Factors Associated with Online Doctoral Student Persistence:
A Critical Integrative Review of the Literature

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Abstract: Online doctoral students may be at especially high risk for not completing their program. The purpose of this paper is to synthesize and critically analyze the body of research examining factors associated with persistence among online doctoral students, a relatively understudied population. Consistent with the notion that integration and institutional factors exert more influence on doctoral persistence than student characteristics, with the exception of leadership and motivation, few student-related characteristics examined were found to be associated with online doctoral student persistence. However, findings should be considered in light of the limitations of the existing research. Based on this critical integrative review of the literature, implications for research and practice as well as recommendations for next steps are offered.

Introduction

In higher education, enrollment in online courses and programs continues to grow and outpace that of traditional programs (Lederman, 2019). However, one of the greatest issues for higher education administrators (Bergman et al., 2014; Lee & Choi, 2011) is the reportedly higher attrition rates for online programs compared to traditional face-to-face programs (Cochran et al., 2014; Stevenson, 2013; Ivankova & Stick, 2007; Rockinson-Szapkiw et al., 2016; Terrell et al., 2016; Terrell et al., 2009; Wladis et al., 2014). It has been found that doctoral students are less likely to persist to degree completion than undergraduate and master's students (Cockrell & Shelley, 2010; Spaulding & Rockinson-Szapkiw, 2012). Varying by field and modality (Terrell et al., 2012), the proportion of students who leave doctoral programs is relatively high (30-70%) and

has remained steady for about 50 years (Zahl, 2015). Taken together, it seems that online doctoral learners are at an especially high risk for not completing their program (Cross, 2014). This is problematic for a number of reasons, including loss of student self-esteem and a potential reduction in institutional profit (Lee & Choi, 2011).

The majority of retention research in higher education has focused on students in traditional face-to-face programs (Bergman et al., 2014; Cochran et al., 2014; Hachey et al., 2014; Stevenson, 2013); however, online doctoral programs and learners warrant scholarly attention, as they have unique characteristics and needs (Akojie et al., 2019; Cockrell & Shelley, 2010; Hachey et al., 2014; Stevenson, 2013). Somewhat complicating the research is the myriad of factors that likely impact online doctoral students' decision to persist as well as the difficulty in tracking students once they withdraw (Fetzner, 2013; Layne et al., 2013; Stevenson, 2013; Willging & Johnson, 2009; Zahl, 2015).

The purpose of this paper is to synthesize and critically analyze the body of research examining factors associated with persistence among online doctoral students. Online doctoral student persistence does not seem to be the result of a single factor (Akojie et al., 2019; Spaulding & Rockinson-Szapkiw, 2012). Instead, it involves the interaction of multiple factors relating to both students and the institution (Ivankova & Stick, 2007). It is theorized that these factors contribute to the extent to which the student becomes integrated into the university, which is essential to persistence (Tinto, 1993). This framework will be used to organize the existing literature.

Methodology

To meet the inclusion criteria, a journal article had to (1) be peer-reviewed, (2) include original data, (3) examine persistence, (4) include only doctoral students taking courses online, (5) be written in English, and (6) be published within the last 15 years. Relevant research articles were located using Education Research Complete, ERIC, EBSCOhost, and Google Scholar. No article in which master's and doctoral students were incorporated in the same sample were included because it was impossible to distinguish what was true of just doctoral students. In addition, no dissertations or book chapters were included. The following search terms were used: "persistence" OR "retention" OR "attrition" OR "drop out" OR "dropout" OR "completion" OR "graduation" AND "online" OR "distance" OR "distributed" OR "blended" OR "hybrid" OR 'limited residency" AND "doctoral students". Articles with seemingly relevant titles were identified, then their abstracts were read. If the article still appeared to be relevant, the entire document was reviewed. The reference list of each relevant article identified was also searched to locate additional articles. Ultimately, 20 articles were deemed to meet the inclusion criteria. Each of these articles was reviewed closely, and the most relevant information was documented in the table in the Appendix.

