INTEGRATION OF DOCTORAL STUDENTS IN DISTANCE PROGRAMS: AN INSTRUMENT VALIDATION STUDY OF EDUCATIONAL DOCTORATE STUDENTS

by

Joseph L. Holmes

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Education

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ABSTRACT

Doctoral attrition rates range between 40%-60%. Attrition rates increase 10%-20% in the distance education (DE) environment. Academic integration and social integration are key elements of doctoral student integration and predictors of student persistence at any program stage. Instruments exist to measure academic integration and social integration for undergraduate students; however, no instruments exist that specifically measure both academic integration and social integration of doctoral students in DE programs at any program stage. The purpose of this research was to develop and analyze the structure, validity, and reliability of the Distance Doctoral Integration Scale (DDIS). Instrument development followed a multi-step process. After DDIS development, a subject matter expert review panel established instrument content and face validity. A DDIS pilot test (n = 8) further assessed content and face validity. The DDIS was then administered electronically via snowball sampling to doctoral students (n = 282) in DE programs. An exploratory factor analysis was used to analyze the DDIS structure and validity. Reliability was assessed using Cronbach's alpha and test-retest of previous participants (n = 109). The result indicated the 32-item DDIS is a valid and reliable instrument. However, the results also indicated the DDIS measures different factors than those hypothesized and provided a new conceptualization of program integration of doctoral students in DE programs.

Keywords: academic integration, distance education, distance learning, doctoral attrition, doctoral education, doctoral persistence, online learning, online education, program integration, social integration

Dedication

I dedicate this work to my loving family. Amy, you are the love of my life and my best friend. There is absolutely no way I could or would have finished without you. From the time I first started talking about pursuing my doctorate through my defense, you never once complained or made me feel guilty. Instead you completed this journey with me. You provided me wise counsel and encouragement when I needed it. You have a great love for our Lord, and provide a great example for me to follow. You are my hero, and I would be absolutely lost without you. I love you more than words can describe.

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you were proud of me and that you supported me. That instilled in me a can-do attitude and the confidence to try.

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Classroom Community Scale (CCS)

College Persistence Questionnaire (CPQ)

Confirmatory Factor Analysis (CFA)

Distance Education (DE)

Distance Doctoral Integration Scale (DDIS)

Doctoral Student Connectedness Scale (DSCS)

Exploratory Factor Analysis (EFA)

Kaiser-Meyer-Olkin (KMO)

National Science Foundation (NSF)

Missing Completely at Random (MCAR)

Science, Technology, Engineering, and Math (STEM)

Subject Matter Expert (SME)

Time-to-Degree (TTD)

CHAPTER ONE: INTRODUCTION

Overview

Research over the past 40 years shows doctoral attrition is a problem. Attrition can be defined as discontinuing a degree program (Bair, 1999). In the traditional setting, doctoral attrition rates range between 40%-60% (Bowen & Rudenstine, 1992; Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000). However, in the distance education (DE) environment where teachers and students are separated from each other (Bryant, Kahle, & Schafer, 2005; Schlosser & Simonson, 2010), student attrition can increase by 10%-20% (Carr, 2000; Frankola, 2001; Terrell, 2005). Universities have a responsibility to identify factors that promote students' progress toward degree completion, or to persist (Bair, 1999). Armed with this understanding, universities can develop intervention strategies to mitigate student attrition (Salter, 2012; Tinto, 2012).

There are many contributors compelling doctoral students in both the residential and DE environments to discontinue. Factors leading to doctoral attrition are generally categorized as either institutional or personal (Wao, 2010; Wao & Onwuegbuzie, 2011), and researchers have identified several of each that may affect the doctoral student's ability to persist in DE programs. Examples of personal factors include family support, employment obligations, and financial obligations; examples of institutional factors include the ability to connect with faculty and peers, support services, and structure of the program and dissertation process (Ivankova & Stick, 2007; Lovitts, 2001; Lovitts & Nelson, 2000; Rovai, 2002b; Spaulding & Rockinson-Szapkiw, 2012; Terrell, Snyder, & Dringus, 2009; Wao & Onwuegbuzie, 2011).

Doctoral attrition cannot be solely attributed to personal or institutional issues because these two categories are intertwined, and the primary factors motivating dropout may change

throughout the various stages of the doctoral program (Lovitts, 2001; Tinto, 1993). For example, a student may easily integrate in the program and university during coursework where peer interactions are built into course assignments. Positive feelings associated with these interactions lead to student persistence. However, this same student may feel isolated during the dissertation stage where peer contact may be limited and choose to drop out (Lovitts, 2001; Terrell et al., 2009).

Tinto (1993) stated that for doctoral students, persistence is "shaped by the personal and intellectual interactions that occur within and between students and faculty and the various communities that make academic and social systems of the institution" (p. 231). Tinto's (1975, 1993) constructs of integration capture the idea that both personal, institutional, and the interaction of the two influence a doctoral student's choice to depart or persist. Although a number of both personal and institutional factors have been identified as potentially influencing a doctoral student's persistence, research clearly suggests academic integration and social integration are two of the primary elements of doctoral student integration and are predictors of doctoral student persistence in DE programs (Ivankova & Stick, 2007; Rockinson-Szapkiw, L.S. Spaulding, & M.T. Spaulding, 2016; Wyman, 2012). Academic integration refers to interaction among students and faculty within the formal academic domain (Tinto, 1993). Social integration refers to interaction among students and faculty outside the formal academic domain (Tinto, 1993).

Tinto's (1993) model of institutional departure may be considered the most respected, tested, confirmed, and widely cited persistence model (Kember, 1989, 1995; Simpson, 2003). However, researchers applying the theory and constructs have not operationalized and measured either academic or social integration in a consistent manner (Braxton, 2000; Braxton & Lien,

2000; Davidson, Beck, & Milligan, 2009; Davidson & Wilson, 2013). Some researchers concluded Tinto's operational definitions for academic integration and social integration are inadequate and methodologically flawed (Braxton & Lien 2000; Braxton, Sullivan, & Johnson, 1997; Kuh & Love, 2000). Moreover, others have argued that Tinto's conceptualizations of academic integration and social integration are not equally applicable to all students (Bean & Metzner, 1985; Berger, 2000).

Definitions and measurements of academic integration and social integration vary based on institution, program level (e.g., doctoral, undergraduate, community college), and type of delivery system (distance, commuter, residential) (Davidson & Wilson, 2013). For example, undergraduate resident students enjoying *college life* with high levels of peer interactions and connections (e.g., social integration) may persist despite low grades and minimal interest in academics (indicators of academic integration of undergraduate students) (Braxton et al., 1997; Cabrera, Nora, & Castaneda, 1992; Pascarella & Terenzini, 1983). Conversely, doctoral students studying at a distance who are unsatisfied with their academic program (an indicator of low academic integration) may not persist despite high feelings of connectedness and support from their online peers (Rockinson-Szapkiw et al., 2016; Rovai, 2002b; Terrell et al., 2009). Until researchers address the inconsistencies when defining and measuring the elements of doctoral student integration (i.e. academic integration and social integration), the mixed findings in research will continue (Strevy, 2009). Therefore, this research focused on integration of doctoral students in DE programs and specifically on academic integration and social integration of doctoral students in DE programs.

Instruments have been developed and validated that include measures of academic integration and social integration for targeted populations. The College Persistence

Questionnaire (CPQ) (Davidson et al., 2009) was developed specifically for the traditional undergraduate student and includes academic and social integration measures. The Classroom Community Scale (CCS) (Rovai, 2002a) was developed to measure aspects of social integration or community within a single distance course. The Doctoral Student Connectedness Scale (DSCS) (Terrell et al., 2009) was developed to measure aspects of social integration or connectedness within the dissertation stage of a distance doctoral program.

However, a validated instrument does not exist to measure distance doctoral student integration with specific academic integration or social integration measures for all program stages. For this research, doctoral students in DE programs are defined as those pursuing their terminal degrees (Ed.D. or Ph.D.) in education via distance education, where at least 80% of the program is completed at a distance (Allen & Seaman, 2014). The intent of this study was to develop and validate the Distance Doctoral Integration Scale (DDIS), aimed at measuring academic integration and social integration factors of doctoral students in DE programs.

This chapter first outlines the impetus for this study by providing a background of distance education; the growing concern for increased DE attrition rates; and the negative effects attrition has on society, institutions, and the student. This background is further described in Chapter Two. The multi-model conceptual framework that grounded the study is also briefly introduced and is fully explained in Chapter Two. This framework provided a lens for identifying the elements of academic integration and social integration important to understanding distance doctoral student integration. The problem and purpose statements are also described. The chapter concludes with a presentation of the research questions and salient definitions.

Background

Distance education, initially beginning with correspondence courses, has been in existence at least 160 years (Simonson, Smaldino, Albright, & Zvacek, 2012). Today, DE generally implies students and teachers are at a distance and are connected via some form of technology. Schlosser and Simonson (2010) defined DE as "institution-based, formal education where the learning group is separated, and where interactive telecommunications systems are used to connect students, resources, and instructors" (p. 1). In their review of DE literature, Bryant et al. (2005) identified "the following terms are commonly used interchangeably: 'distance education,' 'distance teaching, 'distance learning,' 'online education,' 'web-enabled education,' and 'distributed learning'" (p. 256). Online education is currently the most rapidly growing and often used form of distance education (Gunawardena & McIsaac, 2004; Lee & Nguyen, 2007). Distance education (DE) will be the all-encompassing term used for this research; however, it will primarily refer to online education.

Distance education in higher learning institutions has grown significantly over the past 10 years and at a significantly faster pace than traditional higher education enrollment (Allen & Seaman, 2014). Approximately 7.1 million—or 33.5% of all higher education students—took at least one online course in 2012 (Allen & Seaman, 2014). This is a significant increase over the 1.6 million (less than 10%) in 2002 (Allen & Seaman, 2014).

Distance education has increased availability for educational pursuits at all higher education levels, with an ever-increasing variety of offerings from individual courses to fully online bachelors, masters, and doctorate degrees (Allen & Seaman, 2014; Larson & Sung, 2009; Mayadas, Bourne, & Bacsich, 2009). At the doctoral level, distance programs have changed degree access from a privileged few to include availability for all demographics (Allen &

Seaman, 2014; Ivankova & Stick, 2007; Offerman, 2011). Distance programs help mitigate geographical and time challenges, allowing those with full time jobs, familial obligations, and other similar responsibilities to pursue the doctorate (Kember, 1989; Rockinson-Szapkiw, Spaulding, & Lunde, 2017; Rovai, 2003).

While access and numbers of students pursuing distance doctoral degrees has increased, retention of students in online programs is a growing concern. This concern has increased for several years (Allen & Seaman, 2014). In 2004, 27% of academic leaders believed retention to be a greater problem for online classes compared to traditional classes. By 2013, the percentage concerned increased to 41% (Allen & Seaman, 2014). Moreover, doctoral attrition rates are documented to be 10%-20% higher in the online environment than in the residential environment (Carr, 2000; Frankola, 2001; Terrell, 2005). Some believe doctoral student attrition is expected and necessary (Cassuto, 2013; Smallwood, 2004), while others see any amount of doctoral attrition as a waste, bearing negative effects on society, institutions, and students (Cassuto, 2013; Gardner, 2009; Lovitts, 2001; Smallwood, 2004; Tinto, 1993).

Today's doctoral candidate may become tomorrow's world leader, researcher, and educator (Gardner, 2009; National Science Foundation [NSF], 2006, 2014), yet each noncompleter lessens the pool of those available to fill these vital roles (Lovitts, 2001). At the institutional level, high attrition rates cause time, money, and effort losses (Gardner, 2009). High attrition rates not only negatively affect the institution's reputation (Cassuto, 2013), high attrition costs may require departments to downsize or cut programs (Lovitts, 2001; Lovitts & Nelson, 2000). Likewise, there are time, money, and effort losses at the student level (Cassuto, 2013). A decision to discontinue may also be accompanied by years of emotional issues and strain (Cassuto, 2013; Gardner, 2009; Willis & Carmichael, 2011). Coupling the tremendous

growth of online learning with high retention issues leads one to believe "…online learning seems paradoxically to be both booming and busting simultaneously" (Power & Gould-Morven, 2011, p. 19).

While several factors are associated with student persistence (Davidson et al., 2009; Davidson, Beck, & Grisaffe, 2015; Lovitts, 2001; Tinto, 1975, 1993), research identifies two key factors—academic integration and social integration (Terrell et al., 2009; Tinto, 1975, 1993; Wao & Onwuegbuzie, 2011). Thus, a better understanding of doctoral students' academic integration and social integration at each stage of their DE program needs to be better understood and tracked by university administrators and faculty. At the doctoral level, the lines between academic integration and social integration are blurred (Lovitts, 2001; Tinto, 1993), and to better understand these constructs, researchers need to know how, or even if they are indeed separate. If doctoral student integration is better understood, and students with low academic integration and social integration are identified and issues are addressed, students may be more likely to persist.

The CPQ (Davidson et al., 2009) was developed to better understand factors related to traditional undergraduate students' persistence and contains measures of academic integration and social integration. The CPQ was designed for use as "an early warning system" (Davidson et al., 2009, p. 373), enabling colleges and universities to identify and respond to students at risk of attrition (Davidson et al., 2009). However, definitions and measures of academic integration and social integration are not *one-size-fits-all* (Bean & Metzner, 1985; Berger, 2000; Davidson & Wilson, 2013). Researchers (Braxton, 2000; Braxton & Lien, 2000; Braxton et al., 1997; Strevy, 2009), and as noted in the introduction, researchers have found that academic integration and social integration differ across institutions, program levels, and delivery methodologies

(Davidson & Wilson, 2013). The CPQ was designed for the traditional undergraduate environment and has not been revised and validated for either the distance or the doctoral environment.

An instrument specifically designed to measure academic integration and social integration of doctoral students in DE programs does not exist. Doctoral-conferring colleges and universities need a validated instrument to assist in understanding distance doctoral student academic integration and social integration at all stages of the doctoral journey. With such a tool, decision makers can implement early warning systems to recognize doctoral student integration issues. They can then design and implement targeted interventions as a step toward fostering integration and ultimately, persistence. Before an instrument measuring academic and social integration in doctoral students in DE programs can be created, a thorough review of the theory, doctoral education literature, and distance education literature is needed.

Theoretical and Empirical Context

There are multiple studies that evidence the important influence academic integration and social integration have on student persistence. Theories, models, and research often focus on traditional undergraduate students (e.g., Astin, 1984; Bean, 1980; Tinto 1975, 1993) and undergraduate nontraditional and distance students (e.g., Bean & Metzner, 1985; Hunter, 2002; Kember, 1989, 1995). Research has focused on traditional graduate and doctoral students (e.g., Bowen & Rudenstine, 1992; Girves & Wemmerus, 1988; Strayhorn, 2005; Tinto, 1993; Wao & Onwuegbuzie, 2011). Some research has also focused on distance graduate and doctoral students (e.g., Ivankova & Stick, 2007; Wyman, 2012). However, no single theory or model adequately explains the influence academic integration and social integration have on distance

doctoral student persistence. Therefore, multiple validated theories and models guided this study.

Tinto's model of institutional departure. Tinto's (1975, 1993) work may be the most widely-cited (Kember, 1989; Simpson, 2003) and often-used framework for integration and persistence model research and development (Simpson, 2003). Tinto's (1975, 1993) model of institutional Departure focused on explaining the "social and intellectual processes of interaction within institutions that lead individuals to leave prior to degree completion" (Tinto, 1993, pp. 36-37). Tinto (1975, 1993) generally described this interaction as integration, both academic and social.

Tinto's (1975) original work focused on traditional undergraduate students. In this setting, academic performance and intellectual growth lead to academic integration—higher levels of academic performance and intellectual growth indicate higher levels of academic integration (Tinto, 1975). Likewise, peer and faculty interactions outside the formal academic arena lead to social integration—higher quality and higher frequencies of social-based interactions with peers and with faculty indicate higher levels of social integration (Tinto, 1975). While Tinto's (1993) original work focused on undergraduate students, Tinto recognized the manner academic integration and social integration affect doctoral student persistence differs greatly from undergraduate student persistence.

Tinto (1993) furthered the original undergraduate persistence work by developing the longitudinal model of doctoral persistence. Similar to the undergraduate model, Tinto's (1993) doctorate model identified academic integration and social integration as key factors important to understanding doctoral student persistence in traditional, residential programs. However, Tinto

also suggested key differences in how academic integration and social integration may influence doctoral student persistence.

Tinto (1993) characterized academic integration at the doctoral level by the student's ability to assimilate within the student and faculty circles within their program. Tinto characterized social integration as the memberships that arise from and are directly connected to academic memberships (Tinto, 1993). Conversely, academic and social circles at the undergraduate level are generally separate. Positive experiences in one circle may overcome difficulties in the other, thereby increasing persistence (Tinto, 1975, 1993). However, at the doctoral level, academic and social circles are more closely intertwined. Positive experiences in one may not overcome negative experiences in in the other (Tinto, 1993).

Tinto (1993) further recognized academic integration and social integration need to be discussed and understood throughout three different stages of the doctoral program. Stage one is the initial period when doctoral students attempt to integrate into the academic and social communities within the program and generally lasts one to two years (Tinto, 1993). Stage two encompasses knowledge and skill development through the comprehensive examination (Tinto, 1993). During stage two, the academic and social interactions are focused mainly on knowledge and skill development, and it is during this stage that the academic and social communities become closely intertwined. Stage three is from candidacy through dissertation defense (Tinto, 1993). During this stage, the communities of influence shrink to those involved in the dissertation process (e.g., committee members and advisor) and are closely tied to the relationships of a few or even a single faculty member. The faculty influence becomes so strong at this stage that persistence may be entirely tied to the relationship with a single faculty member

(Tinto, 1993). Tinto's (1993) model has been applied and validated in doctoral persistence studies (e.g., Lovitts, 2001; Terrell et al., 2009; Wao & Onwuegbuzie, 2011).

Wao and Onwuegbuzie's integrated conceptual scheme of doctoral persistence. Wao and Onwuegbuzie's (2011) integrated conceptual scheme of doctoral persistence is grounded in Tinto's (1993) persistence work and focused specifically on doctoral student persistence (Wao & Onwuegbuzie, 2011). In developing their model through a mixed methods approach, Wao and Onwuegbuzie investigated how factors related to doctoral student persistence (including academic integration and social integration) influence time-to-degree (TTD) (Bair, 1999; Bowen & Rudenstine, 1992; Council of Graduate Schools, 2008). Wao and Onwuegbuzie (2011) identified both academic integration and social integration as strongly associated with TTD and doctoral student persistence. When doctoral students were integrated both academically and socially, TTD decreased and persistence increased (Wao & Onwuegbuzie, 2011). Conversely, when doctoral students were not integrated academically or socially, TTD increased and persistence decreased. Like Tinto (1993), Wao and Onwuegbuzie (2011) recognized doctoral persistence as a longitudinal process across the stages of doctoral programs.

Wao and Onwuegbuzie's (2011) research furthered Tinto's (1993) work by identifying specific aspects that influence academic integration and social integration. When students are satisfied with their academic program, they are academically integrated (Wao & Onwuegbuzie, 2011). Likewise, when students have positive feelings associated with faculty and peer interactions, they are socially integrated (Wao & Onwuegbuzie, 2011). Wao and Onwuegbuzie's (2011) research confirmed Tinto's (1993) work and the importance of academic integration and social integration in the persistence of traditional doctoral students. Unfortunately, neither

Tinto's (1993) or Wao and Onwuegbuzie's (2011) work considers the uniqueness of how doctoral students in DE programs integrate academically and socially.

Rovai's composite persistence model. Rovai's (2003) composite persistence model is a synthesis of other traditional and nontraditional undergraduate student persistence research. Rovai (2003) synthesized aspects of Tinto's (1975, 1993) integration model and Bean and Metzner's (1985) persistence work on nontraditional commuter students with current research on distance learning to provide insight into distance student, although not specifically doctoral, persistence. Rovai (2003) confirmed that both academic integration and social integration are necessary for distance education students' persistence. Similar to Wao and Onwuegbuzie (2011), Rovai posited levels of satisfaction with the academic program, including academic *fit,* positively influence levels of academic integration in DE students. Likewise, Rovai determined elements of social integration (e.g., connectedness and sense of community) are positively linked to persistence.

Rovai's (2003), Tinto's (1993), and Wao and Onwuegbuzie's (2011) models all demonstrate the role of academic integration and social integration in persistence, providing impetus for their inclusion in an instrument. These foundational models were used to define academic integration and social integration and to create instrument items for the DDIS. This conceptual framework is fully explained in Chapter Two.

Problem Statement

Low doctoral persistence is an issue, with drop-out rates ranging between 40%-60% in traditional programs across disciplines (Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000). Alarmingly, doctoral persistence rates consistently decrease 10%-20% in the DE environment (Carr, 2000; Frankola, 2001). Retaining

students is a widely studied topic (Tinto, 2006-2007), and there is significant research relating to both doctoral persistence and attrition (e.g., Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Lovitts & Nelson, 2000; Rockinson-Szapkiw & Spaulding, 2014; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993; Wao, 2010; Wao & Onwuegbuzie, 2011; West, Gokalp, Pena, Fischer, & Gupton, 2011). However, even with this body of research, doctoral persistence rates remain low (Cassuto, 2013; Council of Graduate Schools, 2008; Tinto, 2006-2007).

The majority of doctoral persistence research emphasizes student-related issues; however, Lovitts (2001) stated, "this emphasis has been ineffective and, possibly, counterproductive" (p. 37). Tinto (2012) posited institutions must invest "resources in those areas that most directly impact student retention" (p. 83). Tinto (2012) furthered this mandate by establishing the need to invest in data collection methods (e.g., surveys) to "pinpoint those aspects of institutional functioning that require improvement" (p. 83).

Doctoral conferring institutions, especially those with DE programs, have a responsibility to identify issues and take actions toward positively influencing academic integration and social integration (Salter, 2012; Tinto, 2012). The ability to identify integration issues, particularly the academic integration and social integration issues of doctoral students in DE programs, may enable institutions to develop targeted intervention strategies and programs to improve student integration and positively affect persistence. As doctoral institutions implement such mitigation strategies, the high doctoral attrition rates (Bowen & Rudenstine, 1992; Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000), particularly in the distance environment (Carr, 2000; Frankola, 2001; Terrell, 2005), may begin to decrease.

Validated instruments exist to measure academic integration and social integration of traditional undergraduate students (Davidson et al., 2009), students' sense of community in

individual distance courses (Rovai, 2002a), and students' feelings of connectedness during the dissertation stage of a DE doctoral program (Terrell et al., 2009). However, there are currently no valid and reliable instruments to specifically measure the academic integration and social integration of doctoral students in DE programs.

Purpose Statement

The purpose of this instrument development study was to develop and assess the validity and reliability of the DDIS. As part of the DDIS development process, I described the elements of academic integration and social integration of doctoral students in DE programs. The descriptions were informed by the conceptual framework (briefly described earlier and fully described in Chapter Two) and an extensive review of the literature. The DDIS development was informed by the element descriptions, conceptual framework, literature, and the three instruments briefly described in the introduction (and fully described in Chapter Two). The three instruments were the CPQ (Davidson et al., 2009, 2015), the CCS (Rovai, 2002a), and the DSCS (Terrell et al., 2009).

Significance of the Study

The implications of this study have practical, theoretical, and empirical significance. The DDIS was found to be valid and reliable for measuring factors associated with integration of doctoral students in DE programs. The DDIS is the first instrument specifically designed to measure integration factors for this population. Davidson et al. (2015) developed the CPQ to "offer schools the opportunity to collect reliable and valid scores on key variables . . . and provide a tool for designing efficient interventions" (p. 162) for traditional undergraduate students. The goal is for the DDIS to do the same for doctoral students in DE programs.

The development and validation of this instrument may assist educators in developing and assessing interventions and strategies to address integration issues connected to distance doctoral student attrition (Ivankova & Stick, 2007; Lovitts & Nelson, 2000; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011; West et al., 2011). The DDIS may also assist doctoral students in DE programs. Knowing the aspects of integration that contribute to their persistence can enable doctoral students in DE programs to make informed decisions and better prepare for distance learning.

There is a current gap in the literature stemming from inconsistent and unclear academic integration and social integration research (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). The findings of this research add empirical support to the literature regarding factors affecting integration of doctoral students in DE programs. With informed institutions, educators, and students, persistence rates may increase (Rockinson-Szapkiw & Spaulding, 2012). As doctoral attrition rates begin to decline, negative undertones related to doctoral attrition (Cassuto, 2013) should also decline.

Research Questions

RQ1: Is the DDIS a valid instrument for measuring academic integration and social integration of doctoral students in DE programs?

RQ2: Is the DDIS a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs?

RQ3: What are the underlying factors that explain integration of doctoral students in DE programs?

Definitions

1. *Academic integration* (in the traditional environment) - Academic integration is the amount and quality of interaction levels among students and faculty within the academic domain (Tinto, 1993).
2. *Attrition* -Attrition is when a student discontinues progress toward degree completion (Bair, 1999).
3. *Curriculum integration* - Curriculum integration is the satisfaction level with the quality and relevancy of the curriculum in the distance doctoral program.
4. *Distance education* (DE) - Distance education is a general term indicating teachers and students are physically separated, and technology is used to connect students, content, and teachers (Simonson et al., 2012). For this research, DE will indicate programs that are delivered at least 80% online (Allen & Seaman, 2014) and will be used in place of other commonly used terms such as distance or distributed learning, online education, and online learning (Bryant et al., 2005).
5. *Faculty integration* - Faculty integration is the satisfaction level with the nature and quality of academic and non-academic student-faculty interactions that take place during the distance doctoral program.
6. *Persistence* - Persistence is when a student continues progress toward degree completion (Bair, 1999).
7. *Social integration* (in the traditional environment) - Social integration is the amount and quality of interaction levels among students and faculty outside the formal academic domain (Tinto, 1993).

8. *Student integration* - Student integration is the satisfaction level with the nature and quality of academic and non-academic student-student interactions that take place during the distance doctoral program.

Summary

Doctoral student attrition is a problem (Bowen & Rudenstine, 1992; Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000), and the issue worsens in the DE environment (Carr, 2000; Frankola, 2001; Terrell, 2005). Research clearly suggests two of the primary elements that influence integration for doctoral students in DE programs are academic integration and social integration (Ivankova & Stick, 2007; Rockinson-Szapkiw et al., 2016; Wyman, 2012). However, research also indicates inconsistencies in defining and measuring academic integration and social integration (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013).

The problem is there are currently no valid and reliable instruments that specifically measure the academic integration and social integration of doctoral students in DE programs. Therefore, the purpose of this instrument development study was to develop and assess the validity and reliability of the DDIS. The DDIS was specifically designed to measure the integration, specifically academic integration and social integration, of doctoral students in DE programs.

This chapter outlined the impetus for this study by providing a background of distance education; the growing concern for increased DE attrition rates; and the negative effects attrition has on society, doctoral conferring institutions, and doctoral students. Three validated theories and models guided this study: Tinto's (1993) model of institutional departure, Wao and Onwuegbuzie's (2011) integrated conceptual scheme of doctoral persistence, and Rovai's (2003)

composite persistence model. These models provided the framework for identifying the elements of academic integration and social integration important to doctoral students in DE programs.

During this study, the DDIS was found to be valid and reliable for measuring factors associated with integration of doctoral students in DE programs. The DDIS is the first instrument specifically designed to measure these integration factors for doctoral students in DE programs. The findings of this research add empirical support to the literature regarding factors affecting integration of doctoral students in DE programs.

