStudy | Perceptions that they can and will succeed in the graduate program in which they are currently enrolled | My advisor promotes my professional development and competence. | 5 | .88 |
| Perceived degree value | Perc_DegreeValue | Perception of the value and utility of the degree they are pursuing | Having this graduate degree will help me achieve my professional goals. | 5 | .94 |
| Perceived competence and identity development | Perc_CompertIdent | Perception of professional competence and developing professional identity | I believe that the level of difficulty in my coursework is appropriate. | 7 | .94 |

| Name of Subscales | Acronym | Definitions | Sample Items | N of Items | Cronbach Alpha |
|-----------------------------------|-----------------|--|--|------------|---|
| Perceived Graduate experience gap | Perc_GradExpGap | Perception of gap between expected and actual graduate experience. Separate parallel forms of questionnaire describing features of the graduate college experience one as student believes it "should" be, the other as that characteristic "is" in the student's experience. (16 items per form, 32 total). Student cannot see both scales at the same time. Separate mean scale scores are generated, then "should" scale score is subtracted from "is" scale score. Difference score represents the gap between what students expected graduate school to be and what they are actually experiencing. | "should" An environment to study and grow intellectually "is" Developing close connections with faculty | 32 | "should" a = .95; "is" a = .70 |
| Dropout Intent | DropoutIntent | How strongly the student considers dropping out, not continuing the degree program to completion | I am strongly committed to graduating. | 7 | .85 |

FINDINGS

DESCRIPTIVE STATISTICS AND INTERNAL CONSISTENCIES

At first, reliability coefficient (Cronbach α) and descriptive statistics were computed for each subscale and presented in Table 3. Each subscale represents one construct associated with students' self-perception, satisfaction with graduate experience, or career-related perception. All subscales are Likert-type from "Strongly Disagree" (1) to "Strongly Agree" (8). Reliability coefficient reflects the degree to which all items of each subscale measure the same construct, based on the coherence among responses. For this group of respondents, all subscales had adequate internal consistency, with Cronbach *alphas*, ranging from .65 to .98. The original target was .70, which had previously been attained by all of these scales in a similar participant group, and was attained for all except one scale in this group (the self-efficacy for professional success). Though it was lower for this whole group, it performed better for the various subgroups, so we retained it for the full analysis.

The mean scores and standard deviations of each subscale represent the general level of agreement of all students with the statements provided for the represented constructs. The graduate students were generally satisfied with their graduate experience since the relevant subscales were all above midpoint (4), the Perceived Gap on Graduate Experience was below 1, and dropout intentions were modest (Mean = 2.11). Students' positive perceptions, such as Self Efficacy for program of study and for professional success, tended to be above midpoint (4). Thus, the descriptive profile of the sample tends to present adequate range without an extreme negative skew.

Table 3. Descriptive statistics and reliability coefficients of measured variables

| Sub-Scale | Description | Mean (N=886) | SD | Cronbach α |
|--------------------|--|--------------|------|-------------------|
| Satisf_ProgStudy | Satisfaction with program of study | 6.06 | 1.15 | .78 |
| Satisf_GradExp | Satisfaction with my graduate experience | 6.43 | 1.37 | .88 |
| Seffic_ProfSuccess | Self-efficacy for profession success | 6.70 | 1.07 | .65 |
| Perc_GradExpGap | Perceived gap between expected and actual graduate experience | 0.63 | 1.11 | .94 |
| Satisf_Advisor | Satisfaction with academic advising | 6.34 | 1.96 | .98 |
| Satisf_Faculty | Satisfaction with academic program faculty | 6.88 | 1.32 | .97 |
| Seffic_ProgStudy | Self-efficacy for graduate program of study | 7.08 | 1.04 | .88 |
| Perc_DegreeValue | Perception of value and utility of degree | 7.12 | 1.11 | .93 |
| Perc_CompentIdent | Perception of professional competence and identity development | 6.70 | 1.21 | .94 |
| DropoutIntent | Dropout Intent | 2.11 | 1.42 | .85 |

CORRELATIONS

Pearson's product moment correlations were calculated to show zero-order correlations between the predictor variables and the three outcome variables. Given the sample size ($N = 886$), the most significant relationships were selected using the dual criteria of high significance ($p \leq .01$) and high magnitude ($r \geq .30$).

Table 4 shows that the first two outcome variables, Satisf_ProgStudy and Satisf_GradExp, showed significantly high correlations with almost all predictor variables respectively. This correlation analysis confirmed our assertion that graduate students' socialization, self-efficacy, and career-related perception influence their satisfaction on their academic program study and, thus, the general impression of their graduate experience. The third outcome variable, Seffic_ProfSuccess, was only significantly, highly correlated with four of the predictor variables: Satisf_Faculty, Seffic_ProgStudy, Perc_DegreeValue, and Perc_CometIdent. It also matched with our finding from the literature review that graduate students' self-efficacy and perceived value and utility of their degree affect their confidence on professional development. The last outcome, DropoutIntent, is shown correlated with the general impression of their graduate experience (Satisf_GradExp) and self-efficacy for professional success (Seffic_ProfSuccess).