Findings

Settings and Programs

As shown in the Appendix, more than half the research comes from only two research groups: Terrell and colleagues and Rockinson-Szapkiw and colleagues. Terrell and colleagues examined students or graduates from a limited-residency doctoral program at a private metropolitan university in the Southeast. Rockinson-Szapkiw and colleagues recruited students or graduates from a Doctor of Education program requiring 50 online credit hours and 10 residential credit hours at a private, religious, non-profit, liberal arts university. In addition to the limited diversity of perspective that characterizes the research, it is problematic because the two programs

from which these authors recruited students have unique characteristics; therefore, the ability to generalize the findings beyond these institutions might be limited. With few exceptions (e.g., Fiore et al., 2019; Lee et al., 2020), the participants in these studies reviewed were current or former students or graduates from one or two programs (usually education-related) at one institution. Moreover, most of the programs examined in this body of literature were limited residency or hybrid in nature. Such programs have different characteristics and outcomes than completely online programs (Davidson et al., 2014). In some cases, the research reportedly was initiated in association with a large number of students' leaving the program (e.g., Brown, 2017; Terrell, 2005b).

Methodologies and Frameworks

As shown in the Appendix table, qualitative (case study, phenomenology, grounded theory), quantitative (correlational, causal-comparative), and mixed (sequential explanatory) methods were employed in the body of literature on factors associated with online doctoral student persistence. In addition, with the exception of the studies involving grounded theory, most previous researchers identified a conceptual or theoretical framework that guided the study. Frequently, their work was informed by one or more models of attrition, most commonly that of Tinto (1993), Bean (1980), and Bean and Metzner (1985). In his model of institutional departure, Tinto maintains that students need integration into formal (academic performance) and informal (faculty/staff interactions) academic systems and formal (extracurricular activities) and informal (peer-group interactions) social systems to persist. In his model, Bean stressed that student integration and interactions combine with subjective evaluations of the educational process, institution, and experience to influence satisfaction directly and intentions to persist indirectly.

At the same time, external factors that are beyond the control of the institution, such as opportunity to transfer, family commitments, and financial constraints, directly influence intention to leave and drop out. In their model, Bean and Metzner (1985) included four sets of variables: academic performance, intent to leave, background and defined variables, and, most importantly, environmental variables. According to the model, student attrition is most directly affected by environmental variables, such as finance, working hours, outside encouragement, family responsibilities, and opportunity to transfer. It is important to note that Tinto's model was created with a focus on traditional undergraduate students, whereas Bean's (1980) and Bean and Metzner's models focused on nontraditional undergraduate students. That is, neither was developed to explain attrition among online and/or doctoral students.

In general, the sample sizes in qualitative studies were under 20, although Brown (2017), Spaulding and Rockinson-Szapkiw (2012), and Deshpande (2016) included 75, 76, and 91 online doctoral students, respectively. The sample sizes in quantitative studies were relatively larger (range: 51 [Terrell, 2005a] to 303 [Gomez, 2013]).

Variables and Constructs

Whereas some researchers measured their variables and constructs of interest directly (e.g., Terrell, 2005a, 2005b, 2014, 2015), others did so indirectly by soliciting participants' perceptions and seeking to understand their lived experiences (e.g., Kennedy et al., 2015; Terrell et al., 2016; Spaulding & Rockinson-Spakiw, 2012; Zahl, 2015). Researchers also varied the way they measured online doctoral student persistence, with some conceptualizing it as choosing to remain continuously enrolled (e.g., Brown, 2017; Rockinson-Szapkiw et al., 2016), and others as the successful completion of the program (e.g., Gomez, 2013, Spaulding & Rockinson-Szapkiw,

2012). In general, when reported, the completion rates of the students in the programs examined were relatively low (e.g., 49% in Terrell, 2005a; 37.6% in Terrell, 2005b, 42.9% in Terrell, 2014).