CHAPTER TWO: LITERATURE REVIEW

Overview

Students have learned at a distance for at least 160 years (Simonson et al., 2012). Over the past 10 years, enrollment in distance education (DE) has exceeded that of traditional higher education (Allen & Seaman, 2014). As enrollment increases, so do concerns with DE student retention (Allen & Seaman, 2014).

Retention concerns also plague distance education (DE) doctoral programs. Traditional doctoral programs have high attrition rates of 40% and 60% (Bowen & Rudenstine, 1992; Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000). However, in the distance environment, attrition rates increase by 10% to 20% (Carr, 2000; Frankola, 2001; Terrell, 2005). While some see doctoral attrition as both expected and necessary (Cassuto, 2013; Smallwood, 2004), high doctoral attrition rates generate negative effects on society, institutions, and the student (Cassuto, 2013; Gardner, 2009; Lovitts, 2001; Tinto, 1993).

Academic integration and social integration are key factors associated with doctoral student persistence in both the traditional and distance environments (Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). Inconsistent research across institutions, program levels, and delivery methodologies has led to inconsistencies in defining and measuring academic integration and social integration (Braxton, 2000; Braxton & Lien, 2000; Braxton et al., 1997; Davidson & Wilson, 2013; Strevy, 2009). These inconsistencies coupled with the intertwining of academic integration and social integration in doctoral programs (Lovitts, 2001; Tinto, 1993) begs one to question if these are even separate constructs. Without clearly defined

and operationalized measures of academic integration and social integration of doctoral students in DE programs, these inconsistencies will remain, and low doctoral persistence rates may never be addressed.

Institutions have a responsibility to take steps toward mitigating academic integration and social integration issues in their doctoral programs (Salter, 2012; Tinto, 2012). The purpose of this study was to clearly define and operationalize academic integration and social integration for doctoral students in DE programs and to develop and validate an instrument to measure those factors. Armed with an instrument to measure academic integration and social integration of doctoral students in DE programs, institutions can develop targeted intervention programs and strategies to increase persistence. Informed institutions, educators, and students may lead to a decline in the high attrition rates of doctoral students in DE programs (Rockinson-Szapkiw & Spaulding, 2012).

This chapter provides grounding and impetus for the study. This review of literature begins with an explanation of the theoretical framework used for this study. Next is a discussion of DE in general. This discussion includes a brief background and history of DE and a comparison of distance and traditional classrooms. This section concludes with a description of the incredible growth of DE over the past 10 years as well as the growth of distance doctoral programs.

The next section is devoted to distance doctoral student persistence and attrition. The section provides insights into distance doctoral student attrition and a discussion of the societal, institutional, and personal effects of doctoral student attrition. This section also includes a discussion of 10 factors important to the study of doctoral student persistence.

This review of literature includes a discussion of academic integration and social integration. This discussion begins with the inconsistencies identified in the literature in measuring both academic integration and social integration. Then both academic integration and social integration for doctoral students in DE programs are described, and a definition for each is developed.

The chapter concludes with a brief discussion of three validated instruments that include measures of academic integration and social integration. However, these instruments do not fully measure academic integration and social integration for doctoral students in DE programs. The definitions and the three instruments provide a foundation for the development of the Distance Doctoral Integration Scale (DDIS) described in Chapter Three.

Theoretical Framework and Empirical-Based Models

As explained in Chapter One, the foundational theoretical model for this study was Tinto's (1975, 1993) widely-used work on student integration and persistence, which was originally developed to address traditional undergraduate persistence. Most relevant to this study was his longitudinal model of doctoral persistence (Tinto, 1993). Wao and Onwuegbuzie's (2011) integrated conceptual scheme of doctoral persistence supported Tinto's assertion that social and academic integration are central to doctoral persistence. Rovai's (2003) composite persistence model aligning with Tinto's (1993) and Wao and Onwuegbuzie's (2011) models provided further support noting the unique academic integration and social integration issues of distance students.

The theory and models that support the importance of academic integration and social integration for persistence were developed for a variety of populations and environments. Table 1 lists each theory or model and for whom it was developed, including traditional classroom,

distance education, undergraduate persistence, or doctoral persistence. It is important to note that no single theory or model adequately explains the influence academic integration and social integration have on the persistence of the distance doctoral student.

Table 1

Student Attrition Models and Theories used to Guide this Study

Authors	Title	TC	DE	UG	DP
Tinto (1993)	Longitudinal Model of Doctoral Persistence	X		X	X
Rovai (2003)	Composite Persistence Model		X	X	
Wao and Onwuegbuzie (2011)	Integrated Conceptual Scheme of Doctoral Persistence	X			X

Note: TC=traditional classroom; DE=distance education; UG=undergraduate or graduate persistence; DP=doctoral persistence

These models acknowledge that persistence factors include more than just academic integration and social integration. Factors such as demographics (e.g., age, gender, race, etc.), academic performance (e.g., prior and current academic achievement such as bachelor's and Master's GPA, graduate record examination [GRE] scores, time to bachelor's or master's degree, etc.), institutional (such as academic integration, social integration, and student support services), and personal (also called external) (Bair, 1999; Bean & Metzner, 1985; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Rovai, 2003; Tinto, 1993; Wao & Onwuegbuzie, 2011) may also affect student persistence. However, the literature often supports academic integration and social integration as most salient.

Other variables may not exert as much influence on persistence. For example, several researchers have indicated both demographic variables and academic achievement generally do not influence doctoral student persistence (Bair, 1999; Girves & Wemmerus, 1988; Hoskins & Goldberg, 2005). Lovitts (2001) posited student background does not affect persistence as the

influencing factors are "what happens to them after they arrive" (p. 2). Therefore, the instrument development process for this study did not involve demographic, academic performance, or personal factors. Instead the focus was on academic integration and social integration.

Tinto's Theory of Student Departure

The most widely used and influential theory in student persistence and attrition research is the model developed by Tinto (1975, 1993) (Kember, 1989; Rovai, 2003; Simpson, 2003). Other student persistence and attrition models use his work as a starting point (Simpson, 2003). It was appropriate for Tinto's work to be the starting point for this study.

Undergraduate student departure. Tinto (1975, 1993) sought to address college attrition by *explaining* rather than merely describing the processes of student departure. Tinto found that research often failed to distinguish between student departure due to academic failure (involuntary) and departure for personal reasons (voluntary). Previous research also lacked the distinction between departure from an institution (possibly to transfer to another institution) and complete collegiate system withdrawal (Tinto, 1975, 1993). These issues often produced contradictory and even misleading findings related to student attrition (Tinto, 1975, 1993); thus, Tinto investigated and developed his model of institutional departure.

Tinto (1993) posited most student attrition is not *formally* related to the institution, but is related to the nature of student integration within the social and intellectual interactions that result from institutional attendance (Tinto, 1993). In general, students who were more satisfied with their social and academic interactions were more likely to persist, and those who were less satisfied were more likely to depart (Tinto, 1993). Thus, Tinto's (1993) model may be considered an interaction or integration model as he posited it is the "social and intellectual

processes of interaction within institutions that lead individuals to leave prior to degree completion" (pp. 36-37).

Foundational to Tinto's model are academic integration and social integration. Academic integration refers to student and faculty interaction levels within the formal academic domain (Tinto, 1993). Students and/or faculty discussing coursework and assignment due dates are examples of academic-based interactions. Social integration refers to the level and type of interaction students have with fellow students and faculty outside the formal academic domain (Tinto, 1993). Students and faculty discussing dorm life, the football game, and sorority or fraternity happenings, are examples of social-based interactions.

Tinto (1993) attributed a student's inability to integrate to two sources—incongruence and isolation. Incongruence generally refers to disparities between student and institutional "needs, interests, and preferences" (Tinto, 1993, p. 50). Examples of incongruence include academics being too challenging or not challenging enough, rules being too rigid or too lax, a difference in values, and other similar issues (Tinto, 1993). When a student feels the institution or the lifestyle surrounding the institution is not a good fit, a withdrawal decision may occur (Tinto, 1993).

Isolation is the student's inability to integrate socially or academically within the institution (Tinto, 1993). Tinto (1993) found that both the amount and quality of student interaction within the institution are critical to persistence. According to Tinto (1993), "[T]he absence of sufficient contact with other members of the institution proves to be the single most important predictor of eventual [student] departure" (p. 56).

In summary, completers make successful transitions and integrate socially and academically in college or university life; noncompleters do not (Tinto, 1993). While Tinto's

model is foundational to the study of persistence and attrition, his original model is limited. Tinto's (1993) model of institutional departure is based on traditional, residential undergraduate college students (those who begin college straight after high school); thus, Tinto (1993) continued work toward a theory of doctoral persistence.

Doctoral student departure. Tinto (1993) used his understanding of undergraduate persistence as the foundation for development of a doctoral persistence model. Similar to his undergraduate persistence model (Tinto, 1975, 1993), Tinto (1993) theorized academic integration and social integration are strongly associated to persistence in each stage of doctoral programs. Tinto (1993) posited doctoral student persistence is "shaped by the personal and intellectual interactions that occur within and between students and faculty and the various communities that make up the academic and social systems of the institution" (p. 231).

As described earlier, Tinto (1993) characterized academic integration of doctoral students as the ability to assimilate within the student and faculty circles within their program. Tinto (1993) posited social integration memberships were "part and parcel of academic membership[s]" (p. 232), with social-based interactions closely linked to intellectual and skill development.

Tinto (1993) viewed doctoral persistence as a longitudinal process across three stages. Stage one, usually when students take course work, is the one-to-two year period when doctoral students attempt to integrate into their program's social and academic communities (Tinto, 1993). Stage two is knowledge acquisition and competency development. During this stage, students gain the knowledge and skills required for their field of study and become integrated within their department. A doctoral student's social and academic interactions are much more *localized* within and influenced by the faculty and student communities existing in their

respective fields of study (Tinto, 1993). These interactions are often intertwined with many of the same students, faculty, and staff. Because the academic and social communities are generally the same, the distinction between academic integration and social integration becomes blurred as "social experiences become part of one's academic experiences and vice versa" Tinto, 1993, p. 236). Social and academic communities are often one in the same, with ties changing, becoming stronger, and having more influence over persistence in the later stages of the program (Tinto, 1993). Stage two culminates with the comprehensive examination.

Stage three encompasses the dissertation process—from candidacy through dissertation defense (Tinto, 1993). During stage three, the sphere of academic and social communities shrinks significantly, generally to the few faculty involved in the dissertation process. The ability to integrate and develop positive working relationships at this stage is so critical to persistence "that it may hinge largely if not entirely upon the behavior of a specific faculty member" (Tinto, 1993, p. 237). Tinto's (1993) longitudinal model of doctoral persistence provided a solid foundation for further doctoral student persistence research.

Wao and Onwuegbuzie's Integrated Conceptual Scheme of Doctoral Persistence

Wao and Onwuegbuzie (2011) developed what they described as "an integrated conceptual scheme of doctoral persistence that draws on the theoretical works in prior studies" (p. 117) (see Girves and Wemmerus [1988] and Tinto [1993]). Their research examined factors related to doctoral student time-to-degree (TTD) completion, an issue negatively associated with persistence. Given the association of TTD with persistence (Bair, 1999; Bowen & Rudenstine, 1992; Council of Graduate Schools, 2008), this research and the resulting model were relevant to this study. Wao and Onwuegbuzie's (2011) research provided validation for Tinto's work on doctoral student persistence.

Wao and Onwuegbuzie (2011) used a mixed-methods approach, including both doctoral students and doctoral educators to examine TTD and persistence. Wao and Onwuegbuzie (2011) viewed pursuit of the doctorate from a systems approach, with inputs (student background [e.g., age, gender, GPA, goals, expectations, and ethnicity]), processes (institutional and personal), and outputs (elapsed time to degree, counted as the total elapsed time from doctoral program entry to degree completion, including any inactive time [Bowen & Rudenstine, 1992]). They recognized the pursuit of the doctorate as a longitudinal process, involving "a complex interplay of institutional and personal factors" (Wao & Onwuegbuzie, 2011, p. 128) that affect a doctoral student's ability to integrate within the institution.

Wao and Onwuegbuzie (2011) identified TTD and persistence were affected by four primary institutional and personal integration domains: academic, social, economic or financial, and personal. This categorization aligned very well with Tinto's research (1975, 1993). While their model included four domains, their findings indicated academic integration and social integration as the two primary domains associated with TTD and persistence (Wao & Onwuegbuzie, 2011).

In their research, Wao and Onwuegbuzie (2011) defined academic integration as "students' level of satisfaction with their academic performance, degree of involvement in program activities, and curriculum structure" (p. 117). They posited students who were satisfied with these aspects were academically integrated and consequently tended to have shorter TTD. They found students who used terms such as relevant, useful, and interesting to describe their coursework and dissertation topics were academically integrated and had shorter TTD (Wao & Onwuegbuzie, 2011).

Wao and Onwuegbuzie's (2011) research also identified student satisfaction with academic-based faculty communications as important to TTD and persistence. Students were more satisfied when communications regarding requirements and expectations were clear and timely (Wao & Onwuegbuzie, 2011). Wao and Onwuegbuzie's (2011) findings regarding academic integration align with distance doctoral student research indicating students with higher perceived levels of learning, course relevance, and course usefulness had greater academic program satisfaction (Ivankova & Stick, 2007; Rovai, 2002b).

Wao and Onwuegbuzie (2011) defined social integration as "the nature of interaction that students experience as they engage in departmental activities" (p. 117). These factors were also identified as important in nontraditional student persistence (e.g., Bean & Metzner, 1985), distance student persistence (e.g., Rovai, 2003), and doctoral student persistence research (e.g., Girves & Wemmerus, 1985; Tinto, 1993). They identified positive interaction with both peers and faculty as important to developing social integration.

Like Tinto (1993), Wao and Onwuegbuzie (2011) found social integration among students stemmed from academic interactions, often focusing on how to overcome struggles and difficulties within the program. However, while peer interactions were important, faculty interactions were strongly associated to TTD and feelings of social integration (Wao & Onwuegbuzie, 2011). Faculty-based social integration was characterized by timeliness, quality of interactions, and the development of *collegial* relationships (Wao & Onwuegbuzie, 2011). When interactions and relationships with faculty were positive, students were able to discuss problems, seek and receive advice, and discuss goals and progress (Wao & Onwuegbuzie, 2011).

Positive interactions can lead to an atmosphere of *safety* where students feel comfortable reaching out and discussing concerns with faculty, indicating higher levels of social integration

(Wao & Onwuegbuzie, 2011). Conversely, low levels of social integration were marked by issues such as lack of communication and personality clashes with faculty, committee members, and dissertation chairs. Terms students used to describe these issues included students feeling *traumatized*, receiving *nasty comments* from committee members, and committee member's *deliberate refusal* to communicate with students, all issues that may increase TTD and decrease persistence (Wao & Onwuegbuzie, 2011).

Wao and Onwuegbuzie's (2011) investigation resulted in the development of the integrated conceptual scheme of doctoral persistence. This model demonstrated four domains of integration (academic, social, economic, and personal) that affect doctoral student TTD and persistence. Their model has been found useful in understanding factors related to both TTD and persistence (Margerum, 2014; Spaulding & Rockinson-Szapkiw, 2012; Wyman, 2012). While Wao and Onwuegbuzie (2011) found social and academic integration as key factors associated with doctoral persistence, but their model did not take into account the unique attributes of doctoral students in DE programs.

Rovai's Composite Persistence Model

Drawing on two of the most influential student persistence models and DE literature, Rovai (2003) developed a comprehensive explanation of student persistence in the distance environment. Rovai's (2003) composite persistence model was grounded in Tinto's (1975, 1993) work because "Tinto's model validates the need for schools to assume a proactive role in a student's integration process" (p. 5). Rovai (2003) recognized distance students are considered nontraditional students who do not reside on campus; are generally more mature (over 24-years old); are often part-time students; and generally have familial, work, and other non-school related responsibilities (Bean & Metzner, 1985; Cercone, 2008; Kember, 1989; Rovai, 2003;

Simonson et al., 2012; West, 2014). To account for these characteristics, Rovai (2003) incorporated aspects of Bean and Metzner's (1985) model of nontraditional undergraduate student attrition. Rovai (2003) stated "a synthesis of Tinto's [student integration] and Bean and Metzner's [non-traditional student attrition] models may be a better predictor of the persistence of nontraditional adult students than either model by itself" (p. 8).

Rovai's (2003) synthesis of Tinto's (1975, 1993) traditional and Bean and Metzner's (1985) nontraditional persistence models resulted in a model better suited for the distance education environment. The model highlights the importance academic integration and social integration have on DE student persistence. Based on the synthesis of the two models and additional DE literature (e.g., Workman & Stenard, 1996), Rovai (2003) determined academic integration is a key component of DE student persistence. Like Wao and Onwuegbuzie (2001), Rovai (2003) identified indicators of academic integration for DE students include academic *fit*, peer and faculty academic-based interaction, and program satisfaction levels.

Rovai (2003) also recognized the importance of social integration for DE students. While Bean and Metzner (1985) posited campus-based social integration does not significantly influence persistence in nontraditional commuter students, Rovai (2003) recognized that non-traditional commuter students (the focus of Bean and Metzner's [1985] research) differ from distance students, and distance students have particular *needs* that commuter students may not. From the literature (e.g., Ashar & Skenes, 1993; Cabrera et al., 1992; Kember, Lai, Murphy, Siaw, & Yuen, 1992; Rovai, 2003; Workman & Stenard, 1996), Rovai (2003) found strong evidence indicating social integration is important to distance student persistence. For DE students, higher levels of social integration may mitigate feelings of isolation and disconnectedness (Rovai, 2003). Indicators of social integration include feelings of

connectedness, community, and the development of personal relationships with peers and faculty that stem from the academic interactions (Rovai, 2003). Rovai's (2003) model has been confirmed as a useful framework for studying student attrition in the DE environment in numerous studies (e.g., Packham, Jones, Miller, & Thomas, 2004; Park & Choi, 2009).

This theoretical framework for the instrument this study sought to develop and validate is a synthesis of three empirical-based models. While no single model sufficiently explains the influence academic integration and social integration have on distance doctoral student persistence, each model selected provided empirical support indicating that academic integration and social integration are important for the persistence of doctoral students in DE programs. For this research, Tinto's (1975, 1993) understanding of academic integration and social integration provided the foundational evidence that these factors are key to persistence. Tinto's (1993) further work on doctoral persistence provided the understanding that academic integration and social integration manifest differently for doctoral students, are important in all stages of the doctoral program, and are closely intertwined with academic and social circles becoming one in the same.

Wao and Onwuegbuzie's (2011) research provided further evidence that academic integration and social integration are key factors that influence doctoral student persistence. Their conceptual scheme of doctoral persistence also informed how TTD negatively affects doctoral student persistence factors, primarily academic integration and social integration. Their research further identified key satisfaction indicators of both academic integration and social integration of doctoral students, finding that students who were both academically and socially integrated had shorter TTD and increased persistence.

Rovai's (2003) composite persistence model addressed how the distance environment may affect student persistence factors. Through significant literature review, Rovai (2003) confirmed academic integration as a key factor of distant student persistence with similar satisfaction indicators as those identified for doctoral students (Wao & Onwuegbuzie, 2011). Rovai (2003) also found strong evidence that social integration is important for distance student persistence. In the distance environment, social integration stems from academic interactions (Rovai, 2003), indicating that like academic integration and social integration of doctoral students, they are closely intertwined in distance students as well.

The models selected to inform the theoretical framework of this study provided clear support that academic integration and social integration are key factors in the persistence of doctoral students in DE programs. The rest of this chapter provides literature support to further understand the distance environment, distance doctoral programs, doctoral student persistence and attrition, doctoral student academic integration, and doctoral student social integration. The literature provided the background and foundation for the researcher-developed definitions of academic integration for doctoral students in DE programs and social integration for doctoral students in DE programs. The chapter ends with a short review of instruments that included measures of academic integration and social integration and helped inform DDIS item development. This chapter provides the empirical support identifying the need to develop the DDIS and the literature to support DDIS item development (explained in Chapter 3).

Related Literature

Distance Education

Background and brief history. Schlosser and Simonson (2010) described the term DE as "a generic, all-inclusive term used to refer to the physical separation of teachers and students"

(p. 129) including "the application of information technology (and infrastructure) to educational and student-related activities linking teachers and students in differing places" (p. 129). To be considered DE, Simonson et al. (2012) purported that four elements must be present:

- The program must be institutionally based, meaning there must be an association with a professional entity such as a school (primary, secondary, collegiate) or business (Simonson et al., 2012).
- Teachers and students be separated by time, geography, or both (Simonson et al., 2012).
- The program used synchronous or asynchronous interactive telecommunications (Simonson et al., 2012). Telecommunications is commuting from a distance through any electronic or non-electronic (postal, correspondence, etc.) media (Simonson et al., 2012).
- Students, resources, and teachers can be linked, creating student-student, student-content, and student-instructor connections (Simonson et al., 2012).

Distance education has been around at least 160 years (Simonson et al., 2012), significantly changing over time. Taylor (2001) described the evolution of DE through five generations. The first generation is the correspondence model and is based on print technologies (Taylor, 2001). Early examples include correspondence courses to learn shorthand via post in England in the 1840s, and in 1883-1891 New York authorized Chautauqua College of Liberal Arts to provide academic degrees via correspondence (Simonson et al., 2012).

The second generation is the multi-media model, which incorporated print, audio, and video delivery mediums (Taylor, 2001). Early examples include experiments using television programs to deliver instruction in the 1930s, and in 1951 Western Reserve University was the

first to offer college credit via televised programs (Simonson et al., 2012). Computer-based training also falls into this generation (Taylor, 2001). The third generation introduced synchronous telecommunications through mediums such as radio, audio, and video conferencing (Taylor, 2001). One example is the Iowa Communications Network that connects over 600 classrooms using interactive two-way audio, video, and Internet (Simonson et al., 2012).

The fourth generation is the flexible learning model that includes interactive multimedia; synchronous and asynchronous computer-mediated communication, collaboration, and interactivity; and access to nearly unlimited resources on the world-wide web (Taylor, 2001). The fifth generation—called the intelligent flexible learning model—leverages relational databases and data mining technologies, or "intelligent object databases" (Taylor, 2001, p. 9) to fourth generation technologies, providing organizational procedures and automated response systems to help manage academic support and teaching (Taylor, 2001).

Today, most distance degree programs are either fourth or fifth generation formats, with students, teachers, and content connected via some form of technology (Baker, 2014). Allen and Seaman (2014) broke down DE by various course delivery methods and have used the following terms to describe those methods since 2002:

- Online—Course delivery is at least 80% online.
- Blended/Hybrid—Course delivery is 30 to 79% online.
- Web Facilitated—Course delivery is 1 to 29% online.
- Traditional—Course delivery is 0% online.

Based on these definitions and the focus of this research, the terms *distance education* or *distance learning* were used interchangeably to describe geographically-separated yet technologically-connected learning situations where there is no indication or need to describe a

separation percentage. Distance education graduate programs that require a residency may be labeled as *limited-residency* programs (Terrell, Snyder, Dringus, & Maddrey, 2012) and may align with either the online or blended category as defined by Allen and Seaman (2014). When the separation percentage was important or implied, the definitions provided by Allen and Seaman (2014) were used. The terms traditional and face-to-face refer to *brick-and-mortar* or *in-residence* education. Finally, as traditional is associated with in-residence, for this study the term *nontraditional* referred to students studying at a distance.

Distance education compared to traditional classroom education. Academic leaders believe and studies establish distance courses to be equal to or better than traditional classroom instruction (Allen & Seaman, 2014; Lapsley, Kulik, Moody, & Arbaugh, 2008; Larson & Sung, 2009; Weber & Lennon, 2007). Meta-analysis research and literature review findings generally support these conclusions, indicating there are generally no significant differences between distance (including online, blended, and web facilitated) and traditional classroom instruction (Allen, Bourhis, Burrell, & Mabry, 2002; Bernard et al., 2004; Russell, 1999; Simonson, Schlosser, & Orellana, 2011; U.S. Department of Education, Office of Planning, Evaluation, and Policy Development [U.S. DOE], 2010; Zhao, Lei, Lai, & Tan, 2005). This is because today's online education methodologies can be engaging and interactive student-to-student, student-to-instructor, and student-to-content learning environments (Mayadas et al., 2009; Moore, 2011).

However, in their meta-analysis comparing distance to traditional education, Bernard et al. (2004) found significant variability in student achievement, attitudes, and retention, concluding that:

> This wide variability means that a substantial number of [DE] applications provide better achievement results, are viewed more positively, and have higher retention rates than

> their classroom counterparts. On the other hand, a substantial number of [DE] applications are far worse than classroom instruction in regard to all three measures. The mistake that a number of previous reviewers have made . . . is to declare that [DE] and classroom instruction are equal without examining the variability surrounding their difference. (p. 406)

In their meta-analysis of 51 articles on DE learning outcomes, Zhao et al., (2005) also found results indicating wide variability with about two-thirds indicating better learning outcomes among distance students, and the other third indicated face-to-face as more favorable.

Distance programs may offer greater access to and opportunities for doctoral education (Allen & Seaman, 2014; Ivankova & Stick, 2007). With these opportunities, students can expect at least as good (Allen et al., 2002; Bernard et al., 2004; Russell, 1999; Simonson et al., 2011; U.S. DOE, 2010) and in some instances better (Zhao et al., 2005) learning experiences and achievements. These findings may be contributors to the significant growth of DE.

Growth of distance education. Distance education in higher learning institutions has grown significantly over the past 10 years, and higher education enrollment has grown at a significantly faster pace than traditional education (Allen & Seaman, 2014). An astonishing 7.1 million—or 33.5% of all higher education students—took at least one online course in 2012 (Allen & Seaman, 2014). This is a significant increase over the 1.6 million (less than 10%) in 2002 (Allen & Seaman, 2014).

Academic leader support for DE is also increasing. Allen and Seaman (2013) found "in 2002, less than one-half of all higher education institutions reported online education was critical to their long term strategy" (p. 4). In 2012, that number increased to 69.1% (Allen & Seaman, 2013). Only one-third of higher-education academic leaders believe their school has a below-

average ability to scale distance course requirements to meet the DE demands and are positioned to utilize technology for course development and innovation (Allen & Seaman, 2013). Today, approximately 87% of higher education institutions offer online courses, and 64% offer full online programs (Allen & Seaman, 2013). It is likely this trend will continue to grow as 90% of chief academic officers believe that within five years the majority of college students will be taking at least one online course (Allen & Seaman, 2014).

William Rainey Harper, a professor at Yale, stated "[A DE student] knows more of the subject treated in those [distance] lessons, and knows it better, than the student who has covered the same ground in the classroom" (as cited by Simonson et al., 2012, p. 38). This statement may not surprise many advocates of DE. However, it may surprise some that Harper made the quote while he headed one of the first DE degree programs in the U.S. from 1889-1891 (Simonson et al., 2012). Harper's notion regarding the benefits of DE still holds true for today's offerings.

According to Mayadas et al., (2009), "online education is established, growing, and here to stay. It is creating new opportunities for students and also for faculty, regulators of education, and the educational institutions themselves." (p. 49). Distance education is currently used very successfully to teach a variety of topics (such as education, leadership and management, math, engineering, and business) at a variety of levels (including single course; massive open online courses; and bachelors, masters, and doctorate degrees) (Allen & Seaman, 2014; Larson & Sung 2009; Mayadas et al., 2009).