Table 4. Pearson product-moment correlations

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--------------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|--------------|--------------|----|
| 1.Satisf_ProgStudy | 1 | | | | | | | | | |
| 2.Satisf_GradExp | .72* | 1 | | | | | | | | |
| 3.Seffic_ProfSucce | .28* | .33* | 1 | | | | | | | |
| 4.Perc_GradExpG | -.58* | -.59* | -.09* | 1 | | | | | | |
| 5.Satisf_Advisor | .55* | .48* | .11* | -.43* | 1 | | | | | |
| 6.Satisf_Faculty | .75* | .72* | .35* | -.59* | .55* | 1 | | | | |
| 7.Seffic_ProgStudy | .62* | .61* | .50* | -.40* | .34* | .57* | 1 | | | |
| 8.Perc_DegreeVal | .57* | .55* | .42* | -.42* | .36* | .56* | .56* | 1 | | |
| 9.Perc_CometIde | .65* | .56* | .41* | -.43* | .37* | .54* | .64* | .70* | 1 | |
| 10.DropoutIntent | -.23* | -.37* | -.34* | .10* | -.13* | -.25* | -.33* | -.26* | -.22* | 1 |

*. Correlation is significant at the 0.01 level (2-tailed).

Bold font: correlations meeting the dual criteria of significance ($p < .01$) and magnitude ($r \geq .30$).

Listwise $N=886$

Note: Satisf_ProgStudy = Satisfaction with program of study; Satisf_GradExp = Satisfaction with graduate experience; Seffic_ProfSuccess = Self-efficacy for profession success; Perc_GradExpGap = Perceived graduate experience gap; Satisf_Advisor = Satisfaction with academic advising; Satisf_Faculty = Satisfaction with academic program faculty; Seffic_ProgStudy = Self-efficacy for graduate program of study; Perc_DegreeValue = Perceived degree value; Perc_CometIdent = Perceived competence and identity development; DropoutIntent = Dropout Intent

STRUCTURAL EQUATION MODELING

AMOS™ 17.0 was used to fit the hypothesized model (see Figure 1.) and estimate model parameters using the maximum-likelihood method. Three fit indices evaluated the goodness of fit: (1) Root Mean Square Error of Approximation (RMSEA), which is absolute fit index determining how far a hypothesized model is far from the best model (Kenny, 2015). RMSEA values below .05 indicate excellent fit (MacCallum, Browne, & Sugawara, 1996; Steiger & Lind, 1980); (2) Comparative Fit Index (CFI) and (3) Tucker Lewis Index (TLI), which are incremental fit indices comparing a hypothesized model to the null model (the worst model) (Kenny, 2015). CFI and TLI values above or equal to .90

indicate good fit (Bentler, 1990; Tucker & Lewis, 1973). These three indices are widely used in the literature (Kenny, 2015). Tables 5 and 6 show the fit statistics and path coefficients of the hypothesized and re-specified models. In addition, Chi-square difference tests were conducted to investigate whether the improvement of model fit from the hypothesized model to the re-specified models are significant. Table 5 shows the results of the Chi-square difference tests.

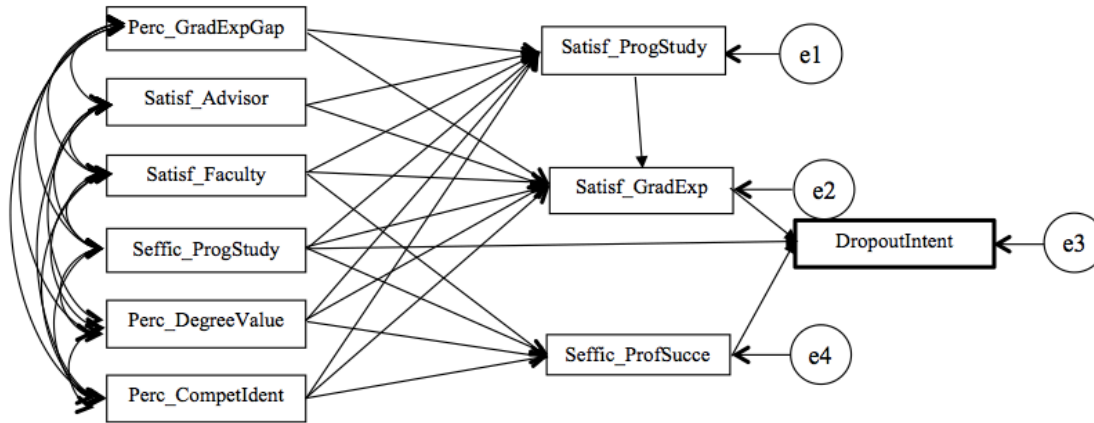


Figure 1. Hypothesized model

Note: Satisf_ProgStudy = Satisfaction with program of study; Satisf_GradExp = Satisfaction with graduate experience; Seffic_ProfSuccess = Self-efficacy for profession success; Perc_GradExpGap = Perceived graduate experience gap; Satisf_Advisor = Satisfaction with academic advising; Satisf_Faculty = Satisfaction with academic program faculty; Seffic_ProgStudy = Self-efficacy for graduate program of study; Perc_DegreeValue = Perceived degree value; Perc_CometIdent = Perceived competence and identity development; DropoutIntent = Dropout Intent