Student-Related Factors

Demographic Factors. Despite the importance of demographic factors to online doctoral student success (see Spaulding & Rockinson-Szapkiw, 2012), only some researchers presented demographic information about the individuals in their studies; even fewer included demographic factors in their analyses. Gomez (2013) examined the influence of gender, whereas Terrell (2005b, 2014) explored the impact of gender as well as age and ethnicity on online doctoral student persistence. Gender was not a significant predictor of persistence in either study. In addition, neither age nor ethnicity significantly predicted persistence.

Academic Factors. Only one researcher analyzed the educational background of the online doctoral students in their samples. Gomez (2013) found no significant influence of master's grade point average or application summary score on program completion (e.g., Gomez. 2013).

Cognitive Factors. Researchers also examined the potential impact of online doctoral students' critical thinking and learning styles. In Gomez (2013), although graduates had higher critical thinking scores by an average of 4.5%, it was not significantly associated with program completion. In an examination of 216 students who began a limited-residency doctoral program, approximately 38% of them graduated but those rates did not differ significantly by learning style (Terrell, 2005b). Although not statistically significant, the effect sizes in one study showed that students with a preference for information perception through sensing were more likely to succeed in programs like the one examined (Terrell, 2005a). However, in a study about a decade later, neither learning style or preference appeared to be related to attrition (Terrell, 2014). The relationship between brain hemispheric preference and attrition has also been examined, but has found to not significantly predict attrition (Terrell, 2015).

Personality. One researcher examined the influence of leadership behaviors and psychological type on program completion among online doctoral students (Gomez, 2013). Graduates had higher Leadership Practice Inventory Modeling the Way scores by an average of 3.8% and exhibited higher percentages (average of 10%) in the Myers-Briggs Type Indicator categories of Introvert, Sensing, Thinking, and Judging. Only Leadership Practices Inventory Modeling the Way emerged as a significant predictor of graduation. Ivankova and Stick (2007) also reported that self-motivation was one of the most important factors to persistence. Similarly, Fiore and colleagues (2019) reported that students believed that "persistence comes from within."

Experience of Disruption and Loss. Qualitative studies offered richer descriptions of online doctoral students' experiences impacting their persistence. Individuals with earned doctorates described personal sacrifice (e.g., summer breaks, sleep, time with loved ones) and disruptive life experiences (e.g., job promotion, marriage, layoff of a partner) (Spaulding & Rockinson-Szapkiw, 2012). Death and illness of either a loved one or a dissertation committee member also delayed progress for students (Spaulding & Rockinson-Szapkiw, 2012). Material loss (e.g., furniture, utilities, home) and relational loss due to divorce, death, and exposure to drug, alcohol, and physical abuse was also transformative for many students from backgrounds of poverty (Rockinson-Szapkiw, Spaulding, Swezey, & Wicks, 2014). Among these students, risk factors served as resilience mechanisms. For them, education was as a way out of their previous circumstances. For this reason, they reportedly felt compelled to continue their education. In Rockinson-Szapkiw, Spaulding, Swezey, and Wicks (2014), it was reported that students' inability

to consistently rely on adults influenced them to become more independent. Their faith also played a role in their self-reliance. At the same time, these students could easily name one or two significant individuals who helped them to develop positive traits and values.

Integration

Researchers have found a link between persistence and online doctoral students' sense of community and positive interactions with others (e.g., Terrell et al., 2009); however, the research has been mixed (e.g., Ivankova & Stick, 2007). Zahl (2015) defined community as "the development of social networks through relationships in the academic setting" (p. 302), using Kadushin's (2004) work in defining social networks as "relationships that one can draw upon as resources during graduate study" (p. 302). These relationships then serve as resources for doctoral students who often face unique challenges while pursuing their degree, and the lack of these relationships or removal of can have a negative impact on student persistence (Zahl, 2015). Online doctoral students report that "doctoral research feels lonely" (Fiore et al., 2019). For those attending doctoral programs part-time and online, developing these supportive relationships can be extra challenging due to distance, lack of time together, changing of cohorts, as well as outside competing obligations (Ivankova & Stick, 2007; Rockinson-Szapkiw et al., 2016; Zahl, 2015). However, the literature continues to grow in showing the importance of these relationships for online doctoral students (Rockinson-Szapkiw et al., 2016).