Growth of distance doctoral programs. The significant growth of DE doctoral programs in the U.S. has dramatically increased doctoral education availability. The number of awarded doctorates has increased an overall average of 3.4% per year over the past 50-plus

years, increasing from nearly 9,000 completers in 1958, to over 51,000 completers in 2012 (NSF, 2014). The DE environment's primary purpose—"to provide a valuable learning experience to students who might otherwise not have access to learning" (Simonson et al., 2012, p. 219)—has certainly supported doctoral program growth.

Distance education opportunities are making previously unavailable doctoral programs available, resulting in increased numbers of doctoral students in DE programs (Allen & Seaman, 2014; Ivankova & Stick, 2007). This availability has promoted both institutional and candidate change. Years ago, a doctoral degree in the U.S. was primarily available only to a privileged few, and those few were generally white, male U.S. citizens (Offerman, 2011). However, today's widely available doctoral programs include all other demographics.

Since 2002, the majority of U.S. citizen and permanent resident doctorates have been awarded to women (NSF, 2014). Underrepresented U.S. citizen and permanent resident minority doctorate completion rates are also increasing. Over the past 20 years, doctoral completion rates have increased 87% among African Americans, and Latino or Hispanic completion rates have more than doubled (NSF, 2014).

Today's DE environment opens doors for those otherwise unable to complete a doctorate. In addition to school responsibilities, nontraditional students often have familial, work, and non-school social organization responsibilities (Bean & Metzner, 1985; Rovai, 2003). This may be even truer in the distance environment because DE is often associated with part-time, more mature students who are generally not on campus (Kember, 1989).

Examples of this nontraditional student demographic include working adults, stay-at-home parents, deploying military personnel, and those geographically separated from campus programs (Cercone, 2008; Simonson et al., 2012; West, 2014). It is easy to see that today's

doctoral student can be a parent or guardian, primary caregiver for an aging family member, full-time employee, and doctoral candidate simultaneously (Rockinson-Szapkiw et al., 2017; Wyman, 2012). However, the increased availability of distance doctoral programs and the changing demographics of today's doctoral students in DE programs bring issues and challenges that uniquely differ from traditional education. With increases in DE come the growing concerns of student retention (Allen & Seaman, 2014). This is especially true in the doctoral environment—significant differences in the population, the learning experiences, and skills required exist between distance and traditional doctorate programs (Baker, 2014).

Persistence and Attrition

Distance doctoral student attrition. Research into the doctoral student journey continues to be a topic of interest worldwide, with particular attention paid to doctoral student attrition (Gardner & Gopaul, 2012). As noted previously, research over the past 40 years shows doctoral attrition in the traditional setting ranges between 40%-60% (Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000; Rockinson-Szapkiw & Spaulding, 2012; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993). These high attrition rates are alarming considering these students have already been successful in undergraduate and graduate programs.

What is even more alarming is that doctoral attrition rates increase in the DE environment (Carr, 2000; Frankola, 2001). However, the majority of persistence and attrition research is focused on the traditional, full-time doctoral student, with research surrounding the distance learning doctoral journey somewhat neglected (Baker, 2014; Gardner & Gopaul, 2012; Terrell et al., 2012).

Attrition of students in online programs has been a growing concern for several years (Allen & Seaman, 2014). In 2004, 27% of academic leaders believed retaining distance students to be a greater issue than traditional retention. By 2013, that number increased to 41% (Allen & Seaman, 2014). Significant variation exists in online attrition rates across institutions (Carr, 2000). For example, online attrition rates have been reported below 20% (Carr, 2000) and as high as 80% (Flood, 2002). Regardless of the variability, the most startling statistic is that educational leaders agree attrition rates are generally 10% to 20% higher in the DE environment (Carr, 2000; Frankola, 2001). Unfortunately, this can make the already high doctoral attrition rates (Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000; Rockinson-Szapkiw & Spaulding, 2012; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993) even higher. Regardless of whether a student departs from a distance or traditional doctoral program, the negative effects of high attrition rates remain the same.

Effects of doctoral attrition. Regardless of the impetus leading to an attrition decision, the result is the same. Some believe that the doctoral journey is not for all, thus a certain amount of attrition should be expected (Cassuto, 2013) or even needed to separate "the wheat from the chaff" (Smallwood, 2004, p. 1). However, there are essentially no undergraduate academic differences between doctoral completers and noncompleters, thus, many see any doctoral attrition as wasted talent and time (Smallwood, 2004). Whether one believes attrition is needed or believes any attrition is wasted time and talent, one truth remains—the effects of doctoral attrition are widespread. Doctoral student attrition brings to bear significant societal, institutional, and personal consequences, thus attrition has been coined as a "dirty word in higher education" (Cassuto, 2013, p. 1).

Societal effects. According to the National Science Foundation (NSF) (2014):

> The American system of doctoral education is widely considered to be among the world's best, as evidenced by the large and growing number of international students each year—many of them among the top students in their countries—who choose to pursue the doctoral degree at U.S. universities. (Introduction, para. 1)

Society needs doctoral graduates, both in and out of academics (Lovitts, 2001) to become what Tinto (1993) described as "high-level manpower" (p. 230). Doctoral graduates develop into world leaders, scientists, researchers, and educators, using their knowledge and skills for innovation and services that promote economic and cultural growth and development and improved standards of living (Gardner, 2009; NSF, 2006, 2014). However, every student who departs from the doctoral journey is one less person capable of filling these key academic, scientific, and societal roles (Lovitts, 2001).

High doctoral attrition rates are becoming even more of an issue in the U.S. Even though the NSF (2014) stated America's doctoral system may be the world's best, a paradox seems to exist. In most nations, the higher the level of education, the lower the attrition rate (Tinto, 1993). Unfortunately, the opposite is true in the U.S.—the higher the level of education, the higher the attrition rate (Tinto, 1993).

At the same time, other nations recognize the importance of doctoral completers and are significantly investing to develop quality doctoral programs (NSF, 2014). The NSF (2014) further stated that "unless doctoral education in the United States continues to improve, the world's brightest students, including U.S. citizens, may go elsewhere for the doctoral degree, and they may begin careers elsewhere as well" (para. 4). Doctoral completers outside the U.S. may lead to what Smallwood (2004) described as "a shrinking 'domestic talent pool'" (p. 2).

Institutional effects. High doctoral student attrition rates can be associated with various types of institutional losses. Attrition is very expensive, causing institutions to feel losses in terms of time, money, and effort (Gardner, 2009). When a student leaves before degree completion, the institutional losses include expenditures for advertisement, candidate recruiting, campus events, and costs associated with assistantships and tuition stipends (Gardner, 2009; Lovitts & Nelson, 2000). In fact, when time, money, and personnel are included, doctoral student recruitment is more expensive than doctoral student retention (Gardner, 2009). Smallwood (2004) reported that the University of Notre Dame determined a 10% reduction in doctoral attrition would result in $1 million savings per year.

High attrition rates are also negatively associated with institutional reputation. For example, high attrition rates in doctoral programs or institutions may induce a stigma that negatively affects student recruitment (Cassuto, 2013). High attrition rates bring increased institutional pressures, putting departments and institutions at risk. These pressures may require departments to economize or downsize to compensate for monies lost through attrition (Lovitts & Nelson, 2000). However, the consequences can also be more extreme. In the 1990s, many universities, including well-known institutions such as Johns Hopkins, Princeton, and Stanford, cut doctoral programs and departments due to political pressures to eliminate ineffective programs (Lovitts, 2001).

Student effects. Students enter doctoral programs for a variety of personal and professional reasons. Examples of personal reasons include goals and dreams, the love of learning, and the personal challenge (Spaulding & Rockinson-Szapkiw, 2012). Examples of professional reasons include increased opportunities, monetary incentives, and status (Spaulding & Rockinson-Szapkiw, 2012). However, doctoral pursuits may conflict and compete with other

life responsibilities (Gardner, 2009; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993; West et al., 2011). This often requires students to resolve, cope with, and/or make tough choices between conflicting school, family, and employment obligations, including a decision to withdraw from the doctorate (Gardner, 2009; Tinto, 1993).

Regardless of the motivation for entering a doctoral program, attrition may be viewed as a significant waste of a noncompleter's time, money, and effort (Cassuto, 2013). A decision to discontinue the doctorate may accompany painful emotions. For some noncompleters, this may be the first failure ever experienced (Lovitts, 2001), and departure can generate emotions such as despair, shame, guilt, embarrassment, anger, and irritation (Cassuto, 2013; Gardner, 2009; Willis & Carmichael, 2011). When recounting their doctoral attrition experiences, Gardner (2009) found noncompleters used descriptors such as bitterness, self-defeating, and soul-crushing. These strong negative emotions may lead to decreased confidence and self-esteem (Lovitts, 2001).

Not surprisingly, the longer one is in a doctoral program before departure, the more traumatic the departure may be (Gardner, 2009). These feelings are not fleeting and may never fade—Willis and Carmichael (2011) found painful emotions quickly resurfaced in noncompleters even after 25 years and found some may never "'get over it'" (p. 200). Lovitts (2001) described how noncompleters often must reconstruct their lives, change their professional image, and pursue far different careers and lifestyles than originally planned.

Distance education is growing, and so are concerns about DE student retention rates (Allen & Seaman, 2014). Some believe doctoral student attrition is expected and necessary (Cassuto, 2013; Smallwood, 2004), while others see any amount of doctoral attrition as a waste with negative effects on society, institutions, and students (Cassuto, 2013; Smallwood, 2004).

These concerns substantiate the importance of identifying and defining specific factors related to distance doctoral student persistence.

Factors Related to Doctoral Student Persistence and Attrition. Numerous researchers have attempted to identify and characterize factors related to doctoral student persistence. For example, in a meta-analysis, Bair (1999) utilized 118 quantitative and qualitative studies to identify factors related to doctoral student persistence and attrition. Bair (1999) stated her results "paint a picture of doctoral student attrition and persistence as a very complex, multi-faceted phenomenon" (p. 62).

Bair's (1999) findings indicated the complexity stems from institutional variables, student variables, and variables related to the intersection of the student and the institution. Variability differs within and across institutions and includes issues such as differences in disciplines of study, departmental culture, and program structure (Bair, 1999). The doctoral student adds additional variability such as personal responsibility variables (e.g., work and family), physical and psychological variables (e.g., personal motivations and goals, emotional stability, and physical health), and demographic variables (e.g., age, gender, ethnicity, etc.) (Bair, 1999). Additional complexities result when the student and institution meet, affecting a student's satisfaction levels with the program (e.g., program relevancy, quality, and structure), with the faculty (including advisors and dissertation committee), and with fellow students (Bair, 1999).

Table 2 depicts a sample of the research used in this study to examine institutional and personal variables associated with doctoral student persistence and attrition. Research methods included qualitative, quantitative, mixed methods, and meta-analysis and included data gathered from students, faculty, and sometimes both to ascertain factors related to doctoral student

persistence and attrition. The table also depicts several researchers that developed models to help explain the phenomena of doctoral student persistence (e.g., Girves & Wemmerus, 1988; Strayhorn, 2005; Tinto, 1993; Wao & Onwuegbuzie, 2011). This further illustrates the multifaceted interplay of institutional and student variables, and their relationship to doctoral student persistence and attrition. This table gives credence to Bair's (1999) statement regarding the complexity of doctoral student persistence and attrition.

Table 2

Factors Important When Studying Doctoral Persistence

Domain	Factor	Studies Informing each Factor
Institutional (Internal)	Academic Integration	Bair, 1999; Girves & Wemmerus, 1988; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Lovitts & Nelson, 2000; Pascarella & Terenzini, 1980, 1983; Rockinson-Szapkiw et al., 2016; Rovai, 2003; Tinto, 1993; Wao & Onwuegbuzie, 2011
	Social Integration	Bair, 1999; Cabrera et al., 1992; Girves & Wemmerus, 1988; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Lovitts & Nelson, 2000; Pascarella & Terenzini, 1980, 1983; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2003, 2014; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993
	Program Structure	Bair, 1999; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts & Nelson, 2000; Rockinson-Szapkiw et al., 2016; Rovai, 2003; Tinto, 1993; Wao & Onwuegbuzie, 2011
	Learning Environment	Baker, 2014; Bair, 1999; Ivankova & Stick, 2007; Rovai, 2002a; Simonson et al., 2012
	Faculty and Advisor Relationships	Bair, 1999; Bowen & Rudenstine, 1992; Earl-Novell, 2006; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts & Nelson, 2000; Pratt & Spaulding, 2014; Tinto, 1993; Wao & Onwuegbuzie, 2011
	Student Support Services	Bowen & Rudenstine, 1992; Ivankova & Stick, 2007; Rockinson-Szapkiw et al., 2016;
Personal (External)	Self-Motivation	Bair, 1999; Ivankova & Stick, 2007, Merriam & Bierema, 2014; Spaulding & Rockinson-Szapkiw, 2012; Terrell, 2005; Terrell et al., 2012; Tinto, 1993, 2017; Wao & Onwuegbuzie, 2011
	Employment Obligations	Baker, 2014; Bair, 1999; Girves & Wemmerus, 1988; Kember, 1989; 1995; Rovai, 2003; Simonson et al., 2012; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011; West, 2014
	Family or Significant Other	Bair, 1999; Baker, 2014; Ivankova & Stick, 2007; Kember, 1989; Rockinson-Szapkiw et al., 2016; Rovai, 2003; Simonson et al., 2012; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; West, 2014;
	Financial Obligations	Bair, 1999; Bean, 1980; Bowen & Rudenstine, 1992; Earl-Novell, 2006; Gardner & Gopaul, 2012; Girves & Wemmerus, 1988; NSF, 2006; Rockinson-Szapkiw et al., 2016; Rovai, 2003; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011

Research indicates decisions leading to doctoral student departure are extremely varied and complicated, making it difficult to pinpoint patterns and solutions for all programs, institutions, and disciplines (Golde, 2005). It would be an overwhelming undertaking for a single researcher in a single effort (e.g., a dissertation) to attempt to identify, clearly define, and develop measures to address every identified institutional and personal variable related to doctoral student persistence.

In the vast majority of the references reviewed, the two most often discussed doctoral student persistence factors were academic integration and social integration. However, the previously described complexities and inconsistencies have led to unclear and conflicting academic integration and social integration research, creating a current research gap (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). There are currently no definitions or instruments that clearly define, operationalize, and measure academic integration and social integration for doctoral students in DE programs. The researcher's intent is to fill this gap by focusing on defining, operationalizing, and developing an instrument to measure academic integration and social integration of doctoral students in DE programs.

Issues defining and measuring academic integration and social integration. Researchers have provided empirical support that both academic integration and social integration are predictors of doctoral student persistence (e.g., Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). However, there is also research demonstrating the links between persistence and academic integration and social integration are sometimes not clear (e.g., Braxton & Lien, 2000; Braxton et al., 1997). Even though there is a consensus by many that academic integration and

social integration are necessary for persistence, researchers have not defined, operationalized, and measured either in a consistent manner (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). For example, some researchers concluded Tinto's operational definitions for academic integration and social integration are inadequate and methodologically flawed (e.g., Braxton & Lien 2000; Braxton et al., 1997; Kuh & Love, 2000), while others described Tinto's propositions as the most respected, tested, confirmed, and widely used research available (e.g., Kember, 1989, 1995; Simpson, 2003).

One contributor to these inconsistencies may be that some researchers have concluded Tinto's conceptualizations of academic integration and social integration are not equally applicable to all students (Bean & Metzner, 1985; Berger, 2000). The definitions and measurements of academic integration and social integration have varied based on institution, program level (e.g. doctoral, undergraduate, community college), and type of delivery system (distance, commuter, residential) (Davidson & Wilson, 2013). Another contributor, particularly at the doctoral level, may be attributed to how closely intertwined academic and social circles become (Lovitts, 2001; Tinto, 1993).

At the undergraduate level, academic and social systems are generally separate, and integration within one does not necessarily lead to integration with the other (Tinto, 1993). Tinto (1975, 1993) and others (e.g., Braxton et al., 1997) contended high levels of social integration may compensate for low levels of academic integration and influence undergraduate students to persist (e.g., Cabrera et al., 1992; Pascarella & Terenzini, 1983). However, for doctoral students, others posited no level of social integration can compensate for low levels of academic integration (Lovitts, 2001; Tinto, 1993). Despite these inconsistencies, the literature is clear

about the relationship between doctoral student persistence and their ability to integrate both academically and socially.

Academic integration has been described as "the primary purpose of graduate education" (Lovitts, 2001, p. 42). Social integration has been described as an "unintended consequence of academic integration" (Lovitts, 2001, p. 42). The literature is clear that failure to integrate academically may undermine the doctoral student's volition to persist (Lovitts, 2001) and lead to an attrition decision (Bair, 1999; Bean & Metzner, 1985; Ivankova & Stick, 2007; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Tinto, 1975, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). Likewise, the literature is clear that social integration is positively linked to doctoral student persistence (Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). Recently, Rockinson-Szapkiw et al. (2016) demonstrated that both social integration and academic integration significantly predict persistence of doctoral students in DE programs. The authors noted that while their research confirms the relevance of academic integration and social integration to doctoral student integration and persistence, there is still a need to define, operationalize, and validate a measure of integration for doctoral students in DE programs. Thus, for the purposes of this research, distance doctoral student academic integration and social integration will be defined and used as a foundation to develop a measure of integration for doctoral students in DE programs.

Academic Integration

Researchers have provided empirical support that academic integration is a predictor of doctoral student persistence in both the traditional and DE environments (e.g., Bair, 1999; Bean

& Metzner, 1985; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Tinto, 1975, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). However, as described earlier, inconsistencies and flaws lead to difficulties in standardized results regarding the effects of academic integration on persistence (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). For example, Tinto (1975) originally operationalized academic integration using grades for traditional undergraduate students. Conversely, for graduate and doctoral students, researchers have purported that grades are a poor measure of academic success (Rovai, 2002b; Girves & Wemmerus, 1988). Similarly, for residential doctoral students, academic integration has been reflected in their active participation in program and departmental activities such as student teaching and research groups (Bair, 1999; Girves & Wemmerus, 1988; Lovitts, 2001). However, doctoral students in DE programs cannot participate in campus-based academic activities due to their proximity to campus (Ivankova & Stick, 2007; Rovai, 2003; Terrell et al., 2009).

Academic integration background. Though the definition and measurement of academic integration has varied even within doctoral studies, critical lines of doctoral education research for both distance and residential students have consistently described academic integration as important in understanding doctoral student persistence (e.g., Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2003; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). The research is clear that the "greater the student's involvement or integration in the life of the college the greater likelihood that they will persist" (Tinto, 1997, p. 600). Greater involvement leads to greater learning and development (Tinto, 1997), which is the primary purpose for pursuing the doctorate (Lovitts, 2001).

For doctoral students, the level of academic integration has been linked to the level of satisfaction, and the literature suggests academic program satisfaction positively influences doctoral student persistence (Bair, 1999; Ivankova & Stick, 2007) and time to degree (Wao & Onwuegbuzie, 2011). Further, the literature indicates a doctoral student's academic integration is influenced by the formal and informal interactions between faculty and students and by the student's perceived learning and development (Earl-Novell, 2006; Lovitts, 2001; Rovai, 2002b; Tinto, 1993). This finding coincides with the literature indicating successful distance learning programs foster integration by creating student-student, student-content, and student-faculty interactions and connections (Moore, 1989; Simonson et al., 2012). Student perceptions of their level of academic involvement will influence the amount of effort (or lack of effort) expended on continued academic involvement (Milem & Berger, 1997). For this research, distance doctoral student academic integration will thus be operationalized by considering the student's satisfaction with (a) the academic program, (b) student-faculty academic interactions, and (c) student-student academic interactions.

Academic program satisfaction. Academic program satisfaction has been identified as being positively associated with doctoral student persistence in both the traditional and distance environments (e.g. Bair, 1999; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002b; Wao & Onwuegbuzie, 2011). In her meta-synthesis of nearly 30-years of doctoral student persistence and attrition research, Bair (1999) identified the academic program satisfaction aspects most closely related to persistence as perceived academic quality and relevancy of the curriculum and instruction to the student's own work. Research since has supported Bair's (1999) findings in both the traditional and distance environments. For example, in their mixed methods study of factors related to doctoral student

time-to-degree, Wao and Onwuegbuzie (2011) found that program satisfaction indicators affected time-to-degree. Students who were satisfied with their courses, the sequencing of courses, and with the level coursework prepared them for the dissertation, tended to have shorter completion times (Wao & Onwuegbuzie, 2011). Likewise, persistence increases and time-to-degree decreases when students are interested in their coursework and dissertation topic (e.g., there is good *fit* with personal interests, application to future job goals, application to real life, or other similar reasons) (Bair, 1999; Earl-Novell, 2006; Golde, 2005; Hoskins & Goldberg, 2005; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011). Research indicates similar findings in the distance environment. Doctoral students in DE programs who perceived higher levels of learning, course relevance, and course usefulness, indicated greater academic program satisfaction (Ivankova & Stick, 2007; Rovai, 2002b). For this research, academic program satisfaction of doctoral students in DE programs will be the first basis for developing measures of academic integration (described in Chapter 3).

Academic interaction. Satisfaction with academic-based interactions has been identified as being positively associated to doctoral student persistence in both the traditional and distance environments (e.g., Bair, 1999; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2002b; Terrell et al., 2009; Wao & Onwuegbuzie, 2011). Academic interactions are critical to doctoral student success (Lovitts, 2001) and happen in all phases of the doctoral journey (e.g., coursework, comprehensive examinations, or dissertation) (Bair, 1999; Golde, 2000; Rockinson-Szapkiw & Spaulding, 2014; Tinto, 1993). For this research, academic interactions are the formal and informal student-student and student-faculty exchanges related to distance doctoral program completion (e.g.,

Bair, 1999; Lovitts 2001; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2014; Tinto, 1993; Wao & Onwuegbuzie, 2011).

Student-faculty interaction. In a meta-synthesis, Bair (1999) identified "the single most frequently-occurring finding…was that successful degree completion is related to the degree and quality of contact between a doctoral student and her or his advisor(s) or other faculty in the student's doctoral program" (pp. 67-68). Likewise, positive faculty working relationships and satisfaction with academic interactions can decrease time-to-degree (Maher, Ford, & Thompson, 2004; Wao & Onwuegbuzie, 2011). Lovitts (2001) captured the importance of faculty-based academic interactions by stating "faculty can fan or smother the flames of intellectual passion by the enthusiasm they show for the discipline and for the students' work, ideas…quality of teaching…the material they assign and the degree of respect it is treated" (pp. 118-119). For this research, the term faculty includes professors, formal or informal mentors, dissertation chair, and dissertation committee members within a doctoral program (Bair, 1999; Golde, 2000; Lovitts & Nelson, 2000; Pratt & Spaulding, 2014; Wao & Onwuegbuzie, 2011).

The need for positive student-faculty interactions coincides with Moore's (1989) suggestion that positive academic-based faculty interaction is both essential and desirable in the distance environment. The essential elements are generally faculty-driven and include motivating and stimulating students; ensuring content is organized and properly presented; evaluating learning transfer and giving feedback; and providing "counsel, support, and encouragement" (Moore, 1989, p. 2). Students describe active faculty correspondence as one of the most desired attributes of DE (Frankola, 2001). In one study, online students from New York University were asked what would help them persist, and the only common answer was personal faculty feedback (Frankola, 2001).

Faculty interactions in distance programs can be either synchronous or asynchronous and take place using a variety of methods, including telephone, live video, online chat, email, discussion board, SharePoint sites, etc. (Grable, 2011; Moore, 1993; Simonson et al., 2012 Terrell et al., 2012). Operant terms used to describe positive aspects of academic-based faculty interactions in both the traditional and distance environments include accessible, helpful, committed, timely, and quality feedback (e.g., Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Maher et al., 2004; Wao & Onwuegbuzie, 2011). Examples of negative academic-based faculty interactions include terms such as lack of cooperation, dictatorial, controversial, challenging or difficult, lack of direction, unhelpful, and unavailable (e.g., Bair, 1999; Golde, 2005; Lovitts, 2001; Spaulding & Rockinson-Szapkiw, 2012; Willis & Carmichael, 2011). The terms *rupture* and *derailment* were used by Golde (2000) to highlight how dramatic difficult interactions between doctoral students and faculty can be. Distance doctoral student satisfaction with academic-based faculty interactions was the second basis for developing measures of academic integration (described in Chapter 3).

Student-student interaction. Student-student (or peer) academic-based interactions can take place both on a formal level (e.g., traditional or distance classrooms, and student cohorts) and an informal level (e.g., informal study or dissertation groups, and online academic communities) (Bair, 1999; Lovitts 2001; Rovai, 2014; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011). Academic interactions with peers are important in all stages of the doctoral journey (Rovai, 2014). Satisfaction with academic-based peer interaction has been identified as being positively associated with doctoral student persistence in both the traditional and distance environments (e.g., Bair, 1999; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2002b; Terrell et al., 2009;

Wao & Onwuegbuzie, 2011). For this research, examples of academic-based peer interactions are those related to distance doctoral program completion (e.g., coursework, comprehensive examinations, or dissertation) and take place between fellow students (Bair, 1999; Lovitts, 2001; Rovai, 2014; Wao & Onwuegbuzie, 2011).

Similar to the need for positive academic-based student-faculty interactions, Moore (1989) suggested positive, academic-based peer interaction is very important in the distance environment. As doctoral students interact with each other in the program, they may begin to form academic communities (Rovai, 2002a, 2002b, 2014; Terrell et al., 2009; Tinto, 1993), and can *meet* formally or informally (whether online or in the classroom) on a regular or irregular basis (Lovitts, 2001). According to Rovai (2014), "Building and being part of an academic learning community is positively related to cognitive development, motivation, active learning, metacognition, satisfaction, high achievement, and student persistence" (p. 88). Academic interactions among peers take place using similar means as those previously described for student-faculty interactions (Moore, 1993; Simonson et al., 2012).

Frequency of interaction does not necessarily correlate to higher satisfaction levels with interaction, and this is one area where quality is more important than quantity (Picciano, 2002; Rovai, 2014; Simonson et al., 2012). Nontraditional doctoral students (such as those in the distance environment) may find academic interactions with peers limited or even nonexistent (Gardner & Gopaul, 2012), yet students with low interaction frequencies may still be satisfied with their interaction levels (Picciano, 2002). Academic-based peer interaction and the desire for interaction may vary during various program stages. For example, the need for students to provide each other guidance and assistance during the dissertation is important, yet little or no

communication often takes place during this stage (Terrell et al., 2012), potentially decreasing satisfaction.

Operant terms used to describe positive aspects of academic-based peer interactions in both the traditional and distance environments include willing, helpful, opportunity to learn from others, share knowledge and examples, and constructive peer feedback (e.g., Ivankova & Stick, 2007; Lovitts, 2001; Maher et al., 2004; Simonson et al., 2012; Spaulding & Rockinson-Szapkiw, 2012; Terrell, 2012). Examples of negative aspects of academic-based peer interactions include terms such as lack of cooperation, argumentative, singlemindedness, little interaction, lack of interest, one-way communications, oblivious to others, different learning goals, competitive, and unwilling (e.g., Golde, 2005; Lovitts, 2001; Rovai, 2014). Distance doctoral student satisfaction with academic-based peer interactions was the third basis for developing measures of academic integration (described in Chapter 3).