Table 5. Fit indices for the hypothesized model

| | Goodness of Model Fit | | | | | | Chi-square Difference Tests | | |
|---------|-----------------------|----|---------|------|------|-------|-----------------------------|-----|---------|
| | X ² | df | p-Value | CFI | TLI | RMSEA | ΔX ² | Δdf | p-Value |
| Model 1 | 60.18 | 10 | .000 | .990 | .953 | .075 | / | / | / |
| Model 2 | 35.897 | 9 | .000 | .994 | .972 | ..058 | 24.28 | 1 | <.001 |
| Model 3 | 20.753 | 8 | .000 | .997 | .985 | ..042 | 15.14 | 1 | <.001 |
| Model 4 | 13.332 | 7 | .064 | .999 | .991 | .032 | 7.421 | 1 | <.01 |

Re-specified models

For the hypothesized model, only CFI and TLI indices fell within acceptable level, and RMSEA index did not reach the level of excellent fit (see Table 5). Thus, this model needed to be re-specified and validated. Firstly, based on the modification indices for the hypothesized model, a path from Perc_GradExpGap to Seffic_ProfSuccess was recommended to add in the hypothesized model (see Figure 2). Table 5 shows that RMSEA index was close to .05, the level of excellent model fit, and the Chi-square difference tests showed adding the path significantly improved the model fit.

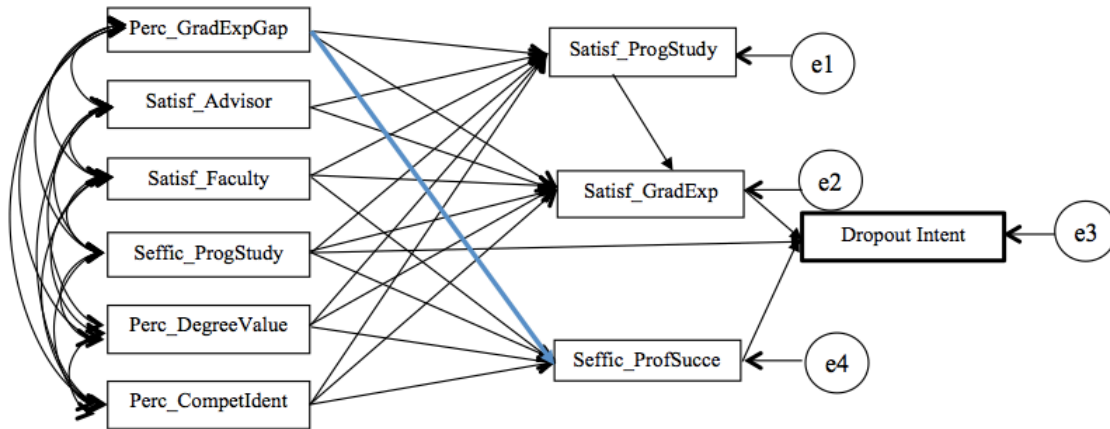


Figure 2. Re-specified Model 2

Note: Satisf_ProgStudy = Satisfaction with program of study; Satisf_GradExp = Satisfaction with graduate experience; Seffic_ProfSuccess = Self-efficacy for profession success; Perc_GradExpGap = Perceived graduate experience gap; Satisf_Advisor = Satisfaction with academic advising; Satisf_Faculty = Satisfaction with academic program faculty; Seffic_ProgStudy = Self-efficacy for graduate program of study; Perc_DegreeValue = Perceived degree value; Perc_CompetIdent = Perceived competence and identity development; DropoutIntent = Dropout Intent

Thus, we continued re-specifying the model based on modification indices, adding the prediction of Perc_GradExpGap to DropoutIntent (see Figure 3), proposing that students’ negative perception of graduation experience would generate dropout intent. Statistical results supported this model modification. Table 5 shows that CFI, TLI, and RMSEA all fell within the acceptable limits and the Chi-square difference tests showed adding the path significantly improved model fit, which indicated that the third re-specification offered improved goodness of fit over model 2.