Relationships within the Institution. Researchers have found online doctoral students' relationship with their advisor to be critical to their success, including the time spent together, frequency of interactions, and the sense of care and trust that they perceive (Rockinson-Szapkiw et al., 2016). Relatedly, Ivankova and Stick (2007) found that graduate students who were inactive or had withdrawn were less likely to rate their advisors positively. Consistent scholarly interactions with peers and faculty have also been found to build a sense of community (Zahl, 2015). Further, supportive faculty mentors are perceived as having a profound impact on student persistence (Zahl, 2015), with students often looking to their faculty for guidance and support more than their academic peers (Ivankova & Stick, 2005). Assigning a faculty advisor to help doctoral students build this positive relationship can help support student success (Rockinson-Szapkiw et al., 2016).

Many students recommend carefully selecting their chair and committee members, as negative experiences with these relationships is often one of the biggest challenges reported by online doctoral students (Rockinson-Szapkiw et al., 2016; Terrell et al., 2016). This can result in a lack of connectedness and increases attrition (Terrell et al., 2009). It is also important to note that online doctoral students may be looking to their advisors to foster these relationships, which may not happen without effort on the student's end (Terrell et al., 2009). Online doctoral students recommend new student orientations where students are matched with peer mentors to establish connectedness and supports for persistence as well as formal processes throughout students' programs to ensure student connectedness to peers, advisors, and faculty (Terrell et al., 2016).

Relationships with academic peers also appear to impact online doctoral student persistence, as many students look to their peers for support when facing challenges (Rockinson-Szapkiw et al., 2016; Zahl, 2015). However, formal academic peer relationships formed through assigned group work at the graduate level led to reported dissatisfaction with courses in some cases (Rockinson-Szapkiw et al., 2016) and, in others, helped form peer mentors between those earlier and later in their academic journeys (Ivankova & Stick, 2005). These informal interactions with peers as well as staff and faculty helped develop a sense of connectedness to academic departments

and a sense of belonging (Zahl, 2015). Novice students appeared to be drawn to and appreciative of the support of students further along in their academic programs (Ivankova & Stick, 2005).

Nevertheless, many online doctoral students struggle to establish long-term relationships with their online academic peers (Ivankova & Stick, 2007), and this sense of isolation can lead to drop out (Rockinson-Szapkiw et al., 2016). This may be due in part to students' lack of self-efficacy to communicate easily with other in the online learning environment (Terrell et al., 2009). Helping build these relationships through scaffolded communications in courses can help build students' abilities to more effectively communicate with peers online and develop those long-lasting connections (Ivankova & Stick, 2005). For example, students reported preferring classes that were not too small or too large (ideal was 6-10 students) with opportunities for synchronous communication and those communications were with those who shared similar goals and values (Ivankova & Stick, 2005). Creating informal discussion areas or places to gather (e.g., "Virtual Cafeteria") are another way students reported building a sense of community in their online learning environments (Ivankova & Stick, 2005).

Spaulding and Rockinson-Szapkiw (2012) mentioned economic integration as an important contributing factor to online doctoral student persistence. Likewise, Deshpande (2016) noted the impact of financial difficulties as an impediment on the road to doctoral persistence. Rockinson-Szapkiw, Spaulding, and Spaulding (2016) pointed to financial integration (the interaction between financial support from the higher education institution and the student's personal finances) as a source of both support and emotional strain felt by online doctoral candidates. This was distinguished from financial support, which was specified as economic support provided solely by the higher education institution.