Social Integration

Similar to academic integration, researchers have provided empirical support that social integration is a predictor of doctoral student persistence in both the traditional and DE settings (e.g., Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). In a meta-analysis, Bair (1999) found the concept of social integration was important in nearly every case investigated, with completers indicating more social-based interaction than noncompleters. However, similar to academic integration, researchers have operationalized and measured social integration in a variety of ways with no widely accepted definition or measurement (Davidson et al., 2009; Davidson & Wilson, 2013). These inconsistencies contribute to the difficulties described earlier in standardizing

results regarding the effects of social integration on persistence (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). Exacerbating the issue is the lack of clear lines between doctoral student academic integration and social integration (Tinto, 1993).

Social integration of doctoral students is closely intertwined and even blurred with academic integration (Lovitts, 2001; Tinto, 1993). Researchers have referenced academic-related factors (e.g., timeliness of faculty feedback, course-related conversations outside the classroom, and interactions within the doctoral department) when describing social integration (Bair, 1999; Golde, 2000; Terrell et al., 2009; Wao & Onwuegbuzie, 2011). Despite unclear lines between the constructs and ambiguous results about the level of importance social integration plays in persistence (Bean & Metzner, 1985; Davidson & Wilson, 2013; Rockinson-Szapkiw et al., 2016; Sweet, 1986; Terrell et el., 2009), the literature clearly reveals social integration is a predictor of doctoral student persistence (e.g., Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012).

Social integration background. It is important to understand and differentiate between academic integration and social integration. The concept of social integration has been notably used and defined in social-philosophical and sociological literature. Theories from these disciplines have identified social integration as consisting of different domains and modes (e.g. Granovetter, 1973; Habermas, 1984; Parsons, 1970). While some theorists stated that social integration consists of common norms and shared values (e.g. Bellah, 1996; Tönnies, 2002), other theorists emphasized that interaction binds individuals together via mutual exchange and dependency (Burgess & Nielsen, 1974; Emerson, 1969).

When developing his persistence theory, Tinto (1975, 1993) drew on the suicide work of Durkheim (1951) and grounded his conceptualization of social integration in the following definition, "the form of integration which results from personal affiliations and from day-to-day interactions among different members of society" (Tinto, 1993, p. 101). Durkheim (1951) proposed that people's norms, beliefs, and values make up a collective consciousness or a shared way of understanding and behaving in the world. This collective consciousness binds individuals together and creates social integration. Durkheim proposed that failure "to become integrated and establish membership within the communities of society" (Tinto, 1993, p. 101) may lead to suicide. Durkheim (1951) further argued individuals with adequate social support networks were less likely to commit suicide, and those with inadequate social support were more likely to commit suicide.

Tinto (1993) drew parallels from Durkheim by asserting that committing suicide was essentially an individual's withdrawal from existence and therefore analogous to dropout from higher education, which was an individual's withdrawal from that aspect of society. Durkheim (1951) proposed an individual who is insufficiently integrated into society may commit suicide. Similarly, Tinto (1993) asserted that an individual who is insufficiently integrated into different aspects of college or university life may drop out.

Tinto (1975, 1993) drew upon Durkheim's (1951) suicide theory to explain how the ability or lack of ability to socially integrate within the collegiate setting may influence a student's decision to persist or drop out. Tinto (1975, 1993) described institutions as being comprised of multiple smaller societies and distinct social components that change over time and look different based on the institutional make-up. For example, social integration of residential undergraduate students may be signified by the number of social contacts on campus, informal

interactions with peers and faculty, participation in social groups or clubs, and participation in other extracurricular activities (Tinto, 1975, 1993). Pascarella and Terenzini (1980) operationalized Tinto's concept of social integration for residential undergraduate students as "primarily a function of the quality of peer-group interactions and the quality of student interactions with faculty" (p. 62).

Social integration of doctoral students. Tinto's (1975, 1993) work was originally based on traditional undergraduate students but has been applied and extended to doctoral students in residential and DE settings. Similar to Pascarella and Terenzini's (1980) definition, Wao and Onwuegbuzie (2011) operationalized social integration of doctoral students in the traditional setting as "the nature of interaction that students experience with peers and faculty as they engage in departmental activities" (Wao & Onwuegbuzie, 2011, p. 117). Researchers have added that for doctoral students, social integration is a consequence of academic and non-academic interactions (Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012).

Unlike academic integration, social integration is not a requirement nor is it the primary purpose for attaining a doctorate (Lovitts, 2001). In other words, failure to integrate socially may not subvert a student's reasons for pursuing a doctorate (Lovitts, 2001). However, a doctoral student's inability to integrate socially may lead to low levels of satisfaction with the doctoral community, thereby negatively influencing persistence (Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009).

Social integration of traditional doctoral students. Doctoral students become socialized as they begin to interact with both peers and faculty within their program, and positive

relationships may begin to develop from these interactions (Rovai, 2014). The literature suggests when interactions are positive, students are connected or integrated with fellow students and faculty within the program (Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014; Tinto, 1993). Doctoral education literature supports this conceptualization despite the fact that the term social integration is sometimes used interchangeably or associated with other theoretical constructs. Examples of terms associated and often used interchangeably with social integration in the doctoral literature include *connectedness*, *community,* and *membership* (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Tinto, 1993).

Drawing from the literature, indicators of a doctoral student being satisfied with the level of social integration include operant terms such as feelings of closeness, cohesion, trust, spirit, personal relationships, and *safety* and feelings that peers and faculty are approachable, cooperative, supportive, caring, and encouraging (Bair, 1999; Bowen & Rudenstine, 1992; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rovai, 2002a; Terrell et al., 2009; Wao & Onwuegbuzie, 2011; Wyman, 2012). Satisfaction indicators associated with being connected to or part of a community include sense of belonging, feelings that members matter to each other, and that members will help meet each other's needs (McMillan & Chavis, 1986). These feelings indicate a sense of acceptance, belonging, and trust, suggesting higher satisfaction levels of social integration (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Terrell et al., 2012). Positive peer and faculty interactions and the feelings associated with the nature of those interactions can have a positive influence on the volition to persist (Rovai, 2014; Wao & Onwuegbuzie, 2011).

Social integration of doctoral students in DE programs. For doctoral students, social integration has been described as an unintended consequence of academic integration and can develop "through informal, casual interactions between and among graduate students and graduate faculty in a variety of contexts" (Lovitts, 2001, p. 42). Hill (1996) posited it is important to understand the contexts of these interactions. Positive feelings of interactions "may not be defined in a geographical sense [and may] consist of groupings of people who…may never physically meet each other" (Hill, 1996, p. 433) such as the DE environment.

Personal interactions and connections may be even more important in distance courses than in the traditional classroom (Frankola, 2001). Satisfaction with connectedness and community in distance doctoral programs can stem from *any* peer and faculty interactions (Rockinson-Szapkiw et al., 2016; Rovai, 2002a; Terrell et al., 2009; Terrell et al., 2012). Peer and faculty interactions help develop positive relationships and feelings of being connected to others in the distance environment (Garrison, Anderson, & Archer, 2000; Ivankova & Stick, 2007; Moore, 1989; Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Terrell et al., 2012).

In the traditional environment, social integration may be experienced with friendly gestures such as making eye contact, waving, or a simple *hello* (Rovai, 2014). Likewise, being *seen* as a real person in the distance environment can help establish and maintain a social presence (Garrison et al., 2000). When doctoral students interact with peers and faculty via synchronous and asynchronous methods (e.g., telephone, live video, online chat, email, social media sites), they may begin to develop into a virtual community (Ivankova & Stick, 2007). Ivankova and Stick (2007) purported that doctoral students in DE programs who feel supported by and perceive encouragement from peers and faculty within a bounded system of a course or participation in online activities (academic or nonacademic) indicates good social integration.

The physical separation of students and faculty in DE environments makes developing and fostering relationships and feelings associated with social integration both challenging and time consuming (Garrison & Arbaugh, 2007; Moore, 1989; Terrell et al., 2009). Dissatisfaction with social integration may cause doctoral students to "question whether they are achieving their intellectual, professional, and personal goals and to examine their reasons for being a member of that community" (Lovitts, 2001, p. 43). These doubts lead to a decreased motivation to interact within the doctoral program, and persistence is compromised (Lovitts, 2001).

While integrating socially is not a requirement for obtaining a doctorate (Lovitts, 2001), the inability to integrate socially in either the traditional or DE setting may lead to feelings of isolation (Lovitts, 2001; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012). Likewise, the inability for distance students to connect with peers and faculty may cause feelings of disconnectedness or even exclusion (Garrison & Arbaugh, 2007; Moore, 1989; Terrell et al., 2009). Distance doctoral noncompleters have referenced feelings of isolation stemming from the lack of social integration (Terrell et al., 2009; Wyman, 2012).

Lovitts (2001, 2005) noted that feelings of isolation and disconnectedness from faculty and their peers, especially during the dissertation phase, were indicators that social integration was not present. Terrell et al. (2009) suggested that doctoral students in DE programs who do not interact face-to-face with peers and faculty on campus may experience feelings of isolation and disconnectedness at an exacerbated level. Additional indicators of poor social integration of doctoral students include operant terms such as a lack of understanding, not encouraging, feelings of competitiveness and competition, neglect, and personal issues with dissertation committees and chair advisor (Bair, 1999; Bowen & Rudenstine, 1992; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rovai, 2002a; Terrell et al., 2009; Wao &

Onwuegbuzie, 2011; Wyman, 2012). Lovitts (2001) found terms related to feelings of isolation (e.g., lack of cohesion, social depravation, isolated, and little personal contact) as "the most frequently cited integration-related reasons" (p. 177) leading to doctoral student decisions to exit a program.

Social integration within the stages of doctoral programs. Social integration is critical to doctoral student success (Lovitts, 2001) and is important in all stages of the doctoral journey (Bair, 1999; Golde, 2000; Lovitts, 2001; Rockinson-Szapkiw & Spaulding, 2014; Tinto, 1993). Tinto (1993) described the importance of social integration early in the doctoral student's program. As doctoral students navigate through the program, they become affiliated with a variety of communities that change over time, become stronger, and have increased influence over persistence in the later program stages (Tinto, 1993). Often these interactions develop into personal relationships, which positively influences persistence (Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001).

As doctoral students move through their program, their need for connections and interaction levels may change, but their satisfaction levels toward the nature and quality of those interactions may not change. For example, early in the program (e.g., coursework stage), doctoral students may feel the need for higher levels of interaction but may not have the same needs during the dissertation (Rockinson-Szapkiw et al., 2016). Frequency of interaction is not important—low levels of interaction may still lead to high satisfaction levels of social integration (Picciano, 2002).

Drawing on the literature, it can be surmised that positive interactions with peer and faculty in distant doctoral programs leads students to feel satisfied with their levels of social integration, and the literature indicates these feelings positively influence persistence (Bair,

1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2014; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012).

Instruments that Measure Aspects of Academic Integration and Social Integration

This research seeks to develop an instrument specifically designed to measure the elements of integration, primarily academic integration and social integration of doctoral students in DE programs. As noted in Chapter One, instruments exist that include validated measures of academic integration and social integration for targeted populations. These instruments were not specifically designed and do not adequately measure academic integration and social integration of doctoral students in DE programs. However, these instruments do provide a solid basis to inform DDIS item development.

The College Persistence Questionnaire. Davidson et al. (2009) developed the College Persistence Questionnaire (CPQ) specifically for the traditional undergraduate student. The designers developed and validated two versions (V1 and V2) of the CPQ (Davidson et al., 2009, 2015). The intent of CPQ-V1 was the development of "an instrument that assessed a diverse array of variables associated with [student] retention" (Davidson et al., 2009, p. 374). The CPQ-V1 included six subscales to measure the factors (variables) associated with undergraduate student persistence (Davidson et al., 2009). Two of the subscales measure academic integration and social integration (Davidson et al., 2009). The CPQ-V1 is well documented and has been used in over 40 collegiate programs for measuring undergraduate student persistence (Davidson et al., 2015).

Davidson et al. (2015) recently redesigned the instrument and aptly named it CPQ-V2. They specifically designed CPQ-V2 to measure student experience variables considered

"malleable and subject to interventions by college personnel" (Davidson et al., 2015, p. 6). The developers began with the CPQ-V1 factors, then used literature to update CPQ-V1 to measure 10 factors deemed important to traditional undergraduate persistence (Davidson et al., 2015). While both CPQ versions included items to measure academic integration and social integration, neither instrument is sufficient in explaining these factors in doctoral students in DE programs.

For example, some academic integration items are worded specifically for measuring classroom-based interactions (e.g., "How well do you understand the thinking of your instructors when they lecture or ask students to answer questions in class" Davidson et al., 2009, p. 379) and do not account for the amount of non-classroom academic-based interactions found important to doctoral students (Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2003; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). Likewise, the social integration items focus on campus-based social aspects common to undergraduate students (e.g., number of hometown friends at same university, participation in extracurricular activities, etc.) as opposed to the satisfaction levels with the nature and quality of student and faculty non-academic interactions deemed important for doctoral students in DE programs (Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Terrell et al., 2009).

The Classroom Community Scale. Rovai (2002a) developed The Classroom Community Scale (CCS) as "a test instrument that can assist educational researchers in studying community in virtual classrooms and help identify course design and instructional delivery that best promotes the development of community" (p. 199). The CCS measures two subscales associated with community: feelings associated with student-student connectedness in the classroom and feelings associated with developing a learning community (Rovai, 2002a).

The CCS (Rovai, 2002a) subscales contain items closely aligned with both academic integration and social integration of doctoral students in DE programs. For example, the learning community subscale item "I feel that I am encouraged to ask questions" (Rovai, 2002a, p. 205) aligns with academic integration—specifically academic-based interactions—for doctoral students in DE programs as defined earlier. The connectedness subscale item "I feel connected to others in this course" (Rovai, 2002a, p. 205) aligns with social integration— specifically satisfaction with the nature and quality of peer and faculty non-academic interactions—for doctoral students in DE programs as described earlier.

The CCS has been validated and found useful in measuring classroom community for undergraduate and graduate students in distance classrooms (e.g., Barnard-Brak & Shiu, 2010; Erdem Aydin & Gumus, 2016; Ni & Aust, 2008; Rovai, 2002b; Rovai & Jordan, 2004). The instrument has also been used to develop measures associated with sense of community for doctoral students in DE programs working on their dissertation (Terrell et al., 2009). However, the CCS is not fully appropriate for measuring either academic integration or social integration as defined earlier for doctoral students in DE programs at all program stages.

The CCS is course- rather than program-focused. The instrument was specifically designed for single classes or courses (Rovai, 2002a), not for outside class or course interactions and experiences important throughout the various stages of a doctoral program (Bair, 1999; Golde, 2000; Lovitts, 2001; Rockinson-Szapkiw & Spaulding, 2014; Tinto, 1993). While the CCS items specifically target interactions with fellow students, no items specifically target interactions with faculty. Further, the CCS does not measure levels of academic program satisfaction important to doctoral students (Bair, 1999; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Wao & Onwuegbuzie, 2011).

The Doctoral Student Connectedness Scale. Terrell et al. (2009) developed The Doctoral Student Connectedness Scale (DSCS) to measure student feelings associated with connectedness within the dissertation stage of a distance doctoral program. The designers built upon Rovai's (2002a) CCS and their own research to develop an instrument to "measure sense of community and research competency" (Terrell et al., 2009, p. 113) of dissertation-stage doctoral students in DE programs. Terrell et al. (2009) recognized the importance of including faculty interactions as an important construct related to sense of connectedness of doctoral students in DE programs.

The DSCS measures two subscales—feelings of student-student connectedness and feelings of student-faculty connectedness (Terrell et al., 2009). In addition to the community-related items from the CCS (Rovai, 2002a), the designers developed items that pertain to student "access to knowledge, skills, and resources within their microenvironment [of the distance doctoral program]" (Terrell et al., 2009, p. 114). Similar to Rovai's (2002a) instrument, the DSCS includes items the literature links to both academic integration and social integration.

For example, the item "When I ask questions or submit work to my dissertation advisor, I feel like I receive timely feedback" (Terrell et al., 2009, p, 116) is associated with academic integration—specifically faculty-based academic interactions—as defined earlier. The item "I feel connected to other students in the program who are working on their dissertation" (Terrell et al., 2009, p, 116) is associated with social integration—specifically satisfaction with the nature and quality of student-student non-academic interactions—as defined earlier. The designers recommended the DSCS "be used for two purposes; identifying students at risk of attrition and justifying the need to develop doctoral program initiatives that encourage persistence" (Terrell et al., 2009, p. 114).

The DSCS has been found useful for measuring social integration of doctoral students in DE programs during their dissertation (e.g., Rockinson-Szapkiw et al., 2016). However, similar to the CCS, the DSCS is not appropriate to fully measure either academic or social integration as defined earlier for doctoral students in DE programs. The DCSC was developed specifically with dissertation-stage students in mind (Terrell et al., 2009) and does not account for the academic and social interactions and experiences during non-dissertation stages of a doctoral program (Bair, 1999; Golde, 2000; Lovitts, 2001; Rockinson-Szapkiw & Spaulding, 2014; Tinto, 1993). The DSCS also did not include items to measure program satisfaction levels important to doctoral student persistence (Bair, 1999; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Wao & Onwuegbuzie, 2011). Both versions of the CPQ (Davidson et al., 2009, 2015), the CCS (Rovai, 2002a), and the DSCS (Terrell et al., 2009) provide insight into item development for the DDIS.

Summary

The purpose of this research was to develop and validate the DDIS—an instrument to measure academic integration and social integration of doctoral students in DE programs. The goal of this literature review was to help inform the development of the DDIS. A multi-model theoretical framework grounded in Tinto's (1975, 1993) theory of student departure and supported by Wao and Onwuegbuzie's (2011) integrated conceptual scheme of doctoral persistence and Rovai's (2003) composite persistence model provided insight and understanding of academic integration and social integration for doctoral students in DE programs.

A review of DE literature provided necessary background on the history, quality, and growth of DE programs. Distance education has been around for over 160 years (Simonson et al., 2012). Significant technology increases have enabled DE to evolve through five major

generations—from print-based correspondence courses to today's web-connected, computer-mediated, and interactive capabilities (Taylor, 2001). Research has established that DE courses are equal to or better than traditional classroom instruction (Allen & Seaman, 2014; Lapsley et al., 2008; Larson & Sung, 2009; Weber & Lennon, 2007).

The excellent opportunities and quality offerings have led DE growth to outpace traditional classroom growth over the past 10 years. These opportunities and growth have led to increased numbers of doctoral students in DE programs (Allen & Seaman, 2014; Ivankova & Stick, 2007) with increased availability across all demographics (NSF, 2014). However, these increases are not without challenges.

The literature provided foundational understanding of the persistence and attrition of doctoral students in DE programs. Doctoral students in DE programs have competing school, family, work, and other responsibilities that may differ from those of traditional students (Cercone, 2008; Simonson et al., 2012; Spaulding & Rockinson-Szapkiw, 2012; West, 2014; Wyman, 2012). With increased responsibilities of distance students comes increased retention concerns (Allen & Seaman, 2014). Traditional doctoral student attrition ranges between 40% and 60% (Bowen & Rudenstine, 1992; Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000; Rockinson-Szapkiw & Spaulding, 2012; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993). Distance doctoral student attrition is generally 10% to 20% higher (Carr, 2000; Frankola, 2001; Terrell, 2005). These high attrition rates have negative societal, institutional, and personal effects (Cassuto, 2013; Gardner, 2009; Lovitts, 2001; Lovitts & Nelson, 2000; Smallwood, 2004; Spaulding & Rockinson-Szapkiw, 2012; Tinto, 1993; West et al., 2011; Willis & Carmichael, 2011).

Review of the literature revealed several factors that may influence a distance doctoral student's persistence or attrition. These factors stem from both institutional and personal variables (Bair, 1999; Wao & Onwuegbuzie, 2011), creating a complex interplay of issues that affect persistence and attrition. However, these complexities make it virtually impossible to identify, clearly define, and develop measures to address all institutional and personal variables related to doctoral student persistence.

Review of the literature empirically revealed academic integration and social integration as the two most often discussed doctoral student persistence factors (e.g., Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). However, the links between persistence and academic integration and social integration are sometimes not clear (e.g., Braxton & Lien, 2000; Braxton et al., 1997), and researchers have not consistently defined, operationalized, and measured either in a consistent manner (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). Despite inconsistencies, the literature clearly evidenced a relationship between doctoral students and their ability to integrate both academically and socially.

This review clearly indicated academic integration and social integration of doctoral students are closely intertwined (Lovitts, 2001; Tinto, 1993). Academic integration of doctoral students in DE programs can be described by considering the student's satisfaction with the academic program, student-faculty academic interactions, and student-student academic interactions (Bair, 1999; Earl-Novell, 2006; Ivankova & Stick, 2007; Lovitts, 2001; Milem & Berger, 1997; Moore, 1989; Rovai, 2002b; Simonson et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011). Social integration of doctoral students stems from academic integration,

and for doctoral students in DE programs, it can be described by satisfaction levels with the nature and quality of non-academic interactions with fellow students and faculty (Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2002b, 2014; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012).

While validated instruments such as the CPQ (Davidson et al., 2009, 2015), the CCS (Rovai, 2002a), and the DSCS (Terrell et al., 2009) have measures of academic integration and social integration, no instruments exist that fully measure these factors in the targeted distance doctoral student population. This dissertation will add to the literature by developing and assessing the validity and reliability of the DDIS to measure the integration of doctoral students in DE programs.

CHAPTER THREE: METHODS

Introduction

The goal of this instrument development research was to develop and analyze the structure, validity, and reliability of the Distance Doctoral Integration Scale (DDIS) for measuring elements of integration, particularly academic integration and social integration of doctoral student in distance education (DE) programs. First, I developed the DDIS using the literature and the previously described instruments to inform item development. Then a subject matter expert (SME) panel reviewed the DDIS for content and face validity. Next was an instrument trial (pilot test) with a small sample of participants. I conducted an exploratory factor analysis (EFA) on the instrument using a large sample of participants, then explored reliability with Cronbach's alpha and test-retest. Through this process I investigated the reliability, validity, and structure of the DDIS.

Design

As noted, the goal for this research was to develop and assess the structure, validity, and reliability of the DDIS. This research followed a multi-step process that included instrument development, instrument pilot test, and instrument validation. During the instrument development process, I initially developed the DDIS via a thorough review of the literature to inform item development. The review included literature on persistence and attrition theory, distance education (DE), doctoral student academic integration and social integration, and existing surveys to inform initial item development. The surveys were the College Persistence Questionnaire (CPQ) (Davidson et al., 2009, 2015), the Classroom Community Scale (CCS) (Rovai, 2002a), and the Doctoral Student Connectedness Scale (DSCS) (Terrell et al., 2009). A

SME panel reviewed the draft DDIS to evaluate the items for both content and face validity (Warner, 2013).

Once initial development was complete, I conducted an instrument pilot test with a small sample (n = 8) of participants (Warner, 2013). The purpose of the pilot test was to further content and face validity by having participants evaluate item clarity, meaning, plausibility, and length of time to complete (Warner, 2013). I then investigated the construct validity, structure, and reliability of the DDIS through a large group (n = 282) study using EFA, Cronbach's alpha, and Pearson's r (pretest-posttest) (Warner, 2013). The process for instrument development, instrument pilot test, and instrument validation is fully explained in the *Procedures* section below.

Research Questions

RQ1: Is the DDIS a valid instrument for measuring academic integration and social integration of doctoral students in DE programs?

RQ2: Is the DDIS a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs?

RQ3: What are the underlying factors that explain integration of doctoral students in DE programs?

Null Hypotheses

$H_0$1: The DDIS is not a valid instrument for measuring academic integration and social integration of doctoral students in DE programs.

$H_0$2: The DDIS is not a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs.

H_03: The DDIS is unidimensional (i.e., it measures a single dimension [or factor] of integration of doctoral students in DE programs).

Participants and Setting

Participants

The participants for the instrument pilot test and the EFA were all doctoral students currently enrolled either full-time or part-time in a United States' public or private university pursuing their terminal degrees (Ed.D. or Ph.D.) in education via DE, where at least 80% of the program (Allen & Seaman, 2014) is completed at a distance. Accessing participants from DE educational doctorate programs enrolled at multiple institutions allowed fairly wide variability among participants (e.g., demographic, program, and institutional differences) (Warner, 2013). Limiting the sample to education doctorates reduced some validity issues by minimizing variability across doctoral program disciplines (Gall, Gall, & Borg, 2007).

I accessed participants for the pilot test and EFA through convenience sampling (Warner, 2013) using a snowball technique (Gall et al., 2007). My dissertation chair and one of my committee members, both affiliated with a private, doctoral-conferring intuition with distance doctoral programs, helped gain access to participants. There were eight participants for the pilot study and 282 participants for the large group study (see Table 3 for a sample of participant demographic and program variability data).

Table 3

Participant Sample Demographics (N = 282)

Variable	Category	Pilot	Large Group
Gender	Male	3 (38%)	78 (27.7%)
	Female	5 (62%)	204 (72.3%)
Ethnicity	African-American	3 (38%)	43 (15.2%)
	Asian		6 (2.1%)
	Caucasian	5 (62%)	208 (73.8%)
	Hispanic		15 (5.3%)
	American Indian		1 (0.4%)
	Other		7 (2.5%)
	Not answered		2 (0.7%)
Age Range (Years)	20-29		20 (7.1%)
	30-39	5 (62%)	81 (28.7%)
	40-49	2 (25%)	105 (37.2%)
	50-59	1 (13%)	53 (18.8%)
	60-69		21 (7.4%)
	70-79		1 (0.4%)
	80 and up		1 (0.4%)
Program Stage	Course work, year 1	4 (50.0%)	57 (19.8%)
	Course work (year 2) through comprehensive exam	1 (12.5%)	85 (29.5%)
	Dissertation (candidacy through proposal defense)	3 (37.5)	145 (50.3%)
	Not answered		1 (0.3%)
Program of Study	Curriculum and Instruction	8 (100%)	101 (35.8%)
	Educational Leadership		121 (42.9%)
	Adult Education		2 (0.7%)
	Higher Education Leadership and Management	1 (12.5%)	12 (4.3%)
	Higher Education		6 (2.1%)
	K-12 School Leadership		2 (0.7%)
	Special Education		2 (0.7%)
	Instructional Design and Technology		13 (4.6%)
	Counselor Education and Supervision		15 (5.3%)
	Other Education		8 (2.8%)

Note. This table represents participants in programs at multiple universities where DE doctoral student participants were accessed through snowball sampling.

Complete demographic data can be viewed in Appendix R. As can be seen in Table 3, participants represented a wide range of ethnicity, ages, program stages, and programs of study. While demographics were gathered on the DDIS, the demographic data collected will be used for follow-on analysis outside the scope of this study.

Setting

The setting for this research was the DE environment, and educational doctoral programs contained the target population. The setting focus was educational doctorate programs with at least 80% of the program delivered via distance (primarily online and asynchronous) methodologies. Qualifying programs may require face-to-face residencies and/or periodic synchronous activities with fellow students and faculty, but no program had more than a combined total of 20% face-to-face requirements. Some of the program specifics can be seen in Table 4. However, the convenience sample acquired through snowball sampling made describing all university or program specifics unfeasible.