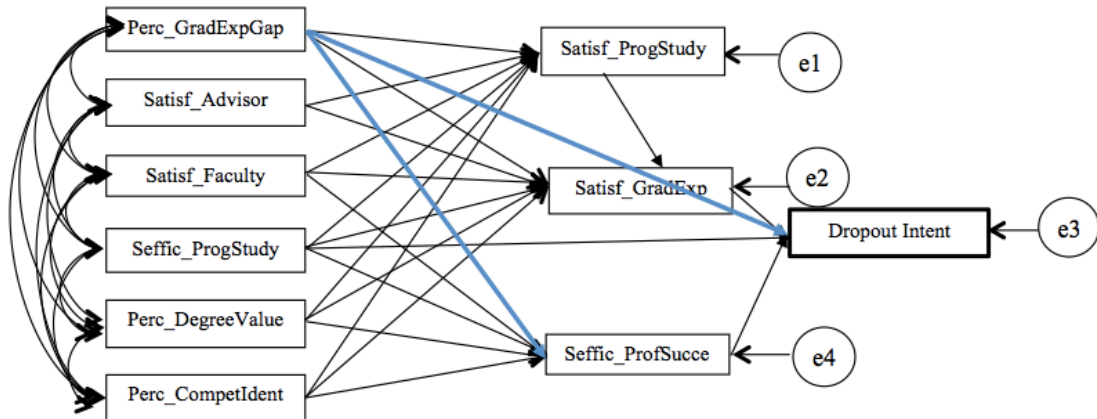


Figure 3. Re-specified Model 3

Note: Satisf_ProgStudy = Satisfaction with program of study; Satisf_GradExp = Satisfaction with graduate experience; Seffic_ProfSuccess = Self-efficacy for profession success; Perc_GradExpGap = Perceived graduate experience gap; Satisf_Advisor = Satisfaction with academic advising; Satisf_Faculty = Satisfaction with academic program faculty; Seffic_ProgStudy = Self-efficacy for graduate program of study; Perc_DegreeValue = Perceived degree value; Perc_CompetIdent = Perceived competence and identity development; DropoutIntent = Dropout Intent

Based on modification indices, we continued re-specifying the model, this time adding the prediction of *Seffic_ProfSuccess* to *Satisf_GradExp* (see Figure 4). Finally, the re-specified model was confirmed via good CFI and TLI as before, significant result of the Chi-square difference test, and excellent RMSEA but non-significant path coefficient. However, the modification is supported by the evidence in our literature review that graduate students' perception of professional development is constructed throughout their whole graduate lives. Hence, the incorporation of the path from perception of professional development to satisfaction on the whole graduate experience could be reasonable, and the statistical results suggested a smaller gap between the re-specified model and the real relationship among the constructs.

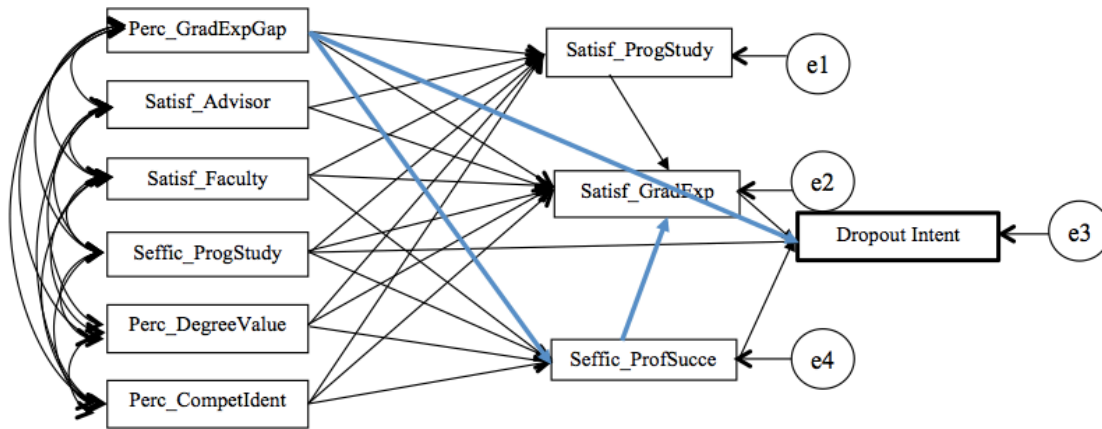


Figure 4. Re-specified Model 4

Note: *Satisf_ProgStudy* = Satisfaction with program of study; *Satisf_GradExp* = Satisfaction with graduate experience; *Seffic_ProfSuccess* = Self-efficacy for profession success; *Perc_GradExpGap* = Perceived graduate experience gap; *Satisf_Advisor* = Satisfaction with academic advising; *Satisf_Faculty* = Satisfaction with academic program faculty; *Seffic_ProgStudy* = Self-efficacy for graduate program of study; *Perc_DegreeValue* = Perceived degree value; *Perc_CompetIdent* = Perceived competence and identity development; *DropoutIntent* = Dropout Intent