Relationships outside the Institution. For online doctoral students spending much of their time at school and work, their peers at work can help address feelings of isolation often felt by online students who struggle to make academic peers (Rockinson-Szapkiw et al., 2016). As many doctoral students also work, their work peers are sometimes also their academic peers, which has been viewed both positively and negatively by students trying to manage those dual roles (Zahl, 2015). Successful online graduate students reported the greatest perceived support from employers, family, and friends compared to those who were inactive or had withdrawn (Ivankova & Stick, 2007). A lack of support from employers reportedly lead to financial strain and decreased likelihood of persistence (Rockinson-Szapkiw et al., 2016).

Supportive partners and family members who can help with childcare and household responsibilities have also been reported to support student success (Spaulding & Rockinson-Szapkiw, 2012). In addition, remaining connected to family while also working to complete a doctoral degree has been shown to support persistence (Rockinson-Szapkiw et al., 2016); others use their family as motivation to obtain their degree (Spaulding & Rockinson-Szapkiw, 2012). However, this can be a challenge for online doctoral students who often report sacrificing time spent with family in order to complete their degree, which adds an additional emotional toll (Spaulding & Rockinson-Szapkiw, 2012). Online doctoral students reported using financial gains and promotions as motivators to help with persistence (Spaulding & Rockinson-Szapkiw, 2012).

Institutional Factors

Several researchers investigated program and/or institutional factors associated with persistence in online doctoral students. In Spaulding and Rockinson-Szapkiw (2012), program characteristics frequently were associated with persistence. Students' finding a reputable program with similar values that are compatible with their circumstances and learning styles was also

mentioned as being important. Brown (2017) also explored doctoral students' perceptions of the university that contributed to their choice to remain continuously enrolled in their online degree program.

Support Services. In particular, support services, such as academic advising, career services, and library resources, seem important to online doctoral student success (Fiore et al., 2019; Rockinson-Szapkiw et al., 2016), as do the quality of academic experiences, support, and assistance (Ivankova & Stick, 2007). Brown (2017) described how some students taking courses online can become overwhelmed by program requirements in combination with work and family demands. In this study, the students' most prevalent university support centered on assistance from instructors and advisors. However, online doctoral students also expressed that they did not feel that they were receiving adequate or consistent support (Fiore et al., 2019; Terrell et al., 2009). Relatedly, inadequate advising and program supports were reported to have contributed to students' leaving their doctoral program (Kennedy et al., 2015).

Brown (2017) examined supports not received that students believed would have helped them to achieve additional success. One theme that emerged was that, although students sought an online program for the flexibility, they missed some aspects of traditional programs, such as face-to-face communication and professor availability after business hours. A lack of time was cited as the greatest challenge for these students. Similarly, Deshpande (2016) reported that the absence of human interaction was a barrier to persistence. Full-time student enrollment was found to be correlated with persistence and degree completion in Zahl (2015), as part-time students perceived faculty as being unavailable to them and at times and that they catered to full-time students. Rockinson-Szapkiw and colleagues (2016) suggested that programs can assign a faculty member to serve in an advisory capacity from program entry through program completion. They argued that this faculty member can support acculturation into academia and socialization surrounding the nature of the doctoral journey and the skills and knowledge needed across the distinct phases.

In addition, institutional technology supports are important for online doctoral students' success. Technology issues when computers crashed were noted as impediments to student progress (Ivankova & Stick, 2005). In addition, the online learning environment was cited as important to persistence in Ivankova and Stick (2007). Moreover, in Lee and colleagues (2020), the ease of use, flexibility, and usefulness of available technology was highlighted.