Table 4

Doctoral Program Characteristics (N = 282)

Program Characteristic	Pilot	Large Group
Program Type		
Ed.D.	7 (87.5%)	243 (86.2%)
Ph.D.	1 (12.5%)	39 (79.4%)
Cohort or Non-cohort		
Non-cohort	6 (75%)	224 (79.4%)
Cohort	2 (25%)	58 (20.6%)
Program Focus		
Educational Leadership		121 (42.9%)
Curriculum and Instruction	7 (87.5%)	101 (35.8%)
Counselor Education and Supervision		15 (5.3%)
Instructional Design and Technology	1 (12.5%)	13 (4.6%)
Higher Education Leadership and Management		12 (4.3%)
Higher Education		6 (2.1%)
Adult Education		2 (0.7%)
K-12 School Leadership		2 (0.7%)
Special Education		2 (0.7%)
Other		8 (2.8%)

The specific setting for participation was online. Participants were able to participate from anywhere they had to access their email—from home, from work, or any other location where they had Internet access. My university requires the use of Qualtrics software for surveying university students and personnel; therefore, I used this software to administer the DDIS for the EFA portion of this study.

Instrumentation and Procedures

The DDIS was the instrument for this research. I designed the DDIS to measure integration, particularly academic integration and social integration of doctoral students in DE

programs. The procedures (instrument development, instrument pilot test, and instrument validation) are described in this section.

Instrument Development

I designed the DDIS to ascertain the academic integration and social integration of doctoral students in DE programs. Initial instrument development consisted of two primary tasks. The first task consisted of developing a pool of *candidate* items (Warner, 2013). The second task consisted of revision of the candidate items through a SME panel review.

Candidate item pool development. From the literature, including the CPQ (Davidson et al., 2009, 2015), the CCS (Rovai, 2002a), and the DSCS (Terrell et al., 2009), I identified five integration factors of doctoral students in DE programs. The three potential factors for the academic integration domain were: (a) satisfaction with the academic program, (b) satisfaction with student-faculty academic interactions, and (c) satisfaction with student-student academic interactions. The two potential factors for the social integration domain were: (a) satisfaction with the nature and quality of student-student non-academic interactions and (b) satisfaction with nature and quality of student-faculty non-academic interactions.

Warner (2013) recommended eight to 10 initial candidate items for each factor to be measured, with an end-state instrument of four to five items for each factor (Warner, 2013). The initial DDIS candidate pool consisted of 50 items to measure the five factors of academic integration and social integration as defined earlier (see Table 5). The initial draft of candidate items with the corresponding references can be seen in Appendix A.

Table 5

Initial Breakdown of DDIS Candidate Items

Domain and Factor	Number of Items
Academic Integration Domain	
Academic Program	8
Student-Faculty Academic Interactions	11
Student-Student Academic Interactions	8
Social Integration Domain	
Student-Student Non-Academic Interactions	12
Student-Faculty Non-Academic Interactions	11

Each of the existing surveys used to inform item development employed a five-point, Likert-type scale (Warner, 2013) to score each item. Each of the existing surveys also incorporated reverse-worded items to "minimize yea-saying bias" (Warner, 2013, p. 921). In similar fashion, the initial DDIS candidate pool included reverse-worded questions and used a five-point, Likert-type scale (Warner, 2013). The initial draft DDIS with Likert-type scales can be seen in Appendix B.

Panel review of initial candidate items. With the help of my chair, I identified a panel of four subject matter experts (SME) to evaluate the DDIS for both and face validity and content validity (Warner, 2013). All panel members have terminal degrees in education or social sciences, and all have previously published research relating to doctoral persistence, online persistence, or online education. Additionally, three of the four panel members have taught at least three years in an online doctoral or graduate program.

The SME panel review consisted of two major parts, and each part used a self-developed evaluation rubric. First, I emailed each panel member the draft DDIS (see Appendix B),

descriptions of academic integration and social integration for doctoral students in DE programs, and Rubric One (see Appendix C). Rubric One asked panel members to evaluate the candidate items for the following criteria: content validity, face validity, clarity, conciseness, and reading level (Worthington & Whittaker, 2006). The SME panel rated each criteria for each item on a five-point scale (one = very poor; five = very good). The rubric also allowed panel members to provide open responses explaining ratings of any item receiving a score of five or lower and to solicit any suggestions for recommended changes, additions, or deletions to improve content and face validity.

I calculated the mean score for each candidate item (Gall et al., 2007) and reviewed the rater comments and suggestions using open coding of all written feedback to identify improvement themes (Creswell, 2013). The DDIS items were adjusted, and items added and deleted as indicated by the panel's feedback. The resulting instrument titled DDIS-V2 (or version two) had 55 candidate items and can be seen in Appendix D.

I then sent DDIS-V2 to the SME panel for a second review using Rubric One (one panel member had to drop out due to personal obligations, leaving three panel members). As before, the SME panel evaluated each item and provided feedback, and I reviewed the data to identify improvement themes and made adjustments. There were 53 candidate items after the second round of review using Rubric One, and the results indicated the DDIS was ready for the second part of the SME panel review.

Panel review to select DDIS items. I placed all candidate items into Rubric Two (see Appendix E). Rubric Two was designed to further evaluate content validity (Warner, 2013) by determining if there were sufficient items measuring each factor. I emailed the SME panel members Rubric Two, and asked each member to select the candidate items (at least six)

required to sufficiently measure the elements of each factor of academic integration and social integration of doctoral students in DE programs.

The rubric also asked each panel member to indicate if their selected items in aggregate were sufficient to measure each factor (Warner, 2013) by indicating *sufficient* or *insufficient*. Any rater giving an insufficient rating was asked to provide suggestions for improvement. I tallied the results of the Rubric Two feedback, and retained the top items indicated to sufficiently measure each factor. The resulting draft, called Pilot-DDIS (see Appendix F) had 34 items (21 academic integration items and 13 social integration items) that appeared to have the content and face validity (Warner, 2013) to sufficiently measure each factor of academic integration and social integration.

Demographic items. In addition to the academic integration and social integration items, The Pilot-DDIS contained demographic and program related items to ascertain participant characteristics. Demographic items gathered information such as age, gender, marital status, and ethnicity. The program related items gathered information such as participant's time in program (years), type of degree (e.g., Ph.D. or Ed.D.), institution type (public or private), and program focus.

All members of my dissertation committee have vast experience in instrument development, therefore, the demographic questions were developed and reviewed in conjunction with my dissertation committee to ensure completeness and were not part of the DDIS development process. The demographic items will be used in follow up research and will not be described in detail in this study (see Appendix G for a full list of demographic items).

Institutional Review Board approval. Once the Pilot-DDIS and demographic items were complete, I submitted a request to my university's Institutional Review Board (IRB) to

conduct the remainder of the study (the pilot study and the large group study using EFA). The IRB approved the research and granted approval to proceed (see Appendix H). Next was the pilot test.

Pilot Test

During the pilot test, also called cognitive testing (Fowler, 2009), I further assessed the face validity of the Pilot-DDIS. Rubric Three (see Appendix I) enabled participants to provide feedback ascertaining reasoning behind their responses to the following cognitive test questions (Fowler, 2009):

- Please describe in your own words what you believe this question is asking.
- Please explain why you chose the selected response over the other choices.
- If you were to reword the question for clarity, how would it be worded? Please indicate if you believe no rewording is necessary.
- Please select how relevant you feel this question is to you as a distance doctoral student (Scale: 5=Very Relevant; 1=Not at all Relevant).

The goal for pilot testing is about 5-10 respondents (Fowler, 2009). I emailed the resources needed to complete the pilot test to my dissertation chair and one committee member, and they forwarded the invitation to potential participants. The pilot test resources included an invitation to participate in the pilot study (see Attachment J), the pilot study consent form (Attachment K), the DDIS-PILOT, and Rubric Three. During the pilot test, participants also recorded the time needed to complete the DDIS so an estimated time-to-complete could be determined and included in the instructions for the large group portion of this study (Gall et al., 2007).

The initial open period was two weeks. I sent a reminder to participate (see Appendix L) to my chair and committee member to forward to the contacted potential participants. By the end of the planned open period, there were only four participants. I extended the dates by seven days, and by then had enough participants (n = 8). Explanation of participant demographic information is found in the *Data Analysis* section.

For the pilot test, participants first completed the Pilot-DDIS then recorded the length of time to complete. Then participants reviewed their responses and completed Rubric Three. Once finished, each respondent emailed me the completed Consent Form and Rubric Three.

I reviewed the means and standard deviations (Gall et al., 2007) of the DDIS items and each of the cognitive testing responses. I then open coded (Creswell, 2013) each response as either a *match* or *no-match* against the intended construct of each item. An explanation of the match and no-match criteria is found in Table 6. I reviewed the cognitive testing responses and response means to identify any emergent themes (Creswell, 2013) indicating further DDIS improvements. I averaged the time to complete the Pilot-DDIS (~14 minutes). After discussion and review with my chair, I made one change to one Pilot-DDIS item and named the instrument DDIS-EFA. Additional pilot test results are explained in Chapter Four.

Table 6

Open Coding Criteria

Cognitive Test Item	Match	No Match
Please describe in your own words what you believe this question is asking.	Indicates intended question meaning was understood.	Indicates intended meaning was not understood.
Please explain why you chose the selected response over the other choices.	Indicates intended question and response choices were understood.	Indicates intended question and response choices were not understood.
If you were to reword the question, how would it be worded? Please indicate if you believe no rewording is necessary.	No rewording necessary.	Rewording suggested.

The electronic version of the DDIS-EFA (see Appendix N for the DDIS items and rating scale only) for the EFA (large group study) was developed using Qualtrics© survey software. Qualtrics© is web-based survey research software and is the required software for use at my university. The software contains survey design templates, an electronic survey invitation and delivery capability, data collection and analysis tools, security measures to protect respondent identity, and the ability to download results into statistical software tools such as SPSS©.

Exploratory Factor Analysis

I conducted the large group study using an EFA on the DDIS-EFA. Exploratory factor analysis is appropriate for early-stage research and instrument development (Tabachnick & Fidell, 2007; Worthington & Whittaker, 2006). This method is also appropriate for determining the number of factors that emerged from a construct (i.e., distance doctoral student integration), and which variables are related to which factors (Kahn, 2006).

Exploratory factor analysis does not have a required minimum sample size, yet researchers generally agree the sample size should be relatively large (Kahn, 2006; Warner, 2013). For this type of research, Warner (2013) stated the sample size should be as large as possible but no less than 100 total participants. Comrey and Lee (1992) suggested the following guide for factor analysis sample size: 50 = very poor; 100 = poor; 200 = fair; 300 = good; 500 = very good; and 1000 = excellent. Kass and Tinsley (1979) stated factor analysis sample size should account for the number of variables, therefore described as "a widely accepted 'rule of thumb'" (p. 124) to have five to 10 participants per variable. My sample size goal was 300, with a minimally acceptable size of 170.

To begin, I provided my chair and one committee member the recruitment email invitation to participate (see Appendix O). They used snowball sampling procedures to invite potential participants and also sent the email invitation to other industry professionals able to invite potential participants. I posted the email invitation on the Graduate Student listserv on the American Educational Research Association's site (site address http://listserv.aera.net/scripts/wa-AERANET.exe?A0=AERA-GS).

After accessing the DDIS-EFA through the link in the invitation, participants completed the online consent form to participate (Gall et al., 2007) (see Appendix P). In the consent form, I incentivized participation by explaining the research purpose, how the DDIS may benefit both online doctoral students and institutions, and the need for a high response rate and by offering participation prizes (Gall et al., 2007). The prizes included two first prizes (a $25 Amazon© Gift Card) and 10 second prizes (a $10 Amazon© Gift Card). To be eligible for one of the prizes, participants provided their email address when they submitted their completed DDIS.

The initial DDIS-EFA open period was two weeks. I sent a reminder to participate email to my chair and committee member (see Attachment L) about 10 days after initial opening, and they forwarded it through the snowball sampling procedures described earlier. I also posted the reminder on the AERA Graduate Student listserv. At the end of the initial open period, there were only 218 respondents.

I extended the open period for another two weeks and again forwarded the reminder and posted it on the listserv as before. A third reminder was sent 10 days later. At the end of the final open period, 322 respondents had completed the consent form, so I closed the survey. The snowball sampling procedures made it impossible to identify the total number of those invited to participate so a participation response rate was not calculated.

The participation prizewinners were randomly selected from the pool of total participants (including the pilot study participants). I emailed winners their prizes. All participants who provided their email at the end of the DDIS-EFA received a thank-you email (see Appendix Q). I downloaded the completed DDIS cases from Qualtrics© into SPSS© and conducted the EFA.

Reliability Analysis

In addition to the EFA, I evaluated the reliability of the DDIS-EFA using two methods. Internal consistency reliability was investigated using Cronbach's alpha, the most popular multi-item reliability assessment (Warner, 2013). Test-retest reliability was evaluated using Pearson's *r* to obtain the reliability coefficient (Warner, 2013).

Data Analysis

All data *runs* were completed in SPSS©. Because the identified variables and factors were hypothesized, EFA was used to determine the number of factors and which variables were related to which factors (Kahn, 2006). Once the factors were selected, Cronbach's alpha was

used to evaluate internal consistency reliability of the DDIS and of each factor (Warner, 2013). Test-retest reliability coefficient was evaluated using Pearson's *r* (Warner, 2013). The full data analysis results are presented in Chapter Four.

Missing Data and Data Suitability

Before proceeding with the EFA, I conducted a frequency analysis on the cases (n = 322) to determine if there was any missing data (Warner, 2013). The frequency analysis revealed missing data issues. Two data handling procedures were used that left a sample size within the acceptable limits for EFA (Comrey & Lee, 1992; Kass & Tinsley, 1979; Warner, 2013). For the first method, a small amount of the cases (n = 34) were missing a large amount of data. I deleted those cases because doing so did not significantly reduce the number of cases (Tabachnick & Fidell, 2007). By deleting those cases, the sample size dropped to n = 288.

The frequency analysis (Warner, 2013) also revealed 17 unanswered items spread among 15 cases (respondents). No single variable had significant (over 5%) missing data (Warner, 2013), and no missing data pattern was evident (Tabachnick & Fidell, 2007). The missing data appeared to be missing completely at random (MCAR), so this was considered a minor issue (Tabachnick & Fidell, 2007). I chose to retain the cases with missing data by imputing the missing data using mean substitution (Tabachnick & Fidell, 2007). Additional cases (n = 5) were disqualified as the respondents indicated they were not in a distance doctoral program. The methods employed to handle missing data kept the sample size (n = 282) well within the acceptable limits for the EFA (Comrey & Lee, 1992; Kass & Tinsley, 1979; Warner, 2013).

I investigated data suitability to proceed with EFA using two measures—the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to support correlation matrix factorability and the assumption of multivariate normality (that all linear

variable combinations are normally distributed) (Tabachnick & Fidell, 2007). The KMO was 0.961, considered excellent or *marvelous* on Kaiser's (1974) index of factorial simplicity, indicating an adequate sample to proceed. Bartlett's test of sphericity was statistically significant ($p < .001$; $\chi^2 = 8001.279$) indicating the assumption of multivariate normality was not violated (Tabachnick & Fidell, 2007). Once the data proved suitable to proceed, I began the EFA.

Exploratory Factor Analysis Method

I selected maximum likelihood with direct oblimin (oblique) rotation as the FA method. Maximum likelihood was appropriate because

> The primary advantage of ML is that it allows for the computation of a wide range of indexes of the goodness of fit of the model [and] ML also permits statistical significance testing of factor loadings and correlations among factors and the computation of confidence intervals for these parameters. (Fabrigar, Wegener, MacCallum, & Strahan, 1999, p. 277)

Maximum likelihood is also the preferred method when data are generally normally distributed (Fabrigar et al., 1999). The correlation matrix (see Attachment T) contained numerous underlying correlations greater than .30, indicating to use oblique rotation (Kahn, 2006; Tabachnick & Fidell, 2007). Descriptive statistics for the DDIS-EFA are found in Appendix S.

Factor Extraction

I applied four statistical analysis methods for factor extraction. First, an eigenvalue cutoff of 1.0 was set, with any factor over 1.0 considered for retention (Tabachnick & Fidell, 2007). The second method was Cattell's (1966) scree test (also referred to as a scree plot). The scree plot was created in conjunction with the eigenvalues. The scree plot was reviewed for the

major *slope change*, with all factors above the slope change considered for retention (Tabachnick & Fidell, 2007).

The third factor extraction was parallel analysis (Horn, 1965). Parallel analysis is conducted by creating a random data set with the same number of cases and items, then generating eigenvalues on the random data set and comparing those eigenvalues to those of the real data set (Kahn, 2006; Tabachnick& Fidell, 2007). Only those factors with higher eigenvalues than the eigenvalues produced by chance in the randomly generated data set are retained (Kahn, 2006; Tabachnick & Fidell, 2007). I used a Monte Carlo simulation to generate eigenvalue results from 100 random data sets containing the same number of cases (n = 282) and items (n = 34).

The fourth factor extraction method was interpretability criteria. O'Rourke and Hatcher (2013) offered four interpretability criteria to make sure the extraction solution makes sense as follows:

- Each factor should have at least three variables with significant (higher than .40) loadings.
- The variables that load on the same factor should appear to be measuring the same construct.
- The variables that load on different factors should measure different constructs.
- The solution should have a simple structure factor pattern, with most variables loading high on only one factor and low on the rest.

The factor extraction methods indicated differing results. The hypothesized solution was five factors. The eigenvalues indicated a four factor solution and the scree plot and parallel analysis each indicated a three factor solution. I made the decision to conduct multiple EFA *runs*

then used interpretability criteria to identify the most interpretable result (O'Rourke & Hatcher, 2013; Tabachnick & Fidell, 2007). I forced five, four, and three factor solutions. The five and four factor solutions each contained multiple cross loadings across the factors, and multiple poor (< .32) factor loadings, indicating neither solution was interpretable (O'Rourke & Hatcher, 2013; Tabachnick & Fidell, 2007).

The three factor solution had multiple loadings with all but one variable loading above .40 on each factor. However, there were two items that cross loaded on multiple factors. I removed those two items and forced another three factor solution. The result was a three factor model that was highly interpretable (O'Rourke & Hatcher, 2013).

Factor Naming and Item Retention

The next task was to name the three factors that emerged (Kahn, 2006). I reviewed each factor with the corresponding loaded items to determine what each grouping had in common (Kahn, 2006). I also reviewed the literature and used all the data to name each factor accordingly.

I then finalized scale length by considering items for retention or deletion (Worthington & Whittaker, 2006). I examined communalities (h_2), and considered items having low communality (< .40) for deletion (Worthington & Whittaker, 2006). I also set a structure coefficient *cut score* for retaining items. The recommended cut score is up to the researcher, but generally is set between .30 and .50 (Kahn, 2006). The instrument with the final factors and items was renamed DDIS-Final.

Internal Consistency Reliability

I used the following criteria for the Cronbach's alpha: ">.9 – Excellent, >.8 – Good, > .7 – Acceptable, > .6 – Questionable, > .5 – Poor, and < .5 – Unacceptable" (George & Mallery,

2003, p. 231). Cronbach's alpha was evaluated on the overall DDIS-Final and on each factor The DDIS-Final indicated overall excellent internal consistency reliability.

Test-Retest Reliability

To further investigate reliability of the DDIS-Final, I conducted test-retest reliability using Pearson's *r*. Pearson's *r* is the most common method of determining the reliability coefficient between the same variables at different points in time (Gall et al., 2007; Warner, 2013). The retest period began about four weeks after the original DDIS participation period.

The retest invitation was sent to participants who had provided their email during the first DDIS large group session. I did not disclose the retest methodology in the initial DDIS invitation to participate and waited about four weeks to begin the posttest to avoid pretest sensitization (Gay & Airasian, 2003). The retest remained open for 10 days.

The retest period ended with an acceptable sample (n = 109) (Warner, 2013). Pearson's *r* was calculated on the composite DDIS-Final score and the composite scores for each identified factor. Because this study was considered early research, I set a *modest* reliability measurement criteria of .70 (Warner, 2013). The DDIS-Final and each of its factors indicated statistically significant reliability.

Summary

This chapter reported the methods used to develop and analyze the structure, validity, and reliability of the DDIS. The DDIS was developed using the literature and current instruments with validated integration measures. Next SME panel provided recommendations to improve the content and face validity the DDIS. A pilot test provided further face validity and a time-to-complete estimation. The EFA further explored the dimensionality of the DDIS, and reliability

was investigated using Cronbach's alpha and test-retest. The findings are discussed in Chapter Four.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this instrument development research was to develop and analyze the structure, validity, and reliability of the Distance Doctoral Integration Scale (DDIS). In this chapter, I present the findings of the methods used to investigate the reliability, validity, and structure of the DDIS. The methods used to investigate validity and structure included a subject matter expert (SME) review panel to assess content and face validity, a pilot test to further assess content and face validity, and an exploratory factor analysis (EFA) to investigate the construct validity and structure of the DDIS. I investigated two types of reliability for the DDIS—Cronbach's alpha and Pearson's *r*.

Results

Subject Matter Expert Panel for Content and Face Validity

I completed the subject matter expert (SME) panel review in two parts. The first part focused on evaluation of the initial pool of DDIS items. The second part focused on finalizing the DDIS item pool to the most parsimonious list of items.

Panel review of initial candidate items. During the initial SME review, each panel member evaluated the 50 DDIS items for content validity, face validity, clarity, conciseness, and reading level (Worthington & Whittaker, 2006) using Rubric One (see Appendix C). The mean scores for each item are in Table 7. The means for each rated area ranged from 2.8 to 5.0.

Table 7

Initial Candidate Item Review—Rubric One

Factor and Items	*M*				
	CV	FV	CL	CN	RL
Satisfaction with the academic program					
I am satisfied with the academic quality of my doctoral program.	4.5	4.5	4.3	4.8	**5.0**
I have found the curriculum and instruction in my doctoral program to be relevant to my job (and/or future job goals).	3.5	3.8	3.8	3.5	4.0
I have found the curriculum and instruction in my doctoral program to be interesting.	4.5	4.3	**5.0**	4.3	**5.0**
I am satisfied with the sequencing of the coursework in my doctoral program.	**5.0**	4.5	**5.0**	**5.0**	**5.0**
I am satisfied with how the doctoral coursework prepared (or is preparing) me for the dissertation.	4.5	4.0	4.0	4.0	4.5
I am satisfied with how the dissertation process is preparing (or will prepare) me for my job or job future goals.	4.5	4.0	3.8	4.0	4.8
I find (or found) my coursework to be interesting and relevant (e.g., there is good *fit* with personal interests, application to future job goals, application to real life, or other similar reasons).	3.0	3.3	3.3	2.8	4.0
I find my dissertation topic (or planned topic) to be interesting and relevant (e.g., there is good *fit* with personal interests, application to future job goals, application to real life, or other similar reasons).	2.8	3.0	2.8	2.8	4.5
Satisfaction with student-faculty academic interactions					
I am satisfied with the degree and quality of academic-based contact I have with the faculty.	4.0	4.0	3.8	4.3	**5.0**
I am satisfied with the working relationship I have with the faculty.	**5.0**	4.8	4.0	4.5	**5.0**
The faculty demonstrate enthusiasm for my work and ideas.	4.0	4.3	4.0	4.3	**5.0**
I have found the faculty to be unavailable and unhelpful.	4.3	4.3	4.0	4.0	**5.0**
I am satisfied with the guidance I receive about the dissertation and dissertation process.	4.3	4.0	3.8	4.3	**5.0**

The faculty in this program provide high quality and timely feedback.	3.5	3.5	3.5	3.8	4.3
The faculty are accessible and approachable to address issues and concerns related to academics.	3.5	3.5	3.5	3.8	4.8
The faculty motivate and stimulate me as a learner and scholar.	4.0	4.0	3.5	4.0	**5.0**
The faculty ensure content is organized and properly presented in coursework.	3.8	4.0	4.0	4.0	**5.0**
I am satisfied with the quality of instruction from the faculty.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
The lack of faculty support has made me want to discontinue in this program.	4.8	4.3	3.8	4.3	4.8
Satisfaction with student-student academic interactions					
I am satisfied with the quality of academic-based interactions with my fellow students.	4.8	4.8	4.8	4.8	4.8
My fellow students are willing to provide help and share knowledge and examples.	4.0	4.3	4.3	4.3	**5.0**
I have the opportunity to learn from my fellow students.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
I receive constructive feedback from my fellow students that helps me improve my doctoral work.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the level/amount of academic-based interactions with my fellow students.	4.0	3.8	3.8	4.0	**5.0**
I am satisfied with the amount I *meet* (consider all synchronous, asynchronous, formal, and informal sessions) academically with my fellow students.	4.8	4.5	4.3	4.0	4.5
I have found a lack of cooperation among my fellow students.	4.5	4.5	4.3	4.8	**5.0**
I am satisfied with the ways I communicate academically with my fellow students.	4.8	4.5	4.5	4.8	**5.0**
Satisfaction with student-student non-academic interactions					
I have developed (or am developing) positive personal relationships with fellow students.	4.8	**5.0**	**5.0**	4.8	**5.0**
I am accepted by my fellow students.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
I am personally connected to one or more peer groups in this program.	4.5	4.5	4.5	**5.0**	**5.0**
I matter to my fellow students.	4.8	4.8	4.8	**5.0**	**5.0**
I can trust my fellow students.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
The level of personal interactions with my fellow students is just right.	4.0	4.3	4.3	4.3	**5.0**

My fellow students *see* me as a real person even though we may have never met face-to-face.	3.8	3.5	3.5	4.0	4.5
Using various distance methods to communicate (i.e., telephone, live video, online chat, email, and/or social media sites) has helped me feel personally connected with my fellow students.	4.8	**5.0**	4.8	4.8	4.8
I feel isolated from my fellow students.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
I can open up about difficulties or struggles with one or more fellow students in this program.	3.8	3.8	3.5	4.0	**5.0**
I have at least one fellow student I can confide with in this program.	4.8	4.8	4.8	5.0	**5.0**
The quality of personal interactions with fellow students is just right.	4.5	4.5	4.5	4.5	4.5
Satisfaction with student-faculty non-academic interactions					
The faculty in this program care about me.	4.8	4.8	4.8	**5.0**	**5.0**
The faculty make me feel safe as a doctoral student.	4.5	4.8	4.8	**5.0**	4.8
I feel personally connected to one or more faculty members.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
Faculty members foster feelings of belonging within this program.	4.8	**5.0**	4.8	**5.0**	**5.0**
I can trust the faculty members in this program.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
I have developed (or I am developing) collegial relationships with one or more faculty members.	4.8	**5.0**	4.8	4.8	**5.0**
I feel neglected by faculty members.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
My interactions with faculty members encourage me to continue in this program.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
I can easily approach faculty members with personal concerns.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
The faculty in this program care about my success.	4.8	**5.0**	**5.0**	**5.0**	**5.0**
I am personally connected to one or more faculty members in this program.	4.3	4.5	4.5	4.5	4.5

Notes. CV=Content Validity; FV=Face Validity; CL=Clarity; CN=Conciseness; RL=Reading Level.

I reviewed all items receiving a mean score below five with the SME panel comments (Creswell, 2013). Using the SME panel's comments, I identified seven improvement categories

and made multiple item revisions (see Table 8 for types of revisions made). Each stem was also revised by adding *I am satisfied* (for reverse-worded questions *I am unsatisfied*).

Five items were also added based on the suggestion to *split* items. For example, the item *I have found the curriculum and instruction in my doctoral program to be relevant to my job (and/or future job goals)* was changed to two items: *I am satisfied with the relevancy of the curriculum to my current or future job and job goals* and *I am satisfied with the relevancy of the instruction to my current or future job and job goals*. The resulting instrument titled DDIS-V2 (or version two) (see Appendix D) had 55 items.