Table 6. Regression weights

| | | Model 1 | Model 2 | Model 3 | Model 4 |
|-----------------------|---------------------------|---------|---------|---------|---------|
| DropoutIntend | <i>Seffic_ProgStudy</i> | -.085 | -.085 | -.114 | -.114 |
| | <i>Seffic_ProfSuccess</i> | -.299* | -.299* | -.268* | -.268* |
| | <i>Satisf_GradExp</i> | -.265* | -.265* | -.348* | -.348* |
| | <i>Perc_GradExpGap</i> | | | -.188* | -.188* |
| <i>Satisf_GradExp</i> | <i>Perc_GradExpGap</i> | -.199* | -.199* | -.199* | -.212* |
| | <i>Satisf_Advisor</i> | .022 | .022 | .022 | .024 |
| | <i>Satisf_Faculty</i> | .279* | .279* | .279* | .282* |
| | <i>Seffic_ProgStudy</i> | .268* | .268* | .268* | .229* |
| | <i>Perc_DegreeValue</i> | .082 | .082 | .082 | .063 |
| | <i>Perc_CompetIdent</i> | -.008 | -.008 | -.008 | -.015 |
| | <i>Satisf_ProgStudy</i> | .301* | .301* | .301* | .303* |

| | | Model 1 | Model 2 | Model 3 | Model 4 |
|--------------------------|--------------------|---------|---------|---------|---------|
| | Seffic_ProfSuccess | | | | .085 |
| Satisf_ProgStudy | Perc_GradExpGap | -.145* | -.145* | -.145* | -.145* |
| | Satisf_Advisor | .083* | .083* | .083* | .083* |
| | Satisf_Faculty | .328* | .328* | .328* | .328* |
| | Seffic_ProgStudy | .158* | .158* | .158* | .158* |
| | Perc_DegreeValue | .011 | .011 | .011 | .011 |
| | Perc_CometIdent | .225* | .225* | .225* | .225* |
| Seff- fic_ProfSuccess | Seffic_ProgStudy | .443* | .448* | .448* | .448* |
| | Perc_DegreeValue | .212* | .223* | .223* | .223* |
| | Perc_CometIdent | .051 | .067 | .067 | .067 |
| | Satisf_Faculty | -.122* | -.055 | -.055 | -.055 |
| | Perc_GradExpGap | | .168* | .168* | .168* |

Note: *: $p \leq .001$

Satisf_ProgStudy = Satisfaction with program of study; Satisf_GradExp = Satisfaction with graduate experience; Seffic_ProfSuccess = Self-efficacy for profession success; Perc_GradExpGap = Perceived graduate experience gap; Satisf_Advisor = Satisfaction with academic advising; Satisf_Faculty = Satisfaction with academic program faculty; Seffic_ProgStudy = Self-efficacy for graduate program of study; Perc_DegreeValue = Perceived degree value; Perc_CometIdent = Perceived competence and identity development; DropoutIntent = Dropout Intent

CONFIRMING FIT FOR SUBGROUPS: DEGREE TYPE AND POINT-IN-PROGRESS

Given the goodness of fit of the finally re-specified model, we investigated the model fit in different populations to ensure the relationship among the ten variables is not only for the whole-group sample. To test its goodness of fit for the more specific subgroups, we separated the data set into subsets, based on two key characteristics – degree type (Masters and Doctoral) and progress-toward-degree (Entrance, Midpoint, and Exit) – and then used confirmatory factor analysis to test whether the factor structure in the finally re-specified model found before could be replicated within the subgroup data sets.

The validation to more specific segments of the population had positive aspects regardless of whether it was a best fit for all subgroups or demonstrated differential fit. On one hand, if the replication was confirmed for the subgroups, it would provide evidence for differential validity of the identified model. That is, we could interpret the strength of influences as consistent across groups arguably different in their needs and concerns (degree types) and also as strongly for those at various points in their degree progress instead of more generally across the degree trajectory (as the whole-group model supported). On the other hand, if it showed differential goodness of fit across subgroups, it would illuminate nuanced differences in the degree to which, and manner in which, these various constructs influence graduate students’ satisfaction and dropout intentions for those different degree types and at those various points-in-progress. This nuanced information would support the

design of interventions to promote their satisfaction and improve retention, sensitive to those subgroup differences.

For the master subgroup (all points-in-progress) and for masters and doctoral students at entrance, Table 7 shows that the whole-group model was applicable with excellent fit without any further revision. The other subgroups required some revision of the whole-group model to achieve more specific best fit.