Curriculum and Instruction. Curriculum and instruction have also been found to be important to online doctoral student persistence (Rockinson-Szapkiw et al., 2016), with some students reporting course structure and workload as barriers to persistence (Deshpande, 2016). In Spaulding and Rockinson-Szapkiw (2012), many participants cited earlier coursework as preparing them for the challenges associated with the dissertation. "Knowledgeable" and "high-quality" faculty were identified as key to success. Similarly, in Ivankova and Stick (2005), the course instructor was described as "a participant, expert, leader, designer, facilitator, and mediator of the course" (p. 8). In the words of one student, "The instructor is the course" (p. 8). According to Ivankova and Stick (2007), instructor accessibility and promptness of feedback were found to be more important that the quality of feedback and willingness to accommodate student needs.

Likewise, Terrell and colleagues (2012) found that longer-than-expected response times from dissertation supervisors might contribute to a lack of student success. These authors also highlighted a need for mentorship and other assistance with the dissertation process. Challenges in completing the dissertation were reported to have contributed to students' leaving their doctoral

program (Kennedy et al., 2015). In Spaulding and Rockinson-Szapkiw (2012), participants also mentioned challenges associated with the dissertation impacting their success.

Discussion

Previous researchers used diverse methodologies and measures to focus on widely varying student, integration, and institutional factors in their attempts to understand persistence in online doctoral students. The resulting lack of overlap makes it difficult to identify convergence and divergence in the research. Nonetheless, important takeaways exist.

The purpose of this literature review was to examine factors related to online doctoral student persistence. This review shows that the literature is not clearly aligned in terms of the factors examined and the definition of persistence. Therefore, it is difficult to ask more sophisticated questions relating to under what conditions factors are related to persistence. Consistent with the notion that integration and institutional factors exert more influence on doctoral persistence than student characteristics (Lovitts, 2001), with the exception of leadership and motivation, few student-related characteristics examined were found to be statistically significantly associated with online doctoral student persistence.

There is evidence that students' sense of community and positive interactions with others reportedly are linked to their persistence (e.g., Fiore et al., 2019; Terrell et al., 2009; Zahl, 2015). Zahl (2015) postulated that research has yet to elucidate how doctoral students develop community. However, "an ideal online learning environment has high levels of faculty-to-student and student-to-student connectedness evidenced by authentic and ongoing discourse and information sharing", with less than ideal conditions leading to attrition (Terrell et al., 2009, p. 114). During their moments of despair, having just one supportive person in the online learning environment can help create a sense of community and support student success (Zahl, 2015). In addition, program and institutional characteristics frequently were associated with persistence (Spaulding & Rockinson-Szapkiw, 2017). Brown (2017) argued that faculty members need to be encouraged to communicate often with online students and to be provided with the technological tools necessary to facilitate that communication. That is, institutions must provide the time, opportunities, and resources for such support to occur.

Implications for Future Research

To connect and build upon the current body of literature, future researchers can take several steps. First, they can examine some of the same factors included in previous research in an attempt to replicate the findings. Second, they can study completely online students as opposed to students taking one course online or students in a hybrid program. Third, given that most of the students included in previous studies were in an education-related program, it is critical to examine students from a variety of programs, disciplines, and institutions. Researchers have found differences across programs in terms of persistence. Attrition rates can be as high as 70% for Doctor of Education (EdD) programs compared to 40% to 60% for other doctoral programs, with online programs having a 10% to 20% higher attrition rate than traditional face-to-face programs (Nettles & Millett, 2006). Fourth, future researchers can use more direct measures of variables and constructs of interest as opposed to soliciting participants' perceptions and seeking to understand their lived experiences. Fifth, more research might be done on external and informal support, including family members and pets. Sixth, more research on factors, such as the impact of caregiving, is needed. Seventh, whereas individual and institutional factors have received a great deal of scholarly attention, academic factors might be examined to a greater extent. Eighth, other factors, such as learning outcomes and time to completion, might be explored.