Table 8

Open Coding of SME Feedback-Rubric One Round One

Issue	# of Times
Need to include "satisfaction" in the stem.	33
The item needs to better align with the definition.	29
Clarify terms used, or need additional clarifying terms.	28
There are two different items in stem (e.g., curriculum *and* instruction; interesting *and* relevant). Separate these items.	27
General grammar issues and typos (e.g., suggestions for improving flow; mixed past and present tense; improper use of i.e. or e.g.).	11
Overlapping items (multiple items appeared to measure the same thing)	7
The item appeared to measure something other than satisfaction.	1

The DDIS-V2 was sent back to the SME panel for a second review using Rubric One. I again calculated the means for each rated item and reviewed the SME panel's comments to make further improvements (Creswell, 2013). For this round, all items with an overall mean score below 4.5 were deleted. All items with a sub-category score below 4.25 and all items with SME

panel comments were further evaluated. The DDIS-V2 was a significantly improved instrument as evidenced by the mean scores and SME panel comments (see Table 9).

Table 9

Second Candidate Item Review—Rubric One

Factor and Items	*M*				
	CV	FV	CL	CN	RL
Satisfaction with the academic program					
I am satisfied with the quality of the curriculum in my program.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the quality of instruction in my program	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the relevancy of the curriculum to my current or future job and job goals.	**5.0**	**5.0**	4.3	4.3	**5.0**
I am satisfied with the relevancy of the instruction to my current or future job and job goals.	4.0	4.0	3.7	4.0	**5.0**
I am satisfied with how well the curriculum has maintained my interest since beginning my program.	**5.0**	**5.0**	4.3	4.3	**5.0**
I am satisfied with how well the instruction has maintained my interest since beginning my program.	**5.0**	**5.0**	4.3	4.3	**5.0**
I am satisfied with how well the coursework prepares students for the dissertation process.	**5.0**	**5.0**	4.3	4.3	**5.0**
I am satisfied with how well my program informed me, or is informing me, about what to expect during the dissertation process.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how the dissertation process is preparing me, or will prepare me, for my job or future job goals.	**5.0**	**5.0**	4.3	4.3	**5.0**
I found, or am finding, the coursework in my program to be a good fit for me (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).	**5.0**	**5.0**	4.3	3.7	**5.0**
Satisfaction with student-faculty academic interactions					
I am satisfied with the amount of academic-related contact I have with faculty (consider all synchronous and asynchronous interactions).	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**

I am satisfied with the quality of academic -related contact I have with faculty (consider all synchronous and asynchronous interactions).	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the enthusiasm faculty demonstrate for my academic work.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the enthusiasm faculty demonstrate for my academic ideas.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am unsatisfied with the availability of the faculty to discuss academic issues.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am unsatisfied with the helpfulness of the faculty to address my academic concerns.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the guidance I receive about the dissertation process in this program.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the quality of academic feedback provided by the faculty.	4.7	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the timeliness of academic feedback provided by the faculty.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the availability of faculty to address program-related issues.	4.7	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how the faculty welcome program-related communications from students.	**5.0**	**5.0**	4.3	**5.0**	**5.0**
I am satisfied with how the faculty motivate me as a learner.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how the faculty organize the coursework in this program.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how the faculty present the coursework in this program.	4.7	**5.0**	**5.0**	**5.0**	**5.0**
I am unsatisfied with the academic support I receive from the faculty.	4.7	**5.0**	4.7	**5.0**	**5.0**
My dissatisfaction with the academic support from the faculty has led me to consider leaving this program.	4.3	4.3	3.3	3.3	3.3
Satisfaction with student-student academic interactions					
I am satisfied with the quality of academic-related interactions I have with other students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the frequency of academic -related interactions I have with other students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the willingness of students to provide academic -related help to other students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the opportunities I have to learn from my fellow students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**

I am satisfied with the amount of constructive feedback I receive from my fellow students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the amount of academic-based interactions I have with my fellow students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am unsatisfied with the level of cooperation among my fellow students when completing program requirements.	4.7	**5.0**	4.7	**5.0**	**5.0**
I am satisfied with the ways I communicate with my fellow students on academic matters (consider all synchronous, asynchronous, formal, and informal communications).	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
Satisfaction with student-student non-academic interactions					
I am satisfied with the personal relationships I have developed, or am developing, with my fellow students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how my fellow students accept me as a person.	4.7	**5.0**	4.7	**5.0**	**5.0**
I am satisfied with how much I matter to my fellow students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the level of mutual trust among the students in this program.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the amount of social interactions I have with my fellow students.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped me feel personally connected with other students in this program.	**5.0**	**5.0**	4.3	4.0	**5.0**
I am satisfied with the sense of social connectivity that exists between me and my fellow students.	4.7	4.7	4.7	4.7	**5.0**
I am satisfied with how I can openly discuss personal difficulties or struggles with one or more of my fellow students.	**5.0**	**5.0**	4.7	4.3	**5.0**
I am satisfied with my feelings of being able to personally confide with at least one fellow student in this program.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the quality of personal interactions I have with my fellow students.	4.7	**5.0**	4.7	**5.0**	**5.0**
I am satisfied with the amount of personal interactions I have with my fellow students.	4.7	**5.0**	4.7	**5.0**	**5.0**
Satisfaction with student-faculty non-academic interactions					

I am satisfied with how much the faculty care about me as a person.	4.7	**5.0**	4.7	**5.0**	**5.0**
I am satisfied with my feelings of personal connectivity with at least one faculty member in this program.	4.7	4.7	4.7	**5.0**	**5.0**
I am satisfied with how well faculty members foster feelings that I personally belong in this program	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the sense of trust the faculty provide me.	4.7	4.7	4.3	**5.0**	**5.0**
I am satisfied with the collegial relationships I have developed, or am developing, with at least one faculty member.	**5.0**	**5.0**	4.3	4.3	**5.0**
I am satisfied with how well the faculty keep me from feeling neglected.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with the encouragement faculty members provide me.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how easily I can approach faculty members with my personal concerns.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how much the faculty care about me as a person.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**
I am satisfied with how much the faculty care about my success.	**5.0**	**5.0**	**5.0**	**5.0**	**5.0**

Notes. CV=Content Validity; FV=Face Validity; CL=Clarity; CN=Conciseness; RL=Reading Level.

The SME panel made over 130 improvement suggestions for the initial DDIS but made less than 30 improvement suggestions for DDIS-V2. The majority of the suggested item improvements were minor grammatical suggestions and clarification of terms. The SME panel also identified multiple candidate items that seemed very similar (see Table 10). Two items were deleted for low overall mean score.

Based on the SME panel's second round of feedback and discussions with my chair, it was decided the stem *I am satisfied* be removed from each item for better item clarity. The rating scale was then updated instructing participants to rate their *satisfaction level* of each item

using the following scale: Very High—High—Medium—Low—Very Low. The resulting DDIS pool had 53 candidate items. The DDIS-V2 was now ready to have the final item pool selected.

Table 10

Open Coding of SME Feedback-Rubric One Round Two

Issue	# of Times
Clarify, remove, or change confusing terms.	12
Remove *filler* words.	8
Ensure stem matches scale.	3
Add assessment instructions directing participants to their current program stage while taking assessment.	2
Rewording of items for better flow and understanding.	2
Spread out reverse-worded questions to all sections.	1

Panel Review to Select DDIS Items. The SME panel used Rubric Two (see Appendix E) to narrow the list of items to those required to sufficiently measure the elements of academic integration and social integration of doctoral students in DE programs. The Rubric Two feedback resulted in 34 items being retained (see Table 11). The resulting instrument was named Pilot-DDIS and can be seen with instrument instructions and rating scale in Appendix F.

Table 11

Items Selected for Pilot-DDIS

#	Item
1	The sequencing of the coursework in your program.
2	The encouragement faculty members provide you.
3	The quality of academic-related interactions you have with other students.
4	The collegial relationships you have developed with at least one faculty member.
5	The quality of social interactions you have with your fellow students.
6	How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.
7	The quality of academic support in your program (e.g., statistics assistance, writing assistance, and research assistance).
8	The quality of academic feedback provided by the faculty.
9	How the dissertation process is preparing you, or will prepare you, for your goals.
10	The enthusiasm faculty demonstrate for your academic work.
11	The quality of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).
12	How easily you can approach faculty members with your personal concerns.
13	The level of mutual trust among the students in this program.
14	The level of social support you receive from fellow students.
15	The personal relationships you developed with your fellow students.
16	The level of cooperation with your fellow students when completing program requirements.
17	The timeliness of academic feedback provided by the faculty.
18	The amount of social interactions you have with your fellow students.
19	The willingness of students to provide academic -related help to other students.
20	How well faculty members foster feelings that you personally belong in this program.
21	The quality of instruction in your program.
22	The amount of constructive feedback you receive from your fellow students.
23	The guidance faculty provide about the dissertation process in this program.
24	The availability of the faculty to discuss academic issues.
25	How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).
26	The sense of social connectedness between you and your fellow students.

27	How the coursework prepares students for the dissertation process.
28	The quality of the curriculum in your program.
29	The relevancy of the curriculum to your goals.
30	Your level of trust in the faculty.
31	The opportunities you have to learn from your fellow students.
32	The frequency of academic-related interactions you have with other students.
33	How the faculty care about you as a real person.
34	The amount of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).

Pilot Test

After the SME panel review, a pilot test was conducted to further assess face validity through cognitive testing (Fowler, 2009) of the Pilot-DDIS. Participants (n = 8) completed the Pilot-DDIS and cognitive testing materials (see Appendix I). The means and standard deviations for participant responses and relevancy ratings for each DDIS item are in Table 12. Five items were rated below 4.0 for relevancy (items 5, 13, 14, 18, and 26). Four items received comments from more than one respondent (items 4, 5, 6, and 19). Appendix M contains a summary of participant comments and the intended actions.

Table 12

Pilot-DDIS Study Ratings (N = 8)

Item	Stem	Satisfaction		Relevancy	
		M	*SD*	*M*	*SD*
1	The sequencing of the coursework in your program.	4.63	0.52	4.63	0.52
2	The encouragement faculty members provide you.	4.00	1.07	5.00	1.07
3	The quality of academic-related interactions you have with other students.	3.50	0.76	4.88	0.76
4	The collegial relationships you have developed with at least one faculty member.	4.13	1.36	5.00	1.36
5	The quality of social interactions you have with your fellow students.	2.63	1.19	3.63	1.19
6	How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.	3.63	1.51	5.00	1.51
7	The quality of academic support in your program (e.g., statistics assistance, writing assistance, and research assistance).	3.63	1.19	4.75	1.19
8	The quality of academic feedback provided by the faculty.	3.88	1.55	5.00	1.55
9	How the dissertation process is preparing you, or will prepare you, for your goals.	4.38	0.74	4.75	0.74
10	The enthusiasm faculty demonstrate for your academic work.	4.00	1.31	4.75	1.31
11	The quality of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	4.38	0.92	5.00	0.92
12	How easily you can approach faculty members with your personal concerns.	4.00	0.76	4.88	0.76
13	The level of mutual trust among the students in this program.	3.75	0.89	3.50	0.89
14	The level of social support you receive from fellow students.	3.25	1.16	3.43	1.16

15	The personal relationships you developed with your fellow students.	2.88	0.99	4.25	0.99
16	The level of cooperation with your fellow students when completing program requirements.	3.38	1.41	4.88	1.41
17	The timeliness of academic feedback provided by the faculty.	3.75	1.04	4.86	1.04
18	The amount of social interactions you have with your fellow students.	2.25	1.16	3.75	1.16
19	The willingness of students to provide academic -related help to other students.	3.38	0.74	4.38	0.74
20	How well faculty members foster feelings that you personally belong in this program.	3.75	1.28	5.00	1.28
21	The quality of instruction in your program.	4.38	0.92	5.00	0.92
22	The amount of constructive feedback you receive from your fellow students.	3.25	1.28	4.88	1.28
23	The guidance faculty provide about the dissertation process in this program.	4.00	1.20	5.00	1.20
24	The availability of the faculty to discuss academic issues.	4.38	0.92	5.00	0.92
25	How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).	4.00	1.20	5.00	1.20
26	The sense of social connectedness between you and your fellow students.	2.75	1.04	3.63	1.04
27	How the coursework prepares students for the dissertation process.	3.75	1.04	5.00	1.04
28	The quality of the curriculum in your program.	4.38	1.06	4.88	1.06
29	The relevancy of the curriculum to your goals.	4.13	1.13	5.00	1.13
30	Your level of trust in the faculty.	4.13	1.13	4.50	1.13
31	The opportunities you have to learn from your fellow students.	3.50	1.20	4.71	1.20
32	The frequency of academic-related interactions you have with other students.	3.25	1.49	5.00	1.49

33	How the faculty care about you as a real person.	4.00	1.41	4.88	1.41
34	The amount of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	3.88	1.13	5.00	1.13

After discussion and review with my chair, only one change was made. It appeared item 4—*the collegial relationships you have developed with at least one faculty member*—may have been misinterpreted. The item was designed as a faculty-related social integration item. The intended meaning of *collegial* is in line with terms in the MS Word© thesaurus: *shared, reciprocal, friendly, and mutual*. The item also aligns with Merriam-Webster's (2017) definition that collegial is "marked by camaraderie among colleagues" (para 3). The intended use of collegial to align with social integration is consistent with the social integration literature (Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2014; Spaulding & Rockinson-Szapkiw, 2012; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012).

However, it appeared at least two participants interpreted the item differently and believed the item described *professional* relationships. The term *collegial* was removed. No other item had multiple participants provide similar comments, and after review with my chair, no single comment was deemed significant enough to warrant further changes.

The resulting instrument was the 34-item DDIS-EFA (see Appendix N), which based on the SME panel review and the pilot testing was deemed to have sufficient content and face validity (Warner, 2013). The DDIS-EFA was used for data collection, and an EFA was conducted on the data.

Exploratory Factor Analysis

In order to investigate the validity and structure of the DDIS-EFA, a maximum likelihood method of EFA with oblique rotation was conducted. Prior to performing the EFA, the suitability of data for the analysis was assessed. Inspection of the correlation matrix indicated many of the coefficients were greater than the threshold of .3 (see Appendix T) (Tabachnick & Fidell, 2007). The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.961 and exceeded the needed .6 critical value (Kaiser, 1974). The Bartlett's Test of Sphericity was statistically significant ($p < .001$), supporting the factorability of the correlation matrix and assumption of multivariate normality (Tabachnick & Fidell, 2007). With this, the data were determined to be suitable for an EFA. The decision to retain a three factor solution was made based on analysis of the eigenvalues inspection, Cattell's (1966) scree plot inspection, parallel analysis, interpretability criteria, and consideration of conceptual understanding of the literature, which is further explained below.

Factor extraction. The scree plot (see Figure 1) displays the run chart of eigenvalues plotted (Warner, 2013). While four eigenvalues were higher than 1.0 (16.767, 3.624, 1.547, and 1.009), indicating a four factor solution, the major *slope* change on the scree plot indicated a three factor solution (Tabachnick & Fidell, 2007).

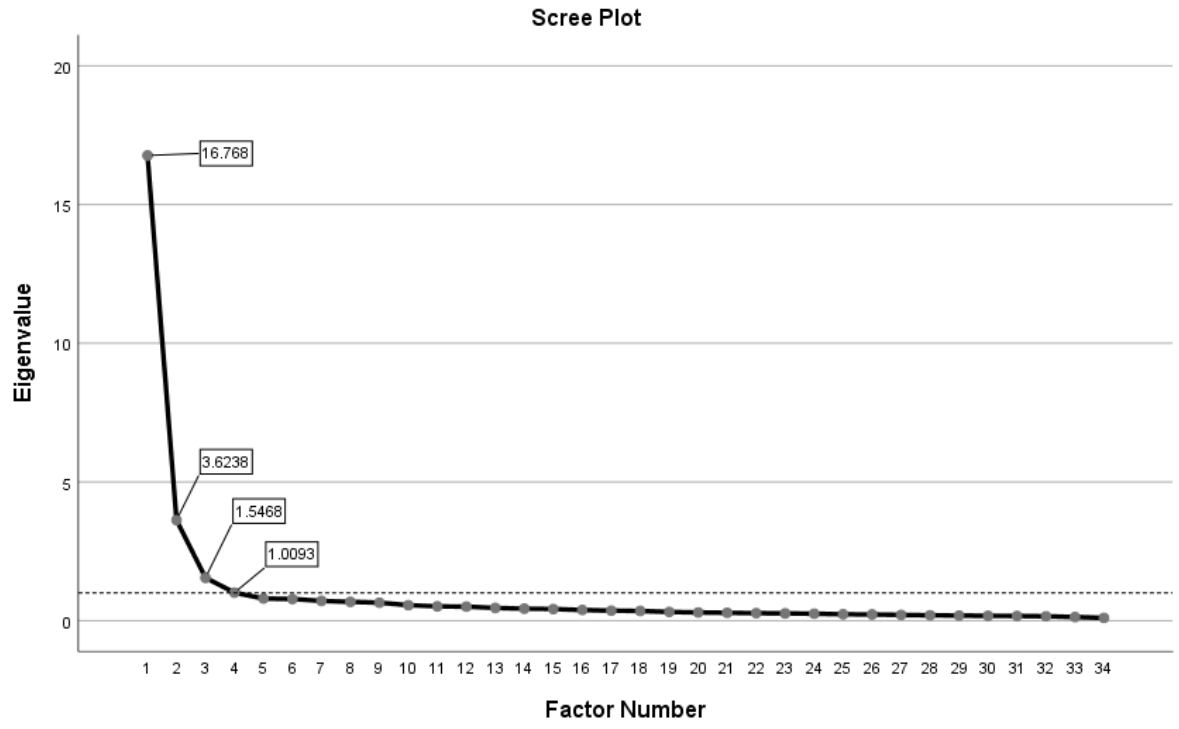

Figure 1. Initial scree plot showing four factors above the 1.0 cutoff. The dotted line indicates where all eigenvalues are above 1.0.

To further inform the factor solution decision, a parallel analysis (Horn, 1965) was conducted. As seen in Table 13, the first three eigenvalues of the original data had higher eigenvalues than the simulated data (those produced by chance). However, the third eigenvalue in the original data (1.547) is very close to the third averaged eigenvalue in the random data set (1.540).

The eigenvalues inspection indicated four factors over 1.0 and both the scree plot and parallel analysis indicated to retain three factors. Research indicates extraction of factors may not be exact and may require researcher judgment to identify the best solution (Kahn, 2006; Tabachnick & Fidell, 2007). Based on the literature indicating a potential of five factors, I decided to run the factor extraction process by specifying differing numbers of factors (five, four,

and three) and use interpretability criteria (O'Rourke & Hatcher, 2013) to identify the most interpretable result.

Table 13

Parallel Analysis Results

EGV	Random Data	DDIS Data
1	1.720	**16.768**
2	1.629	**3.624**
3	1.540	**1.547**
4	**1.500**	1.009
5	**1.444**	0.798
6	**1.398**	0.780
7	**1.356**	0.712

*Note*s. EGV = eigenvalue. Only the top seven eigenvalues are shown. Random data was generated using a Monte Carlo simulation.

For the initial run, I forced a five factor extraction (see Table 14). This did not provide an interpretable result. The fifth factor only had two items load above .32, with those items loading between fair (.45) and poor (.32) (Comrey & Lee, 1992). Both items cross-loaded higher (but still between fair and poor) with the second factor. This solution did not pass the interpretability criteria (O'Rourke & Hatcher, 2013) as it is did not have at least three variables load above .40 per factor and had cross-loaded items.

Table 14

Pattern Matrix-Five Factors

DDIS Item	Factor				
	1	2	3	4	5
33	0.830				
10	0.769				
20	0.768				
12	0.758				
2	0.665				
24	0.628				
34	0.612				
11	0.610				
4	0.566	-0.364			
17	0.508				
8	0.488		-0.392		
23	0.482				
30	0.476		-0.398		
7	0.359				
15		-0.916			
5		-0.837			
26		-0.797			
18		-0.781			
14		-0.771			
6		-0.622			
3		-0.567			
13		-0.517			0.305
19		-0.444			0.405
22		-0.361		-0.355	
28			-0.813		
29			-0.801		
21			-0.742		
25			-0.622		
27			-0.597		
1			-0.594		
9			-0.518		
32				-0.660	
31		-0.371		-0.491	
16		-0.393			0.428

Note. Extraction Method: Maximum Likelihood. Rotation Method: Oblimin with Kaiser Normalization. Items sorted by size; items with values < .3 suppressed to ease interpretability.

A four factor solution was then conducted. There were similar issues with the four factor extraction (see Table 15) as found with the five factor solution. The fourth factor only had one item load above .32, and it cross-loaded higher on the second factor. With only one item in the fourth factor and that factor cross-loading, the four factor extraction did not appear to be the most interpretable result (O'Rourke & Hatcher, 2013). Next, I ran a three factor extraction.

Table 15

Pattern Matrix-Four Factors

DDIS Item	Factor			
	1	2	3	4
33	0.848			
10	0.815			
20	0.781			
12	0.769			
2	0.692			
24	0.667			
34	0.649			
11	0.641			
4	0.590			
17	0.548			
23	0.529			
8	0.525		-0.363	
30	0.490		-0.374	
7	0.392			
15		-0.930		
26		-0.912		
18		-0.887		
14		-0.877		
5		-0.856		
6		-0.673		
19		-0.672		
3		-0.622		
16		-0.607		
22		-0.607		0.31
13		-0.605		
31		-0.595		
32		-0.538		0.388
28			-0.802	
29			-0.793	
21			-0.704	
25			-0.619	
1			-0.58	
27			-0.578	
9	0.312		-0.494	

Notes. Extraction Method: Maximum Likelihood. Rotation Method: Oblimin with Kaiser Normalization. Items sorted by size; items with values < .3 suppressed to ease interpretability.

The three factor extraction can be seen in Table 16. All three factors had multiple factor loadings above .40 (O'Rourke & Hatcher, 2013), with the majority of loadings above *good* (.55), and several *very good* (.63) and *excellent* (.71) loadings (Comrey & Lee, 1992). The total variance explained by the three factors was 64.525% (Warner, 2013). It appeared that a three factor solution was the most interpretable result. As two items in the third factor cross-loaded above .40 with the first factor, the decision was made to remove the complex items and rerun the EFA to see if there was a more interpretable result (Tabachnick & Fidell, 2007).

Table 16

Pattern Matrix-Three Factors

DDIS Item	Factor 1	2	3
33	0.856		
10	0.850		
12	0.788		
20	0.779		
2	0.726		
24	0.699		
11	0.673		
34	0.650		
4	0.594		
8	0.587		
17	0.586		
23	0.571		
30	0.538		-0.324
7	0.420		
26		-0.943	
15		-0.925	
18		-0.916	
14		-0.903	
5		-0.864	
19		-0.710	
6		-0.696	
22		-0.654	
3		-0.647	
16		-0.646	
31		-0.645	
13		-0.637	
32		-0.587	
28			-0.750
29			-0.750
21			-0.603
25			-0.587

1		-0.547
27		-0.504
9	0.378	-0.396

Notes. Extraction Method: Maximum Likelihood. Rotation Method: Oblimin with Kaiser Normalization. Items sorted by size; items with values < .3 suppressed to ease interpretability.

I removed items nine and 30 (both variables cross-loaded) and re-ran the EFA. This three factor solution appeared highly interpretable with all variable loadings above .40 and all variables loading on only one factor (O'Rourke & Hatcher, 2013). A scan of the DDIS items that loaded on each factor indicated three distinct categories (O'Rourke & Hatcher, 2013). This solution showed the three factors were significantly associated as seen in the factor correlation matrix in (see Table 17).

Table 17

Factor Correlation Matrix

Factor	1	2	3
1	—	-.583*	-.613*
2		—	.375*
3			—

Note. *Correlations significant at the .05 level. Factor labels: 1- faculty, 2-student, 3-academic program. The — indicates correlation of 1.0.

All variables loaded above .40, with the lowest loading .42. Only three variables were below *good* (above .55); the rest were all in the *very good* (above .63) and *excellent* (above .71) ranges (Comrey & Lee, 1992). A review of the item stems and their respective loadings on the three distinct factors indicated interpretability criteria was met (O'Rourke & Hatcher, 2013). This highly interpretable three factor solution with the items retained, the factor loadings, and items removed can be seen in Table 18.

Table 18

Three Factor Pattern Matrix-Two Items Removed

Item	Stem	1	2	3
33	How the faculty care about you as a real person.	0.851		
10	The enthusiasm faculty demonstrate for your academic work.	0.838		
12	How easily you can approach faculty members with your personal concerns.	0.783		
20	How well faculty members foster feelings that you personally belong in this program	0.774		
2	The encouragement faculty members provide you.	0.719		
24	The availability of the faculty to discuss academic issues.	0.700		
11	The quality of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	0.668		
34	The amount of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	0.650		
4	The relationships you have developed with at least one faculty member.	0.596		
8	The quality of academic feedback provided by the faculty.	0.586		
17	The timeliness of academic feedback provided by the faculty.	0.586		
23	The guidance faculty provide about the dissertation process in this program.	0.569		
7	The quality of academic support in your program (e.g., statistics assistance, writing assistance, and research assistance)	0.426		
26	The sense of social connectedness between you and your fellow students.		-0.939	
15	The personal relationships you developed with your fellow students.		-0.927	
18	The amount of social interactions you have with your fellow students.		-0.911	
14	The level of social support you receive from fellow students.		-0.904	

5	The quality of social interactions you have with your fellow students.	-0.865	
19	The willingness of students to provide academic - related help to other students.	-0.707	
6	How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.	-0.691	
22	The amount of constructive feedback you receive from your fellow students.	-0.649	
3	The quality of academic-related interactions you have with other students.	-0.646	
16	The level of cooperation with your fellow students when completing program requirements.	-0.645	
31	The opportunities you have to learn from your fellow students.	-0.639	
13	The level of mutual trust among the students in this program.	-0.637	
32	The frequency of academic-related interactions you have with other students.	-0.581	
28	The quality of the curriculum in your program.		-0.767
29	The relevancy of the curriculum to your goals.		-0.749
21	The quality of instruction in your program.		-0.609
25	How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).		-0.581
1	The sequencing of the coursework in your program.		-0.542
27	How the coursework prepares students for the dissertation process.		-0.494
Removed			
9	How the dissertation process is preparing you, or will prepare you, for your goals.		
30	Your level of trust in the faculty.		

Note. Extraction Method: Maximum Likelihood. Rotation Method: Oblimin with Kaiser Normalization. Items sorted by size; items with values < .3 suppressed to ease interpretability.

Factor naming. Based on the high interpretability of the forced three factor solution, the next task was to name the three factors (Kahn, 2006). I reviewed each factor with the

corresponding loaded items to determine what each grouping had in common (Kahn, 2006). The EFA-identified factors appeared grouped in the following broad categories: faculty (n = 13), student (n = 13), and program curriculum (n = 6). Therefore, I named the three factors as follows: (a) *faculty integration*, (b) *student integration*, and (c) *curriculum integration*. Naming rationale is further described in Chapter Five.

Item retention. As seen in Table 19, two items (items 1 and 4) had communalities (h_2) with values below. 40. However, the structure matrix indicated all items were above the higher cutoff threshold of .50 (Kahn, 2006). There was no clear indicator for item deletion at the higher cutoff thresholds I selected, so I retained all 32 items. I named the instrument DDIS.