Table 7. Fit indices for the Entrance, Midpoint, Exit, Master, and Doctoral models

| | X ² | df | p-Value | CFI | TLI | RMSEA |
|---------------|----------------|----|---------|-------|------|-------|
| Entrance | 12.404 | 7 | .088 | .998 | .986 | .044 |
| Midpoint | 17.418 | 7 | .015 | .993 | .954 | .072 |
| Midpoint (re) | 6.316 | 6 | .389 | 1.000 | .998 | .013 |
| Exit | 11.042 | 7 | .137 | .996 | .973 | .056 |
| Master | 12.024 | 7 | .100 | .999 | .991 | .033 |
| Doctoral | 13.534 | 7 | .060 | .995 | .965 | .065 |
| Doctoral(re) | 6.268 | 6 | .394 | 1.000 | .998 | .014 |

According to the modification indices, we added the prediction of Perc_CompIdent to DropoutIntent in Mid model and the path from Satisf_Advisor to DropoutIntent, which showed best fit for doctoral students alone (all points-in-progress) and for both masters and doctoral students at midpoint and exit (see Table 7). Besides improving the model fit, the added path is significant for Midpoint students, but not for Doctoral students (at all points). This means that for the subgroup of Midpoint students, their negative perception of professional competence and identity development appears to more strongly influence their dropout intent. For Doctoral students, their satisfaction with advising can also more strongly influence their dropout intent. For Exiting students, there is no statistical recommendation for model improvement, which means the re-specified model aforementioned is the best fit model for the group of Exit students.

SUMMARY OF FINDINGS

Our final re-specified model fit the data well. First, it confirmed the complex, multifaceted nature of the graduate experience, and variability among the strength of multiple influences on graduate students’ success vs. intent to dropout. Second, across all these graduate students, the most significant influences on dropout were satisfaction with the graduate experience, self-efficacy for professional success, and the perceived graduate experience gap (Hardré & Hackett, 2015a). Third, modeling of the predictive role of the perceived graduate experience gap underscored both direct and indirect influences of this phenomenon that has until recently been ignored in studies of this kind. Finally, while these essential components were consistently significant across subgroups and over time, the data also demonstrated some notable variability in important factors between masters and doctoral subgroups and at particular points along the graduate degree trajectory. Together these findings offer important, original information to graduate educators and administrators.

Limitations

First, while non-parametric statistics might be considered more appropriate, this study reports its finding using statistic more commonly understood by readers of this journal. Second, this was a voluntary sample, so the generalizability of findings depends on its degree of representativeness. At the same time, the demographics of this sample are very similar to the institution’s graduate enrollment

demographics, at the time of this research, and they are designed as representative of the diversity in a U.S. research university across disciplines and degree types. Third, the study utilized dropout intentions, not actual dropout, but previous research has demonstrated that intentions predict dropout. Since graduate education is non-compulsory and therefore depends on learner choice to continue to completion, their intentions are a reasonable proxy for actual dropout probability. We did not include a detailed stratification of the analysis by disciplines, which may be seen as a limitation of this study, based on differences previously found in attrition rates between disciplines. However, we did include confirmation of the model fit for subgroups by degree type and by point-in-progress toward degree. The more extensive detailed stratification by disciplines was set aside based on the goal of this study to examine the overall graduate experience and move beyond the tendency of previous research to focus on single disciplines and homogeneous samples that did not generalize well across the diversity of graduate education. The influential roles of ethnicity and socioeconomic factors, though important, were beyond the scope of this study, and should be addressed in future research.

DISCUSSION

Multidisciplinary studies of graduate students with recent and robust sampling are relatively rare, and those including modeling of dropout intentions are extremely rare, so a study of this kind offers a range of potential value to both current practice and future research. Our overall study design both confirmed some previous findings and broke new ground regarding the complex dynamic of the graduate experience.

Our first key finding from this study was that our final respecified model fit the data well. It confirmed the complex, multifaceted nature of the graduate experience, and variability among the strength of multiple influences on graduate students' success vs. intent to dropout. This is one of very few systematic modeling studies across a multi-disciplinary graduate sample to include students' dropout intentions. Many published studies in graduate education present limitations that constrain generalizability, such as focusing in single disciplines (e.g., Dollarhide et al., 2013; Solem et al., 2011), only including doctoral students (e.g., Golde, 2000; Litalien & Guay, 2015; Mullen et al., 2010), using qualitative methods and very small local samples (e.g., Peters & Daly, 2013; Vekkaila et al., 2013), or defaulting to older (2001, 2003) archived data sets (e.g., Barnes & Randall, 2012; Xu, 2015). While these large national data sets offer robust sampling, we argue they may present somewhat dated perspectives (a decade or more old) relative to current issues and needs in the rapidly-changing context of higher education (see also Choi, 2016; Levine, 2005; Manning, 2013). Researchers have only begun understanding the complex perceptual interactions that contribute to critical outcomes of the graduate experience dynamic (e.g., Hardré & Hackett, 2015a, 2015c; Peltonen et al., 2017; Spaulding & Rockinson-Szapkiw, 2012). This study adds to those previous findings some important paths, showing how those factors are related to graduate students' dropout intentions.