APPENDIX

Table 1

Articles Included in the Critical Integrative Review of the Literature

Citation	Focus	Framework	Methods	Participants & Setting
Brown (2017)	Doctoral students' perceptions of work, university, and patterns of familial support that contribute to students' choice to remain continuously enrolled in the online degree program	Andragogy	Qualitative Interview and demographic questionnaire	75 students enrolled in a university's newly developed online doctoral program in Educational Leadership
Deshpande (2016)	Challenges in persistence in an online DBA Program in England	Unclear	Qualitative Interviews and survey	91 doctoral students at one institution 63.5% males, approx. 36% females
Fiore, Heitner, & Shaw (2019)	Online doctoral students' perceptions of the role of academic advising on their persistence as they transition from coursework to research in doctoral study	Unclear, but mentioned Tinto's work, Bean and Metzner's work, the ABD phenomenon	Qualitative Interviews	18 ABD students who were currently enrolled in an online doctoral program (n=6), online ABD students who completed their coursework within the past five years but were no longer enrolled in an online doctoral program (n=5), and students who had graduated from an online doctoral program in the past five years (n=7) 5 men, 13 women 8 participants identified as white, 10 identified as non-white

				Participants' ages ranged from under 45 years of age (27.8%), age 45-54 (33.3%), and over 55 years of age (38.9%) The most popular fields of doctoral study were education (39%) and psychology (28%)
Gomez (2013)	Predictive impact of student characteristics on persistence in an online doctoral leadership program	Unclear	Quantitative Secondary and program-specific data	303 doctoral students in a multi-disciplinary online doctoral program in organizational and in strategic leadership at a private graduate university 179 graduated (113 male, 66 female), 124 attritted (86 male, 38 female)
Ivankova & Stick (2005)	Experiences reported by doctoral students in an online course related to community building and persistence.	Unclear	Qualitative Online discussion questions	34 doctoral students in educational leadership in higher education program enrolled in online course. All had completed at least one online course. approximately 50% had completed 3 or more online courses. Students were from around the globe, with 31 paying non-resident tuition. Students ranged in age from 33-52 and all were employed full-time.
Ivankova & Stick (2007)	Predictive power of internal and external factors on	Tinto's student integration theory, Bean's student attrition model, and	Mixed methods	207 active and inactive students who took more than half their classes online in educational leadership in

	doctoral students' persistence	Kember's model of dropout from distance education courses	Interviews, academic transcripts and student files, elicitation materials, questionnaire, archived courses, survey	higher education program (202 admitted and active, 13 admitted but inactive, 26 graduated, and 37 withdrawn or terminated from the program) Typical participants were between 36 and 54 years of age, predominantly women, employed full-time, mostly out-of-state, and married with children
Kennedy, Terrell, & Lohle (2015)	A grounded theory of persistence in a limited-residency doctoral program	Unclear	Grounded theory Interviews	17 students who left a limited-residency doctoral program.
Lee, Chang, & Bryant (2020)	Impact of technological factors (TF) and relational factors (RF) on doctoral student learning success (SLS)	TF, RF, SLS	Quantitative Survey	210 doctoral students from 26 online doctoral leadership programs in the U.S. 140 female students, 70 male students
Rockinson-Szapkiw, Spaulding, & Lunde (2017)	How distance education women EdD students who are mothers balanced and integrated their multiple identities to persist	Jones and McEwen's conceputalization of identity, conceputalization of intersectionality drawn from critical race theory, Tinto's theory of integration	Qualitative Questionnaires, life maps, and interviews	17 women candidates in one of two distance education EdD programs with second-generation characteristics at universities in the southeastern US
Rockinson-Szapkiw, Spaulding, & Spaulding (2016)	**Identifying significant integration and institutional factors that predict online doctoral persistence**	Classic persistence models of Tinto, Bean, and Bean and Metzner	Quantitative Archival survey	148 doctoral candidates enrolled in an online Doctor of Education program with second-generation characteristics 24 African American, 116 Caucasian, 3 Latino, 4 Asian, 1 American Indian participants