Table 19

Three Factor Structure Matrix and Communalities

Item	Stem	Factor			
		1	2	3	h_2
33	How the faculty care about you as a real person.	0.849			0.725
20	How well faculty members foster feelings that you personally belong in this program	0.831			0.696
11	The quality of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	0.821			0.698
10	The enthusiasm faculty demonstrate for your academic work.	0.808			0.653
24	The availability of the faculty to discuss academic issues.	0.778			0.612
12	How easily you can approach faculty members with your personal concerns.	0.770			0.598
34	The amount of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	0.748			0.568
8	The quality of academic feedback provided by the faculty.	0.747			0.609
2	The encouragement faculty members provide you.	0.743			0.555
23	The guidance faculty provide about the dissertation process in this program.	0.662			0.455
7	The quality of academic support in your program (e.g., statistics assistance, writing assistance, and research assistance)	0.656			0.489
17	The timeliness of academic feedback provided by the faculty.	0.588			0.400
4	The relationships you have developed with at least one faculty member.	0.572			0.396
26	The sense of social connectedness between you and your fellow students.		-0.904		0.822
14	The level of social support you receive from fellow students.		-0.880		0.776
18	The amount of social interactions you have with your fellow students.		-0.878		0.778

15	The personal relationships you developed with your fellow students.	-0.873		0.772
5	The quality of social interactions you have with your fellow students.	-0.829		0.692
31	The opportunities you have to learn from your fellow students.	-0.764		0.646
22	The amount of constructive feedback you receive from your fellow students.	-0.761		0.618
6	How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.	-0.752		0.579
16	The level of cooperation with your fellow students when completing program requirements.	-0.742		0.578
3	The quality of academic-related interactions you have with other students.	-0.734		0.573
19	The willingness of students to provide academic -related help to other students.	-0.728		0.532
13	The level of mutual trust among the students in this program.	-0.715		0.535
32	The frequency of academic-related interactions you have with other students.	-0.712		0.552
28	The quality of the curriculum in your program.		-0.871	0.787
29	The relevancy of the curriculum to your goals.		-0.823	0.713
21	The quality of instruction in your program.		-0.791	0.689
25	How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).		-0.723	0.563
27	How the coursework prepares students for the dissertation process.		-0.704	0.569
1	The sequencing of the coursework in your program.		-0.600	0.369

Note: h_2=communalities. Sorted by size and only the highest loadings for each factor retained for ease in viewing.

Internal Consistency Reliability

The internal consistency of the 32 item instrument was assessed using Cronbach's alpha. The Cronbach's alpha for the DDIS was .966, indicating excellent reliability (George & Mallery, 2003). The Cronbach's alpha for faculty integration factor was .937 and .957 for the student integration factor. Both factors indicated excellent reliability (George & Mallery, 2003). The Cronbach's alpha for curriculum factor was .899 indicating good reliability (George & Mallery, 2003).

The final DDIS item breakdown by factor is seen in Table 20. This appears to be the most interpretable solution that adequately measures the three factors identified through this research (O'Rourke & Hatcher, 2013; Tabachnick & Fidell, 2007). There is strong evidence the DDIS is a reliable instrument. I further assessed reliability using test-retest.

Test-Retest Reliability

I analyzed test-retest reliability using data from $n = 109$ participants to calculate Pearson's r of the composite DDIS, as well as each of the three factors. The Pearson correlation for the DDIS was $r(107) = .855$, $p < .01$ (two-tailed). The faculty integration factor was $r(107) = .780$, $p < .01$ (two-tailed), the student integration factor was $r(107) = .810$, $p < .01$ (two-tailed), and the curriculum factor was $r(107) = .842$, $p < .01$ (two-tailed). These results were above the reliability measurement criteria of .70 suggested by Warner (2013), providing further evidence that the DDIS is a reliable instrument.

Table 20

Final DDIS Items by Factor

Factor	Item	Stem
Faculty Integration	2	The encouragement faculty members provide you.
	4	The relationships you have developed with at least one faculty member.
	7	The quality of academic support in your program (e.g., statistics assistance, writing assistance, and research assistance).
	8	The quality of academic feedback provided by the faculty.
	10	The enthusiasm faculty demonstrate for your academic work.
	11	The quality of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).
	12	How easily you can approach faculty members with your personal concerns.
	17	The timeliness of academic feedback provided by the faculty.
	20	How well faculty members foster feelings that you personally belong in this program.
	23	The guidance faculty provide about the dissertation process in this program.
	24	The availability of the faculty to discuss academic issues.
	33	How the faculty care about you as a real person.
	34	The amount of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).
Student Integration	3	The quality of academic-related interactions you have with other students.
	5	The quality of social interactions you have with your fellow students.
	6	How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.
	13	The level of mutual trust among the students in this program.
	14	The level of social support you receive from fellow students.
	15	The personal relationships you developed with your fellow students.
	16	The level of cooperation with your fellow students when completing program requirements.
	18	The amount of social interactions you have with your fellow students.

	19	The willingness of students to provide academic -related help to other students.
	22	The amount of constructive feedback you receive from your fellow students.
	26	The sense of social connectedness between you and your fellow students.
	31	The opportunities you have to learn from your fellow students.
	32	The frequency of academic-related interactions you have with other students.
Curriculum Integration	1	The sequencing of the coursework in your program.
	21	The quality of instruction in your program.
	25	How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).
	27	How the coursework prepares students for the dissertation process.
	28	The quality of the curriculum in your program.
	29	The relevancy of the curriculum to your goals.

Null Hypotheses

The first null hypothesis stated, *The DDIS is not a valid instrument for measuring academic integration and social integration of doctoral students in DE programs*. I used an extensive review of the literature including validated measures of academic integration and social integration for targeted populations to hypothesize three factors associated with academic integration and two factors associated with social integration of distance doctoral students. This foundation was used to inform initial DDIS item development. However, it is important to note that while the research clearly indicates academic integration and social integration are predictors of doctoral student persistence (e.g., Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012), the

research also indicates these constructs often overlap, making the lines between them hard to distinguish (Lovitts, 2001; Tinto, 1993).

Initial DDIS content, construct, and face validity were evaluated by a SME review panel (Warner, 2013). Face validity was further assessed through cognitive testing (pilot test) (Fowler, 2009) of the DDIS. Then an EFA was conducted on the DDIS. The process to complete the EFA included investigating and handling missing data, investigating data suitability to proceed with EFA, and the actual EFA. The EFA also included multiple steps including selecting the methods for factor extraction, factor rotation, and factor naming.

The EFA results indicated the DDIS measures three factors, and the structure of those factors differed significantly from those hypothesized. Therefore, I was unable to reject the null hypothesis that *the DDIS is not a valid instrument for measuring academic integration and social integration of doctoral students in DE programs*. However, there is strong evidence that the DDIS is a valid instrument for measuring the three identified factors: (a) faculty integration, (b) student integration, and (c) curriculum integration. Additionally, as the literature and SME panel were used to specifically design each item to measure integration factors of doctoral students in DE programs, there is strong evidence these three factors indeed measure the integration of doctoral students into their DE programs.

The second null hypothesis stated, *The DDIS is not a reliable instrument for measuring academic integration and social integration of doctoral stude**n**ts in DE programs*. I investigated internal consistency reliability with Cronbach's alpha and test-retest reliability with Pearson's *r* (Warner, 2013). The Cronbach's alpha for the DDIS was .966. The faculty integration factor was .937, the student integration factor was .957, and the curriculum integration factor was .899. These results provide strong evidence that the DDIS is reliable (George & Mallery, 2003).

The Pearson's *r* for the DDIS was $r(107) = .855$, $p < .01$ (two-tailed). Reliability coefficients for each of the three factors were as follows: faculty integration $r(107) = .780$, $p < .01$ (two-tailed), student integration $r(107) = .810$, $p < .01$ (two-tailed), and curriculum integration $r(107) = .842$, $p < .01$ (two-tailed). With reliability coefficients above .70, these findings provide statistically significant evidence the DDIS is reliable (Warner, 2013). However, based on the three factor structure, I failed to reject the null hypothesis that *the DDIS is not a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs*. Nevertheless, the statistically significant Cronbach's alpha and test-retest results provide strong evidence that the DDIS is a reliable instrument to measure the three identified factors.

The third null hypothesis stated, *The DDIS is unidimensional* (i.e., it measures a single dimension [or factor] of integration of doctoral students in DE programs). I used the EFA to investigate the dimensionality of the DDIS. The results indicated strong factor loadings on three factors, and the factors were significantly associated. There is sufficient evidence to reject the null hypothesis that *the DDIS is unidimensional.*

Summary

This chapter reported the findings from the methods used to develop and investigate the structure, validity, and reliability of the DDIS. The SME panel assessed initial content and face validity, resulting in an initial instrument with 34 items. The pilot test to further assess content and face validity indicated one minor wording change to one item. An EFA using a maximum likelihood method with direct oblimin rotation was used to further investigate the construct validity and structure of the DDIS. The results of the EFA indicated a highly interpretable, 32-item instrument that measures three factors: (a) faculty integration, (b) student integration, and

(c) curriculum integration. The Cronbach's alpha indicated the DDIS has excellent overall internal consistency reliability. The Pearson's *r* results of the test-retest reliability also provided further evidence the DDIS is a reliable instrument. The findings indicate the DDIS is a valid and reliable instrument. The conclusions are discussed in Chapter Five.

CHAPTER FIVE: CONCLUSIONS

Overview

The purpose of this instrument development study was to develop and assess the validity and reliability of the Distance Doctoral Integration Survey (DDIS). I designed the DDIS to measure factors of integration of doctoral students in distance education (DE) programs. Results of the analyses indicated that the DDIS is a valid and reliable instrument. In this chapter, I present a thorough discussion of the findings described in Chapter Four. I also present implications, limitations, and delimitations of this study. I conclude with recommendations for future research.

Background

Many personal and institutional factors influence a student's persistence or attrition, and research clearly suggests two of the primary predictors of doctoral student persistence in DE programs are academic integration and social integration (Ivankova & Stick, 2007; Rockinson-Szapkiw et al., 2016; Wyman, 2012). However, there are no widely accepted definitions or instruments that clearly define, operationalize, and measure academic integration and social integration for doctoral students in DE programs. Confounding the issue is research demonstrating the links between persistence, academic integration, and social integration are sometimes not clear (e.g., Braxton & Lien, 2000; Braxton et al., 1997), and that academic and social integration of doctoral students are closely intertwined (Lovitts, 2001; Tinto, 1993).

This gap has led to unclear and conflicting academic integration and social integration research (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). I conducted this research with the intention of narrowing this gap by developing the

DDIS to measure academic integration and social integration of doctoral students in DE programs. The following research questions guided my study:

RQ1: Is the DDIS a valid instrument for measuring academic integration and social integration of doctoral students in DE programs?

RQ2: Is the DDIS a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs?

RQ3: What are the underlying factors that explain integration of doctoral students in DE programs?

In order to develop the DDIS, I began with gaining a deep understanding of academic integration and social integration of doctoral students in distance programs through a review of empirical and theoretical literature. The core of this research was grounded in Tinto's (1975, 1993) work on undergraduate student integration and persistence and the longitudinal model of doctoral persistence (Tinto, 1993). Wao and Onwuegbuzie's (2011) integrated conceptual scheme of doctoral persistence added support to Tinto's assertion that social and academic integration are central to doctoral persistence. Rovai's (2003) composite persistence model helped incorporate the unique academic integration and social integration issues of distance students.

The literature review provided empirical support indicating both academic integration and social integration are predictors of doctoral student persistence (e.g., Bair, 1999; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). The review also included current instruments that contain validated measures of academic integration and social integration for targeted populations. These

instruments were The College Persistence Questionnaire (CPQ) (Davidson et al., 2009), The Classroom Community Scale (CCS) (Rovai, 2002a), and The Doctoral Student Connectedness Scale (DSCS) (Terrell et al., 2009). The theoretical framework, extensive literature, and current instruments informed DDIS development. From the literature, I hypothesized five factors associated with academic integration and social integration of doctoral students in DE programs.

The hypothesized academic integration factors were satisfaction levels with (a) the academic program, (b) student-faculty academic interactions, and (c) student-student academic interactions. The hypothesized social integration factors were satisfaction levels with the nature and quality of (a) student-student non-academic interactions and (b) student-faculty non-academic interactions. These hypothesized factors formed the framework to develop the candidate pool of DDIS items.

Summary of Findings

I developed an initial pool of DDIS candidate items to measure each hypothesized factor. Initial DDIS content and face validity were investigated through a subject matter expert (SME) panel (Warner, 2013). The SME panel was comprised of published experts in doctoral persistence, online persistence, or online education, and all have experience in online doctoral or graduate program instruction. As experts, the SME panel essentially *judged* the content validity of the DDIS by providing suggested improvements and selecting the best items to measure each hypothesized factor (Warner, 2013).

Next, I conducted a pilot test with sample participants (n = 8) to further assess the DDIS for face validity, item relevancy, and to obtain an estimated time-to-complete (Warner, 2013). The resulting 34-item instrument appeared to have sufficient content and face validity (Warner, 2013) to measure each hypothesized factor of academic integration and social integration. The

DDIS was ready for exploratory factor analysis (EFA). A large sample of participants (n = 282) completed the DDIS, providing sufficient data for the EFA.

I conducted a maximum likelihood method of factor analysis with direct oblimin rotation. Based on the literature and development process to this point, I fully expected to see factor extraction indicate a five factor solution as hypothesized. However, the factor extraction methods indicated differing results. No factor extraction method indicated a five factor solution. The eigenvalue over 1.0 (Tabachnick & Fidell, 2007) indicated four factors and the scree plot (Cattell, 1966) and the parallel analysis (Horn, 1965) each indicated a three factor solution.

I forced five, four, and three factor solutions and used interpretability criteria (O'Rourke & Hatcher, 2013) to identify the most interpretable solution. Neither the five nor the four factor solution was interpretable as each contained multiple cross loadings and multiple poor loadings (below .32) (O'Rourke & Hatcher, 2013; Tabachnick & Fidell, 2007). The three factor solution appeared very interpretable. Each had at least six variables with significant (higher than .40) loadings, and this solution had a simple factor pattern as most variables loaded high on only one factor and low on the rest (O'Rourke & Hatcher, 2013).

In the three factor solution, there were two items that cross-loaded on multiple factors above .32 (Tabachnick & Fidell, 2007). I removed those two items (item 30-*how the dissertation process is preparing you, or will prepare you, for your goals* and item 9-*your level of trust in the faculty*). I again forced a three factor solution, and this 32-item three factor solution appeared highly interpretable as all variables loaded above .40 and all loaded on only one factor (O'Rourke & Hatcher, 2013).

Another interpretability criteria is that all variable loadings on each factor appear to be measuring the same construct (O'Rourke & Hatcher, 2013). Based on the literature, I had

originally hypothesized five factors, and the three factor solution was somewhat surprising to me. Up to this point, the low factor loadings and cross-loaded items were enough to reject the five and four factor solutions (O'Rourke & Hatcher, 2013; Tabachnick & Fidell, 2007). However, as I investigated the interpretability of the three factor solution and reviewed the actual item stems, I noticed something interesting. Each factor appeared to group as follows: items associated with *faculty*, items associated with *students*, and items associated with the *curriculum*.

The curriculum factor contained all of the items originally designed to measure the academic program factor. The faculty and student factors both included items originally hypothesized to *separately* measure academic integration and social integration as indicated by the literature. For example, the items with the highest loadings on the faculty factor were items 33-*how the faculty care about you as a real person* and item 10-*the enthusiasm faculty demonstrate for your academic work*. Item 33 was originally designed with academic integration in mind, and item 10 was originally designed with social integration in mind, yet both loaded at the excellent (above .71) level (Comrey & Lee, 1992) on the faculty factor. The results indicated different factors emerged than those hypothesized, and these findings are further discussed in the next section.

Discussion

The literature describes that academic integration and social integration are closely intertwined for doctoral students (Lovitts, 2001; Tinto, 1993). Tinto (1993) alluded to social memberships becoming "part and parcel of academic memberships, and social interaction with one's peers and faculty becomes closely linked" (p. 232) to the intellectual and skill development needed to attain the doctorate. Even though Tinto (1993) described the closeness of academic integration and social integration of doctoral students in the longitudinal model of doctoral

persistence, Tinto still portrayed academic integration and social integration as separate factors. Similarly, other literature reviewed (e.g., Bair, 1999; Girves & Wemmerus, 1988; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Lovitts & Nelson, 2000; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2003, 2014; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011) described academic integration and social integration of doctoral students as separate. In fact, Lovitts (2001) posited that while academic integration is necessary for completion, social integration is not.

Despite the research indicating academic integration and social integration are separate, this research suggests a different position. The three factor solution suggests that for doctoral students, in addition to satisfaction with the curriculum (previously named *academic program*), the level of satisfaction with interactions—regardless of whether academic or social—is what is important.

The final aspect of interpretability criteria is to ensure variables that load on different factors should measure different constructs (O'Rourke & Hatcher, 2013). Upon further review of the items that loaded on each factor, it is absolutely clear that *all* faculty items loaded on the first factor, *all* student items loaded on the second factor, and *all* curriculum items loaded on the third factor. Further, faculty items, student items, and curriculum items appear to measure distinctly different factors. Overall, the three factor solution was very interpretable. The faculty category (n = 13) had over half of the factor loadings above very good (.63) with five above excellent (.71) (Comrey & Lee, 1992). The student category (n = 13) had all but one item load above very good (.63) with five above excellent (.71) (Comrey & Lee, 1992). The curriculum category (n = 6) had over half of the items load above good (.55), with two excellent (.71) loadings (Comrey & Lee, 1992).

The literature describes that at the doctoral level, academic integration and social integration become intertwined (Lovitts, 2001; Tinto, 1993). However, the term *intertwined* may not go far enough. Perhaps a better term is *conjoined*.

Merriam-Webster's (2018) thesaurus recommends the use of conjoin to describe how separate items "come together as a single unit" (para 1). In this research, items designed to separately measure academic integration and social integration instead conjoined by *who* the interaction was with (faculty or peers) not the interaction type (academic or social). Therefore, while the concepts of academic integration and social integration conjoin for doctoral students, the items measuring integration grouped into three categories—faculty, students, and curriculum.

Considering the results of the instrument development process, the EFA, Cronbach's alpha, and the test-retest, it appears the DDIS does indeed measure aspects of what Tinto (1993) described as academic integration and social integration of doctoral students. However, it also appears the loading of these items may have revealed a new integration construct for doctoral students in DE programs. Based on these findings, I propose that for distance doctoral students, the term *program integration* may be a more accurate description than the separate terms academic integration and social integration. Thus, I suggest the construct program integration for doctoral students studying at a distance is comprised of three factors: (a) satisfaction with faculty integration, (b) satisfaction with student integration, and (c) satisfaction with curriculum integration.

I failed to reject the null hypothesis that *the DDIS is not a valid instrument for measuring academic integration and social integration of doctoral students in DE programs*, and the null hypothesis that *the DDIS is not a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs*. I was able to reject the null hypothesis

the DDIS is unidimensional. However, the results of this study indicate the DDIS appears to have good construct, content, and face validity for measuring *program integration of doctoral students in DE programs*. It also appears that program integration of doctoral students in DE programs can be defined as *the satisfaction level with* faculty integration, student integration, and curriculum integration.

Implications

Over 40 years of research indicates that doctoral attrition rates range between 40%-60% (Bowen & Rudenstine, 1992; Cassuto, 2013; Council of Graduate Schools, 2008; Ivankova & Stick, 2007; Lovitts & Nelson, 2000), and rates can increase by 10%-20% in the DE environment (Carr, 2000; Frankola, 2001; Terrell, 2005). While some argue that a certain amount of doctoral attrition is expected (Cassuto, 2013), every doctoral student leaving his or her program is one less person eligible of filling vital positions in society and academia (Lovitts, 2001). Identifying key factors linked to persistence of doctoral students in DE programs and developing valid and reliable instruments to measure those factors, may help to decrease attrition rates. Therefore, the implications of this research are both theoretical and practical.

Theoretical Implications

Even though there is a consensus by many that academic integration and social integration are necessary for persistence, researchers have not defined, operationalized, and measured either in a consistent manner (Braxton, 2000; Braxton & Lien, 2000; Davidson et al., 2009; Davidson & Wilson, 2013). The issue has led to inconsistencies in defining and measuring factors associated with academic integration and social integration at all program levels (e.g.,, doctoral, undergraduate, community college) and delivery methodologies (distance, commuter, residential) (Davidson & Wilson, 2013). Recent research has demonstrated that

factors associated with academic integration and social integration significantly predict persistence of doctoral students in DE programs (Rockinson-Szapkiw et al., 2016). However, the same study noted there is also a need to accurately define, operationalize, and validate instruments for these constructs for consistency in future research. Through this research, I sought to narrow this gap by developing and validating an instrument to measure academic integration and social integration of doctoral students in DE programs.

Tinto's (1975, 1993) student integration theory is the most widely used and influential theory in student persistence and attrition research (Kember, 1989; Rovai, 2003; Simpson, 2003). Tinto's work was also the foundation for the other models informing the theoretical framework of this study (Rovai, 2003; Wao & Onwuegbuzie, 2011). At the core of Tinto's undergraduate and graduate persistence theories (1975, 1993) is that academic integration and social integration are both key, yet separate constructs.

However, the findings of this study indicate a different conceptualization of factors associated with the integration of doctoral students in DE programs. Prior research has indicated that the lines between academic integration and social integration at the doctoral level become blurred, and the two become closely intertwined (Lovitts, 2001; Tinto, 1993). The results of this study indicate that *intertwined* may not go far enough—rather they are conjoined, and different factors emerged.

This study indicated that for doctoral students in DE programs, program integration may be a more accurate, all-encompassing term. Program integration of doctoral students in DE programs appears to be comprised of three factors. These factors appear to be satisfaction with faculty integration, student integration, and curriculum integration. Prior research clearly suggests the satisfaction factors associated with program integration as identified in this study

(faculty integration, student integration, and curriculum integration) are primary predictors of doctoral student persistence in DE programs (Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1975, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012). The findings of this study may be used to further understand current theories or may be used to develop new integration and persistence theories for doctoral students in DE programs.

Practical Implications

A valid and reliable instrument to identify and measure program integration as identified in this study may be able to help decrease and mitigate doctoral student attrition, thereby reducing the number of those who experience negative societal, institutional, and personal effects of attrition. Society needs doctoral graduates to these key academic, scientific, and societal roles (Lovitts, 2001; Tinto, 1993). Every doctoral graduate may be a future leader, researcher, educator, and innovator, and every doctoral departure leaves a potential gap in these key roles (Gardner, 2009; Lovitts, 2001; NSF, 2006, 2014). Universities also pay a price.

Doctoral attrition also causes significant institutional and personal issues. Doctoral attrition causes doctoral conferring institutions significant time, money, and effort (Gardner, 2009). Research has indicated that when time, money, and personnel are included, doctoral student recruitment is more expensive than doctoral student retention (Gardner, 2009). Further, the stigma of high attrition rates can negatively affect student recruitment (Cassuto, 2013).

Similar time, money, and effort losses can be felt by noncompleters (Cassuto, 2013). Attrition decisions may also cause significant personal distress and lasting painful emotions (Gardner, 2009; Lovitts, 2001; Willis & Carmichael, 2011). Decisions to stay or leave a

program can cause years or even life-long mental pain and anguish (Lovitts, 2011; Willis & Carmichael, 2011), and these decisions can come at any program stage (Tinto, 1993).

The DDIS was developed to measure integration of doctoral students *at any stage* of their DE program. As students navigate a doctoral program, their needs and abilities to integrate may change (Tinto, 1993). For example, in the early stage of their program, students attempt to *find their place* as they try to integrate into their program's communities (Tinto, 1993). Later in the program, integration tends to become more localized within smaller communities and eventually narrows to the few (e.g., student cohort, committee, and chair) involved in the dissertation process (Tinto, 1993). Therefore, the DDIS may be used as a formative assessment at any stage to provide information about integration and address integration-related issues that may lead to attrition.

Universities have a responsibility to identify factors that promote doctoral student persistence (Bair, 1999), and the DDIS has substantial utility for faculty and administrators of distance doctoral programs to identify program integration issues or at-risk students. Armed with the ability to identify program integration shortfalls associated with program persistence, universities can develop and implement policies and targeted initiatives that promote doctoral student integration. Research indicates students who are satisfied with their program integration are more likely to persist (Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Spaulding & Rockinson-Szapkiw, 2012; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1975, 1993; Wao & Onwuegbuzie, 2011; Wyman, 2012).

Limitations

This study has limitations and delimitations. One of the delimiters was associated with the sampling procedures. This research used a convenience sample (garnered through snowball

sampling) of a limited population (e.g., doctoral students in an asynchronous online school of education program with 80% of the program delivered at a distance). Narrowing the sample to this specific population is a delimiter that reduced the ability to generalize results (Warner, 2013) to the total distance and traditional doctoral student population pursuing non-science, technology, engineering, and math (STEM) degrees.

To increase generalizability, I used snowball sampling (Gall et al., 2007) to gain access to participants (doctoral students currently enrolled in a United States' public or private university pursuing their terminal degrees in education via DE where at least 80% of the program is completed at a distance) otherwise unreachable by me. This increased sample variability (e.g., multiple institutions, program concentrations, time in program, etc.) is desired for this type of research (Warner, 2013). However, generalizability is still be limited to doctoral students in DE programs pursuing their terminal degrees in education.

Using EFA was another limitation. Because EFA is an *exploratory* method, "decisions about number of factors and rotational scheme are based on pragmatic rather than theoretical criteria" (Tabachnick & Fidell, 2007, p. 611) as evidenced in this research. The research indicated five hypothesized factors, and the extraction methods indicated four and three factors. To mitigate this limitation, I used multiple methods of factor extraction and the interpretability criteria (O'Rourke & Hatcher, 2013) to identify the best solution.

The sample size also brought a potential limitation. For factor analysis, many (e.g., Comrey & Lee, 1992; Kahn, 2006; Warner, 2013) recommended sample sizes of at least 300. Small sample sizes may reduce reliability of correlation coefficients, thus the largest sample possible should be obtained (Tabachnick & Fidell, 2007). In this study, I had $N = 282$ participants—considered in the *fair* category, but very close to the recommended 300 (Comrey &

Lee, 1992; Tabachnick & Fidell, 2007). This limitation was mitigated by the multiple high variable loadings (above .80) in the selected three factor solution, and Tabachnick and Fidell (2007) stated with high loadings, samples of 150 are sufficient.

Missing data was a limitation, and one of the most prevalent issues in data analysis (Tabachnick & Fidell, 2007). I used research-approved methods to handle missing data by removal of cases and mean substitution (Tabachnick & Fidell, 2007). However, by deleting cases with significant amounts of data, I reduced the sample size below the recommended 300 as described earlier. By using mean substitution, there is a risk of over-fit of data, causing overly high correlations (Tabachnick & Fidell, 2007). However, the missing data accounted for less than 5% of the overall data, thus the issue was less serious, and nearly any handling procedure would have likely produced similar results (Tabachnick & Fidell, 2007).

False correlations may also be a limitation. Correlations among items may not necessarily be due to item relationships within the factor, but instead may be due to sampling error or because items are similar in ways other than those previously identified (Warner, 2013). There were multiple ways this potential issue was mitigated. A thorough review of the literature and other instruments with validated integration measures informed DDIS item development and the use of SMEs to improve validity of the DDIS reduced the potential of false correlations. Additionally, the multiple high variable loadings described earlier were statistically significant, indicating these readings are attributed to errors or chance is unlikely (Tabachnick & Fidell, 2007).