Our second key finding was that across all these graduate students, the most significant influences on dropout included satisfaction with the overall graduate experience (not just the discipline and program area) and self-efficacy for professional success (not just for coursework). Previous qualitative research by Spaulding and Rockinson-Szapkiw (2012) showed that graduate students' dropout intentions in a single discipline could be linked to their match with both academic program offerings and social needs. Our modeling of similar dynamics extends and quantifies these ideas, showing how such perceptions can be standardized, measured, and modeled across disciplines and colleges. Similarly, the qualitative research of Emmioğlu et al. (2017) demonstrated that affect such as "feeling like an academic" draws students into the graduate experience, to engaging with peers and faculty, qualitatively illustrating the theoretical dynamic relationships between self-efficacy for professional success and program of study, with perceived competence and identity development. Our modeling study demonstrated and further confirmed that same theoretical relationship independently using the quantitative methodology.

Our third key finding was a confirmation that the significant predictive role of the perceived graduate experience gap (between expectations and actual graduate experience) (Hardré & Hackett, 2015a), which predicted dropout intentions both directly and indirectly (through Satisfaction). Modeling of the predictive role of the perceived graduate experience gap underscored both direct and indirect influences of this phenomenon that has until recently been ignored in studies of this kind. Adding to previous research on the Graduate Experience Gap (Hardré & Hackett, 2015a), it once again negatively predicted all positive outcomes for graduate students, indicating that consideration of this gap between student expectations and experiences is a critical factor with regard to their satisfaction with, success in and even completion of graduate school. Of particular note, perception of the Graduate Experience Gap strongly predicted both overall satisfaction with the program of study (negatively) and critical dropout intentions (positively). This finding illuminates how much graduate students' overall satisfaction with their programs and intentions to stay in school—across disciplines and colleges—are influenced by that match between expectations and actual experience. Regardless of what program or discipline these graduate students were in, what point in program, what college or subgroup, the greater the perceived match of their current graduate experience with their expectations, the greater their satisfaction with their program of study and the lower their likelihood of contemplating dropping out. This finding should enlighten the work of graduate program recruiting and advising staff regarding the importance of preparing graduate students with informed and realistic expectations of the graduate experience, and the positive difference that can make for their graduate journey. Recruiters, advisors, and support staff should attend to and be aware of how students' expectations align with the realities of program and experience, to help reduce this gap as much as possible, or intervene and adjust if the need arises, to help graduate students navigate and complete their degree programs.

Our fourth key finding was that, while the essential model findings were consistent for the whole group, the data also demonstrated some notable variability in nuanced factors between master and doctoral subgroups and at particular points along the graduate degree trajectory. Previous work of qualitative researchers such as Vekkaila et al. (2013) illustrates the importance of monitoring and maintaining graduate students' engagement in the graduate enterprise. Our own previous research on modeling motivation for graduate students along the developmental trajectory added an important element of information on timing, to help support staff understand when disengagement may be most likely to occur overall and for various subgroups of graduate students. Specifically, we found that the most common point for that potential drop in engagement to occur—across disciplines—was near the midpoint in the graduate experience (Hardré & Hackett, 2015a). This current study uncovered one more nuanced finding related to this issue, that is, the additional sensitivity of Midpoint students to the influences of the negative perception of professional competence and identity development toward dropout intent. This is one more level of clarity, opening up one more path to inquiry on the timing of, and reasons for, graduate students' dropout intent and actual attrition. Our future research will include following up with additional inquiry on this point. In addition, this finding can assist graduate support staff in monitoring and intervening for dropout intentions and possibly reducing graduate student attrition.

This finding unpacks and adds nuanced detail to the assertion that graduate students have both shared and unique needs and perceptions, both by degree type (e.g., masters, doctoral) and across the degree trajectory. The differences in factors predicting dropout intentions across the progress-toward-degree trajectory are unique to this study and offer potential to help graduate advisors and program administrators to recognize the importance of timing for support of goals and aspirations. As in previous studies of graduate degree trajectory (e.g., Hardré & Hackett, 2015c) there is a notable shift in perceptions and their influences near the midpoint-in-progress for many graduate students. Its value to inform practice and intervention is that graduate advisors and administrators need to be aware of this potential shift and to monitor and support graduate students' perceptions and progress at what the data indicate may be a critical juncture. While these point-in-progress differences were

not the focus of this particular analysis, they confirm previous patterns and recommend additional focused study of developmental subgroup differences among graduate students.

In addition to the four key findings, this study added a reliable assessment tool to the toolbox of researchers and policy-makers: the graduate student dropout intentions scale. This instrument was originally created by Hardré and Reeve (2003) for secondary students; it was redesigned and validated for the graduate population in the present study. It demonstrated excellent reliability and consistent performance across multiple subgroups. The modeling analysis further demonstrated the utility of the construct and scale in modeling with other variables previously demonstrated as important contributors to the graduate educational enterprise. Graduate colleges and programs can benefit from introducing incremental assessment of dropout considerations to provide information about the point-in-time and trajectory status of perceptions and outcomes of their students, to assist in advising students and improving programs. The Dropout Intentions subscale (Figure 5) used in this study is provided as a brief and useful assessment tool.