				Majority was 30-49 and female, married, and working full time
Rockinson-Szapkiw, Spaulding, Swezey, & Wicks (2014)	Poverty and Persistence: A Model for Understanding Individuals' Pursuit and Persistence in a Doctor of Education Program	Deci and Ryan's self-determination theory, Tinto's integration theory, resilience framework	Qualitative Survey and interviews	12 students (7 female, 5 male) enrolled in a Doctor of Education (EdD) program requiring 50 online credit hours and 10 residential credits at a private, religious, non-profit, liberal arts university in the eastern United States 1 Africa-American, 1 Hispanic, 10 Caucasian students
Spaulding & Rockinson-Szapkiw (2012)	To analyze the narratives of successful doctoral candidates to uncover the personal, social, and institutional factors and contexts leading to the completion of the doctorate	Resilience framework, Tinto's integration theory	Qualitative Interviews	Data from 42 women and 34 men with earned doctorates in education and employed in the field were analyzed 55 Caucasian, 16 African-American, 2 Latino, 2 Asian, and 1 "other" participant(s)
Terrell (2005a)	**A longitudinal investigation of the effect of information perception and focus on attrition in online learning environments**	Jung's theory of psychological type	Quantitative Longitudinal survey	51 students in limited residency doctoral program. 84.3% male, 37.3% identified as members of a minority group. Average age 42 (range 24-64), 78.4% married. 51% dropped from the program or failed to finish within 7 years

Terrell (2005b)	Relationship between age, gender, ethnicity, learning style and their effect on attrition from an online doctoral program.	Kolb's learning styles	Quantitative

Longitudinal survey | 216 students who began a limited-residency doctoral program between 1993 and 1998 and graduated or left by 2003

54.6% male, 22.2% identified as members of a minority group, average age was 43.37 years old and approximately 38% graduated . |
| Terrell (2014) | The Use of Experiential Learning Styles to Predict Attrition from a Limited-Residency Information Systems Graduate Program | Kolb's learning styles | Quantitative

Surveys | 56 students enrolled in a course within a limited-residency information systems program

82.1% male, 37.5% identified as a member of a minority group, and 42.9% graduated |
| Terrell (2015) | Relationship between brain hemispheric preference and attrition in students enrolled in a limited-residency doctoral program. | Theory of brain hemisphericity | Quantitative

Longitudinal surveys | 152 students in a limited-residency information systems doctoral program

53.9% female, average age of 44, and 19.7% identified as belonging to a minority group |
| Terrell, Lohle, & Kennedy (2016) | Lived experiences that contributed to persistence for students who graduated from a limited-residency information systems doctoral program. | Unclear | Qualitative

Interviews | Graduates from a limited-residency doctoral program

Although 7 students who had graduated agreed to participate, data collection stopped after 5 due to saturation |
| Terrell, Snyder, & | Limited-residency doctoral students' feelings of connectedness towards | Unclear | Mixed methods

Survey | 223 students in a limited-residency doctoral program currently working on their dissertation as part of a |

Dringus (2009)	each other and the faculty by using a survey developed specifically for that purpose			degree in either educational technology or information systems
Terrell, Snyder, Dringus, & Maddrey (2012)	A Grounded Theory of Connectivity and Persistence in a Limited Residency Doctoral Program	Unclear	Qualitative Survey, online questionnaire	17 students, representing three different dissertation advisors Approximately 80% of students were in at least their fourth year of the program and had enrolled in an average of 5.8 terms for dissertation credit 65% male, with 64.7% of all students yet to complete their idea paper
Zahl (2015)	Ways part-time Ph.D. students develop community within the academic department and how a sense of community is related to persistence	Tinto's theory of doctoral student persistence Weidman et al.'s four stage model of doctoral student socialization	Qualitative Interviews	12 participants (10 students and 2 program chairs) in 2 academic departments (4 from Nursing and 6 from Education) at one urban research institution Students were at or near the qualifying examination phase of their program (they were allowed to have up to two courses remaining)

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