For the following questions, please respond regarding your agreement with each statement in the survey below. Indicate your level of agreement for each item using the following response scale:

| Strongly Disagree | Moderately Disagree | Somewhat Disagree | Slightly Disagree | Slightly Agree | Somewhat Agree | Moderately Agree | Strongly Agree | |
|-------------------|---------------------|-------------------|-------------------|----------------|----------------|------------------|----------------|--|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| 234. I sometimes consider dropping out of school | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 235. I intend to drop out of school | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 236. I sometimes feel ambivalent about continuing my studies | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 237. I am strongly committed to graduating | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 238. I'm not sure if I will finish this degree program | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 239. I am certain that I will complete my degree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 240. I am likely to drop out before completing this degree | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Figure 5. Dropout intentions scale

Note: The dropout intentions scale is presented here in the Qualtrics digital system interface, exactly as it was delivered to participants in the present study.

IMPLICATIONS FOR GRADUATE COLLEGE POLICY AND PRACTICE

This study data illustrates the dynamic interplay of some critical motivational factors, in a diverse graduate sample, also analyzed for key subgroups, culminating in how they contribute to dropout intentions and consideration of dropout. To whatever degree faculty members and administrators can reduce these factors, they can arguably reduce dropout intentions and increase likelihood of program completion among graduate students. Some factors that influence graduate student dropout (like family or financial crisis) are less controllable or amenable to intervention by higher education institutions. However, the factors this study found most powerfully influential on dropout intentions are to some degree within the control of educational systems and are demonstrably responsive to intervention. This is good news, because the things this research shows matter most for graduate student success are within reach of caring faculty and administrators to influence.

Self-efficacy for professional success is directly amenable to intervention, responsive to specific instructional, mentoring, and support strategies (direct and vicarious success experiences, modeling and visioning) that programs can implement to enhance self-efficacy for professional success (Bandura, 1997). Satisfaction with the graduate experience and the perceived gap in the graduate experience are both related to fulfillment of needs and expectations, which can be enhanced by building curricula and programs on theoretical frameworks (e.g., Austin et al, 2009; Baker & Lattuca, 2010). The Grad-

uate Experience Gap (Hardré & Hackett, 2015c) is at its heart a matter of aligning expectations with reality and then monitoring and managing change and adjustment as they occur over time (as research demonstrates they will).

ONGOING AND FUTURE RESEARCH

Together these four key findings offer important, original information to graduate educators and administrators, as well as raise interesting questions for ongoing research and scholarship in graduate education. Based on these findings, our own next steps in research are positioned along several pathways. Many additional questions and directions are open for future research that will improve knowledge and clarity on issues raised in this study. First, the various nuances of models that may explain graduate students' development of dropout intentions and lead to actual dropout need additional investigation in more and diverse population samples. These investigations should not be limited to single disciplines or degree types, but continue to be illuminated across samples that include multiple disciplines, multi-levels of degrees, and more than one institution if possible. They should use the same instrumentation, to hold measures and methods as constant as possible, to support comparison of findings across studies, including comparison of variables and constructs based on the same definitions and measures, and include dropout intentions.

Second, the key constructs and most powerful predictor variables in this study deserve much more attention as core factors in ongoing research. Self-efficacy has been studied long and widely, but unfortunately much of that research has been treated rather casually and managed at the level more of anecdote than scholarship. However, the particular contrast found in this study is that of two types of self-efficacy; it was self-efficacy for the long-term identity of career-related professional success, rather than the short-term immediate goal efficacy of confidence in ability to complete course tasks and grades, that predicted intentions to persist (negatively predicted dropout). Similarly, it was the more global satisfaction with the overall graduate experience, the whole of being a graduate student, not just localized satisfaction with the disciplinary culture, courses, and program-of-study, that also more powerfully predicted intentions to persist (negatively related to dropout). Because we separately assessed and analyzed each of these variables at the fine-grained level in the same study with the same students, we were able to compare the findings and identify the differences between the roles of these closely related factors. This was a particular contribution of the scope of instrumentation for this research project, providing foundations for future studies to build on.

Third, future research should continue investigating the roles of satisfaction with local and global components of the graduate experience and illuminate the outcomes and implications of each, along with how students can be supported toward positive experiences overall. Further, research needs to attend to subgroup differences, by degree type and point-in-program. Given the nuanced differences suggested here, more focused examination could unpack key points for intervention to reduce dropout risk. In addition, researchers need to examine the gaps between graduate students' expectations and experiences, which continue to demonstrate impact on students' life and success, yet get far too little serious research attention.

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