Lack of the DDIS to be a reliable measure may also be a limitation. To attempt to mitigate this issue, I investigated reliability with two methods—Cronbach's alpha and test-retest (Pearson's *r*). The majority of the Cronbach's alpha results were excellent (> 0.9) and the test-

retest results were also high (> .78), indicating statistically significant reliability (George & Mallery, 2003; Warner, 2013). Also pretest sensitization was mitigated by not disclosing the test-retest methodology in the initial invitation to participate and waiting about four weeks to begin the posttest (Gay & Airasian, 2003).

Recommendations for Future Research

This research was exploratory in nature, so there is certainly the need to continue research on the DDIS. One highly recommended next step is to conduct a confirmatory factor analysis (CFA) on the DDIS. The EFA identified three factors of program integration. A CFA may be used to confirm if the three-factor solution is a good fit for the data—essentially the CFA is "a hypothesis testing procedure" (Kahn, 2006, p. 702). In this research, a set of 32 items appears to comprise three dimensions of program integration (satisfaction with faculty integration, satisfaction with student integration, and satisfaction with curriculum integration). A CFA would be an appropriate next-step procedure to further test that hypothesis.

One delimiter of this research was the population. Limiting the sample to education doctorates in DE programs reduced some validity issues by minimizing variability across DE doctoral program disciplines (Gall et al., 2007). My eventual goal is for the DDIS to be a valid and reliable instrument for doctoral students in additional non-STEM and STEM distance programs. Research to further this effort should be pursued. Additionally, thought should be given to investigate the utility of the DDIS for investigating program integration of students in residential doctoral programs.

I also recommend consideration be given to conduct a longitudinal study with the DDIS to determine if the DDIS is able to predict persistence and time-to-degree of doctoral students in DE programs. I recommend prediction studies be conducted targeting doctoral students in

various program stages. Finally, I recommend studies using the DDIS in targeted populations to see how demographic variables may be associated with program integration and persistence.

Summary

During this instrument development study, I developed and evaluated the validity and reliability of the DDIS. I conducted a thorough review of the literature to develop hypothesized factors of academic integration and social integration of doctoral students in distance education (DE) programs. I used the literature and existing surveys to develop an initial candidate item pool (n = 53) of DDIS items. I then conducted a subject matter expert (SME) panel (N = 3) to review and improve the content and face validity of the DDIS candidate pool, resulting in a 34-item instrument. I conducted a pilot test on the revised DDIS with a small sample (n = 8) of participants to further assess face validity. After a final revision, I conducted an exploratory factor analysis (EFA) on the 34-item instrument using a large sample (n = 282) of participants to investigate validity and dimensionality of the DDIS. I used Cronbach's alpha and Pearson's r to assess reliability. The final DDIS is a 32-item instrument that measures three factors of integration of distance doctoral students. Throughout this process, the DDIS was found to be a valid and reliable instrument for measuring integration of doctoral students in DE programs. This research identified a gap in the current literature related to the conceptualization of academic integration and social integration of doctoral students in DE programs. The results of this research suggests program integration is a more accurate, all-encompassing term comprised of three factors—satisfaction with faculty integration, satisfaction with student integration, and satisfaction with curriculum integration. Prior research clearly suggests the program integration factors as identified in this study are primary predictors of doctoral student persistence in DE

programs. Implementing tools such as the DDIS may help lower the high attrition rates of doctoral students in DE programs.

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APPENDIX A

Initial pool of Distance Doctoral Integration Scale (DDIS) Candidate Items with References

Academic Integration Candidate Items

Satisfaction with the Academic Program

1. I am satisfied with the academic quality of my doctoral program (Bair, 1999).
2. I have found the curriculum and instruction in my doctoral program to be relevant to my job (and/or future job goals) (Bair, 1999).
3. I have found the curriculum and instruction in my doctoral program to be interesting (Bair, 1999; Earl-Novell, 2006; Golde, 2005; Hoskins & Goldberg, 2005; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011).
4. I am satisfied with the sequencing of the coursework in my doctoral program (Wao & Onwuegbuzie, 2011)
5. I am satisfied with how the doctoral coursework prepared (or is preparing me) for the dissertation (Wao & Onwuegbuzie, 2011)
6. I am satisfied with how the dissertation process is preparing me (or will prepare me) for my job or job future goals (Bair, 1999; Earl-Novell, 2006; Golde, 2005; Hoskins & Goldberg, 2005; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011).
7. I find (or found) my coursework to be interesting and relevant (e.g., there is good *fit* with personal interests, application to future job goals, application to real life, or other similar reasons) (Bair, 1999; Earl-Novell, 2006; Golde, 2005; Hoskins & Goldberg, 2005; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011).
8. I find my dissertation topic (or planned topic) to be interesting and relevant (e.g., there is good *fit* with personal interests, application to future job goals, application to real life, or other similar reasons) (Bair, 1999; Earl-Novell, 2006; Golde, 2005; Hoskins & Goldberg, 2005; Spaulding & Rockinson-Szapkiw, 2012; Wao & Onwuegbuzie, 2011).

Satisfaction with Student-Faculty Academic Interactions (faculty includes professors, formal or informal mentors, dissertation chair, and committee members)

1. I am satisfied with the degree and quality of academic-based contact I have with the faculty (Bair, 1999)
2. I am satisfied with the working relationship I have with the faculty (Maher et al., 2004; Wao & Onwuegbuzie, 2011).
3. The faculty demonstrate enthusiasm for my work and ideas (Lovitts, 2001).
4. I have found the faculty to be unavailable and unhelpful (e.g., Bair, 1999; Golde, 2005; Lovitts, 2001; Spaulding & Rockinson-Szapkiw, 2012; Willis & Carmichael, 2011).
5. I am satisfied with the guidance I receive about the dissertation and dissertation process (Lovitts, 2001).

6. The faculty in this program provide high quality and timely feedback (Frankola, 2001; Moore, 1989; Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Maher et al., 2004; Wao & Onwuegbuzie, 2011).
7. The faculty are accessible and approachable to address issues and concerns related to academics (Bair, 1999; Golde, 2005; Ivankova & Stick, 2007; Maher et al., 2004; Wao & Onwuegbuzie, 2011).
8. The faculty motivate and stimulate me as a learner and scholar (Moore, 1989).
9. The faculty ensure content is organized and properly presented in coursework (Moore, 1989; Garrison, Anderson, & Archer, 2001).
10. I am satisfied with the quality of instruction from the faculty (Lovitts, 2001).
11. The lack of faculty support has made me want to discontinue in this program (e.g., Bair, 1999; Golde, 2005; Lovitts, 2001; Spaulding & Rockinson-Szapkiw, 2012; Willis & Carmichael, 2011).

Satisfaction with Student-Student Academic Interactions.

1. I am satisfied with the quality of academic-based interactions with my fellow students (Bair, 1999; Girves & Wemmerus, 1988; Ivankova & Stick, 2007; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2000b; Terrell et al., 2009; Wao & Onwuegbuzie, 2011).
2. My fellow students are willing to provide help and share knowledge and examples (e.g., Ivankova & Stick, 2007; Lovitts, 2001; Maher et al., 2004; Simonson et al., 2012; Spaulding & Rockinson-Szapkiw, 2012; Terrell, 2012).
3. I have the opportunity to learn from my fellow students (Rovai, 2002a, 2002b, 2014; Terrell et al., 2009; Tinto, 1993).
4. I receive constructive feedback from my fellow students that helps me improve my doctoral work (e.g., Ivankova & Stick, 2007; Lovitts, 2001; Maher et al., 2004; Simonson et al., 2012; Spaulding & Rockinson-Szapkiw, 2012; Terrell, 2012).
5. I am satisfied with the level/amount of academic-based interactions with my fellow students (Rovai, 2014; Golde, 2005; Lovitts, 2001).
6. I am satisfied with the amount I *meet* (consider all synchronous, asynchronous, formal, and informal sessions) with my fellow students (Golde, 2005; Lovitts, 2001; Rovai, 2014).
7. I have found a lack of cooperation among my fellow students (e.g., Rovai, 2014; Golde, 2005; Lovitts, 2001).
8. I am satisfied with the ways I communicate academically with my fellow students (Gardner & Gopaul, 2012; Picciano, 2002; Rovai, 2014).

Social Integration Candidate Items

Satisfaction with Student-Student Non-academic Interactions

1. I have developed (or am developing) positive personal relationships with fellow students (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
2. I am accepted by my fellow students (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
3. I am connected to one or more peer groups in this program (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
4. I matter to my fellow students (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
5. I can trust my fellow students (Rockinson-Szapkiw et al., 2016; Rovai, 2002a; Terrell et al., 2009; Terrell et al., 2012).
6. The level of interactions with my fellow students is just right (Picciano, 2002; Rockinson-Szapkiw et al., 2016).
7. My fellow students *see* me as a real person even though we may have never met face-to-face (Garrison et al., 2000; Hill, 1996).
8. Using various distance methods to communicate (i.e., telephone, live video, online chat, email, and social media sites) has helped me feel connected with my fellow students (Ivankova & Stick, 2009; Terrell et al., 2009).
9. I feel isolated from my fellow students (Lovitts, 2001; Rovai, 2003; Terrell et al., 2009; Terrell et al., 2012).
10. I can *open up* about difficulties or struggles with one or more fellow students in this program (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
11. I have at least one fellow student I can confide with in this program (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
12. The quality of interactions with fellow students is just right (Picciano, 2002; Rockinson-Szapkiw et al., 2016).

Satisfaction with Student-Faculty Non-academic Interactions

1. The faculty in this program care about me (Terrell et al., 2009).
2. The faculty make me feel *safe* as a doctoral student (Bair, 1999; Rovai, 2002a; Terrell et al., 2009).
3. I feel personally connected to one or more faculty members (Rockinson-Szapkiw et al., 2016; Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
4. Faculty members foster feelings of belonging within this program (Terrell et al., 2009; Rovai, 2002a, 2002b, 2014).
5. I can trust the faculty members in this program (Rovai, 2002a, 2002b, 2014).

6. I have developed (or I am developing) collegial relationships with one or more faculty members (Bair, 1999; Rovai, 2002a; Terrell et al., 2009).
7. I feel neglected by faculty members (Bair, 1999; Rovai, 2002a; Terrell et al., 2009).
8. My interactions with faculty members encourage me to continue in this program (Bair, 1999; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2002b, 2014; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011).
9. I can easily approach faculty members with any concern (Bair, 1999; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2002b, 2014; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011).
10. The faculty in this program care about my success (Bair, 1999; Lovitts, 2001; Rockinson-Szapkiw et al., 2016; Rovai, 2002a, 2002b, 2014; Terrell et al., 2009; Terrell et al., 2012; Tinto, 1993; Wao & Onwuegbuzie, 2011).
11. I am personally connected to one or more faculty members in this program (Bair, 1999; Rovai, 2002a; Terrell et al., 2009).

APPENDIX B

Initial Draft of the Distance Doctoral Integration Scale (DDIS)

Academic Integration Candidate Items

Satisfaction with the Academic Program

#	Item	SA	A	N	D	SD
1	I am satisfied with the academic quality of my doctoral program.					
2	I have found the curriculum and instruction in my doctoral program to be relevant to my job (and/or future job goals).					
3	I have found the curriculum and instruction in my doctoral program to be interesting.					
4	I am satisfied with the sequencing of the coursework in my doctoral program.					
5	I am satisfied with how the doctoral coursework prepared (or is preparing me) for the dissertation.					
6	I am satisfied with how the dissertation process is preparing me (or will prepare me) for my job or job future goals.					
7	I find (or found) my coursework to be interesting and relevant (e.g., there is good fit with personal interests, application to future job goals, application to real life, or other similar reasons).					
8	I find my dissertation topic (or planned topic) to be interesting and relevant (e.g., there is good fit with personal interests, application to future job goals, application to real life, or other similar reasons).					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Satisfaction with Student-Faculty Academic Interactions

#	Item	SA	A	N	D	SD
1	I am satisfied with the degree and quality of academic-based contact I have with the faculty.					
2	I am satisfied with the working relationship I have with the faculty.					
3	The faculty demonstrate enthusiasm for my work and ideas.					
4	I have found the faculty to be unavailable and unhelpful.					

5	I am satisfied with the guidance I receive about the dissertation and dissertation process.					
6	The faculty in this program provide high quality and timely feedback.					
7	The faculty are accessible and approachable to address issues and concerns related to academics.					
8	The faculty motivate and stimulate me as a learner and scholar.					
9	The faculty ensure content is organized and properly presented in coursework.					
10	I am satisfied with the quality of instruction from the faculty.					
11	The lack of faculty support has made me want to discontinue in this program.					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Satisfaction with Student-Student Academic Interactions

#	Item	SA	A	N	D	SD
1	I am satisfied with the quality of academic-based interactions with my fellow students.					
2	My fellow students are willing to provide help and share knowledge and examples.					
3	I have the opportunity to learn from my fellow students.					
4	I receive constructive feedback from my fellow students that helps me improve my doctoral work.					
5	I am satisfied with the level/amount of academic-based interactions with my fellow students.					
6	I am satisfied with the amount I meet (consider all synchronous, asynchronous, formal, and informal sessions) with my fellow.					
7	I have found a lack of cooperation among my fellow students.					
8	I am satisfied with the ways I communicate academically with my fellow students.					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Social Integration Candidate Items

Satisfaction with Student-Student Non-academic Interactions

#	Item	SA	A	N	D	SD
1	I have developed (or am developing) positive personal relationships with fellow students.					
2	I am accepted by my fellow students.					
3	I am connected to one or more peer groups in this program.					
4	I matter to my fellow students.					
5	I can trust my fellow students.					
6	The level of interactions with my fellow students is just right.					
7	My fellow students see me as a real person even though we may have never met face-to-face.					
8	Using various distance methods to communicate (i.e., telephone, live video, online chat, email, and social media sites) has helped me feel connected with my fellow students.					
9	I feel isolated from my fellow students.					
10	I can open up about difficulties or struggles with one or more fellow students in this program.					
11	I have at least one fellow student I can confide with in this program.					
12	The quality of interactions with fellow students is just right.					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Satisfaction with Student-Faculty Non-academic Interactions

#	Item	SA	A	N	D	SD
1	The faculty in this program care about me.					
2	The faculty make me feel safe as a doctoral student.					
3	I feel personally connected to one or more faculty members.					
4	Faculty members foster feelings of belonging within this program.					
5	I can trust the faculty members in this program.					
6	I have developed (or I am developing) collegial relationships with one or more faculty members.					

7	I feel neglected by faculty members.					
8	My interactions with faculty members encourage me to continue in this program.					
9	I can easily approach faculty members with any concern.					
10	The faculty in this program care about my success.					
11	I am personally connected to one or more faculty members in this program.					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

APPENDIX C

Rubric One

The Distance Doctoral Integration Scale (DDIS) is being developed to measure academic integration and social integration of doctoral students in DE programs. The following pages contain the candidate items measuring the constructs and sub-constructs of academic integration and social integration. The purpose of Rubric One is to evaluate the content and face validity each candidate item for inclusion in the DDIS.

Please review the provided definitions of academic integration and social integration. Then review each candidate item (organized by domain and factor), and using the scale below, rate each item on the listed criteria by *clicking* on the word *rate* in the box below each criteria and selecting the appropriate rating from the drop-down box that appears. Then please provide feedback in the space provided on any rating of *four* (good) or below as well as suggestions for recommended changes, additions, or deletions, to improve both content and face validity.

Scale: 5-Very Good; 4-Good; 3-Fair; 2-Poor; 1-Very Poor

Academic Integration Section

Academic integration for doctoral students in DE programs: *The satisfaction level with the academic program, student-faculty academic interactions, and student-student academic interactions*.

Domain: Academic Integration Factor: satisfaction with the academic program						
1	I am satisfied with the academic quality of my doctoral program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
2	I have found the curriculum and instruction in my doctoral program to be relevant to my job (and/or future job goals).	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
3	I have found the curriculum and instruction in my doctoral program to be interesting.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
4	I am satisfied with the sequencing of the coursework in my doctoral program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
5	I am satisfied with how the doctoral coursework prepared	Content Validity	Face Validity	Clarity	Conciseness	Reading level

	(or is preparing me) for the dissertation.	rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
6	I am satisfied with how the dissertation process is preparing me (or will prepare me) for my job or job future goals.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
7	I find (or found) my coursework to be interesting and relevant (e.g., there is good *fit* with personal interests, application to future job goals, application to real life, or other similar reasons).	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
8	I find my dissertation topic (or planned topic) to be interesting and relevant (e.g., there is good *fit* with personal interests, application to future job goals, application to real life, or other similar reasons).	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					

Domain: Academic Integration **Factor: satisfaction with student-faculty academic interactions**						
1	I am satisfied with the degree and quality of academic-based contact I have with the faculty.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
2	I am satisfied with the working relationship I have with the faculty.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
3	The faculty demonstrate enthusiasm for the discipline and for my work and ideas.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
4	I have found the faculty to be unavailable and unhelpful.	Content Validity	Face Validity	Clarity	Conciseness	Reading level

		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
5	I am satisfied with the guidance I receive about the dissertation and dissertation process.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
6	The faculty in this program provide high quality and timely feedback.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
7	The faculty are accessible and approachable to address issues and concerns related to academics.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
8	The faculty motivate and stimulate me as a learner and scholar.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
9	The faculty ensure content is organized and properly presented in coursework.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
10	I am satisfied with the quality of instruction from the faculty.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
11	The lack of faculty support has made me want to discontinue in this program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					

Domain: Academic Integration **Factor: satisfaction with student-student academic interactions**						
1	I am satisfied with the quality of academic-based interactions with my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					

2	My fellow students are willing to provide help and share knowledge and examples.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
3	I have the opportunity to learn from my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
4	I receive constructive feedback from my fellow students that helps me improve my doctoral work.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
5	I am satisfied with the level/amount of academic-based interactions with my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
6	I am satisfied with the amount I *meet* (consider all synchronous, asynchronous, formal, and informal sessions) with my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
7	I have found a lack of cooperation among my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
8	I am satisfied with the ways I communicate academically with my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					

Social Integration Section

Social integration for doctoral students in DE programs: *The satisfaction level with the nature and quality of student-student and student-faculty non-academic interactions within the doctoral program.*

Domain: Social Integration **Factor: satisfaction with student-student non-academic interactions**						
1	I have developed (or am developing) positive personal relationships with fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
2	I am accepted by my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
3	I am connected to one or more peer groups in this program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
4	I matter to my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
5	I can trust my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
6	The level of interactions with my fellow students is just right	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
7	My fellow students *see* me as a real person even though we may have never met face-to-face.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
8	Using various distance methods to communicate (i.e., telephone,	Content Validity	Face Validity	Clarity	Conciseness	Reading level

	live video, online chat, email, and social media sites) has helped me feel connected with my fellow students.	rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
9	I feel isolated from my fellow students.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
10	I have at least one fellow student I can confide with in this program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
11	The quality of interactions with fellow students is just right.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					

Domain: Social Integration **Factor: satisfaction with student-faculty non-academic interactions**						
1	The faculty in this program care about me.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
2	The faculty make me feel *safe* as a doctoral student.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
3	I feel personally connected to one or more faculty members.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
4	Faculty members foster feelings of belonging within this program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
5	I can trust the faculty members in this program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					

6	I have developed (or I am developing) collegial relationships with one or more faculty members.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
7	I feel neglected by faculty members.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
8	My interactions with faculty members encourage me to continue in this program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
9	I can easily approach faculty members with any concern.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
10	The faculty in this program care about my success.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					
11	I am personally connected to one or more faculty members in this program.	Content Validity	Face Validity	Clarity	Conciseness	Reading level
		rate	rate	rate	rate	rate
	Comments: Click here to enter text.					

APPENDIX D

Draft DDIS-V2

Academic Integration Candidate Items

Satisfaction with the Academic Program

#	Item	SA	A	N	D	SD
1	I am satisfied with the quality of the curriculum in my program.					
2	I am satisfied with the quality of instruction in my program					
3	I am satisfied with the relevancy of the curriculum to my current or future job and job goals.					
4	I am satisfied with the relevancy of the instruction to my current or future job and job goals.					
5	I am satisfied with how well the curriculum has maintained my interest since beginning my program.					
6	I am satisfied with how well the instruction has maintained my interest since beginning my program.					
7	I am satisfied with how well the coursework prepares students for the dissertation process.					
8	I am satisfied with how well my program informed me, or is informing me, about what to expect during the dissertation process.					
9	I am satisfied with how the dissertation process is preparing me, or will prepare me, for my job or future job goals.					
10	I found, or am finding, the coursework in my program to be a good fit for me (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Satisfaction with Student-Faculty Academic Interactions

#	Item	SA	A	N	D	SD
1	I am satisfied with the amount of academic-related contact I have with faculty (consider all synchronous and asynchronous interactions).					

2	I am satisfied with the quality of academic -related contact I have with faculty (consider all synchronous and asynchronous interactions).					
3	I am satisfied with the enthusiasm faculty demonstrate for my academic work.					
4	I am satisfied with the enthusiasm faculty demonstrate for my academic ideas.					
5	I am unsatisfied with the availability of the faculty to discuss academic issues.					
6	I am unsatisfied with the helpfulness of the faculty to address my academic concerns.					
7	I am satisfied with the guidance I receive about the dissertation process in this program.					
8	I am satisfied with the quality of academic feedback provided by the faculty.					
9	I am satisfied with the timeliness of academic feedback provided by the faculty.					
10	I am satisfied with the availability of faculty to address program-related issues.					
11	I am satisfied with how the faculty welcome program-related communications from students.					
12	I am satisfied with how the faculty motivate me as a learner.					
13	I am satisfied with how the faculty organize the coursework in this program.					
14	I am satisfied with how the faculty present the coursework in this program.					
15	I am unsatisfied with the academic support I receive from the faculty.					
16	My dissatisfaction with the academic support from the faculty has led me to consider leaving this program.					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Satisfaction with Student-Student Academic Interactions

#	Item	SA	A	N	D	SD
1	I am satisfied with the quality of academic-related interactions I have with other students.					
2	I am satisfied with the frequency of academic -related interactions I have with other students.					
3	I am satisfied with the willingness of students to provide academic -related help to other students.					

4	I am satisfied with the opportunities I have to learn from my fellow students.					
5	I am satisfied with the amount of constructive feedback I receive from my fellow students.					
6	I am satisfied with the amount of academic-based interactions I have with my fellow students.					
7	I am unsatisfied with the level of cooperation among my fellow students when completing program requirements.					
8	I am satisfied with the ways I communicate with my fellow students on academic matters (consider all synchronous, asynchronous, formal, and informal communications).					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Social Integration Candidate Items

Satisfaction with student-student non-academic interactions

#	Item	SA	A	N	D	SD
1	I am satisfied with the personal relationships I have developed, or am developing, with my fellow students.					
2	I am satisfied with how my fellow students accept me as a person.					
3	I am satisfied with how much I matter to my fellow students.					
4	I am satisfied with the level of mutual trust among the students in this program.					
5	I am satisfied with the amount of social interactions I have with my fellow students.					
6	I am satisfied with how using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped me feel personally connected with other students in this program.					
7	I am satisfied with the sense of social connectivity that exists between me and my fellow students.					
8	I am satisfied with how I can openly discuss personal difficulties or struggles with one or more of my fellow students.					

9	I am satisfied with my feelings of being able to personally confide with at least one fellow student in this program.					
10	I am satisfied with the quality of personal interactions I have with my fellow students.					
11	I am satisfied with the amount of personal interactions I have with my fellow students.					

Note: strongly agree = SA; agree = A; neutral = N; disagree = D; strongly disagree = SD

Satisfaction with student-faculty non-academic interactions

#	Item	SA	A	N	D	SD
1	I am satisfied with how much the faculty care about me as a person.					
2	I am satisfied with my feelings of personal connectivity with at least one faculty member in this program.					
3	I am satisfied with how well faculty members foster feelings that I personally belong in this program					
4	I am satisfied with the sense of trust the faculty provide me.					
5	I am satisfied with the collegial relationships I have developed, or am developing, with at least one faculty member.					
6	I am satisfied with how well the faculty keep me from feeling neglected.					
7	I am satisfied with the encouragement faculty members provide me.					
8	I am satisfied with how easily I can approach faculty members with my personal concerns.					
9	I am satisfied with how much the faculty care about me as a person.					
10	I am satisfied with how much the faculty care about my success.					

Note: strongly agree

APPENDIX E

Rubric Two

The Distance Doctoral Integration Scale (DDIS) is being developed to measure the academic integration and social integration of doctoral students in distance education (DE) programs. The purpose of this review is to further evaluate content validity by ensuring the candidate items measure exactly what is intended to be measured…nothing more, nothing less.

For your review, please complete the following steps.

STEP 1-FACTOR REVIEW:

1. Please select the candidate items (about 4-6 items) required to sufficiently measure each factor by placing an *X* next to each selected item. The result should be a pool of items that fully measures each factor.
2. Please review each factor in aggregate to determine if the selected pool of items fully measures each factor—nothing more, nothing less.
3. If the factor is fully measured, place an *X* next to *sufficient*. If a factor is missing any aspects or characteristics, or if there are aspects or characteristics included that should not be, please place an *X* next to *insufficient* and describe necessary improvements in the spaces provided.

STEP 2-DOMAIN REVIEW

1. Please review in aggregate the three factors for the **academic integration** domain and place an *X* next to the *sufficient* box if the three factors in aggregate fully measure the domain—nothing more, nothing less. If any aspects or characteristics are missing, or if there are aspects or characteristics included that should not be, please place an *X* next to *insufficient* and describe necessary improvements in the spaces provided.
2. Please review in aggregate the two factors for the **social integration** domain and place an *X* next to the *sufficient* box if the two factors in aggregate fully measure the domain—nothing more, nothing less. If any aspects or characteristics are missing, or if there are aspects or characteristics included that should not be, please place an *X* next to *insufficient* and describe necessary improvements in the spaces provided.

NOTE: Some words have been **bolded** in the candidate items to make your review easier.

Academic Integration Section

Academic integration for doctoral students in DE programs: *The satisfaction level with the academic program, student-faculty academic interactions, and student-student academic interactions*.

FACTOR REVIEW **Domain: Academic Integration** **Factor: satisfaction with the academic program**		
Candidate Items. NOTE: Participants will be asked to rate their satisfaction level of each item using the following scale: Very High—High—Medium—Low—Very Low		Place *X* to select item
The quality of the **curriculum** in your program.		
The quality of **instruction** in your program.		
The relevancy of the **curriculum** to your vocational goals.		
The sequencing of the coursework in your program.		
How the **curriculum** has maintained your interest since beginning your program.		
How the **instruction** has maintained your interest since beginning your program.		
How the coursework prepares students for the dissertation process.		
How your program informed you, or is informing you, about what to expect during the dissertation process.		
How the dissertation process is preparing you, or will prepare you, for your vocational goals.		
How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).		
	Sufficient	
	Insufficient	
Please describe necessary improvements for *insufficient* rating:		

FACTOR REVIEW **Domain: Academic Integration** **Factor: satisfaction with student-faculty academic interactions**	
Candidate Items. NOTE: Participants will be asked to rate their satisfaction level of each item using the following scale: Very High—High—Medium—Low—Very Low	Place *X* to select item

The **amount** of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).		
The **quality** of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).		
The quality of instruction from the faculty in this program.		
The enthusiasm faculty demonstrate for your academic **work**.		
The enthusiasm faculty demonstrate for your academic **ideas.**		
The **availability** of the faculty to discuss academic issues.		
The **helpfulness** of the faculty to address your academic concerns.		
The guidance you receive about the dissertation process in this program.		
The **quality** of academic feedback provided by the faculty.		
The **timeliness** of academic feedback provided by the faculty.		
The availability of faculty to address program-related issues.		
How the faculty welcome program-related communications from students.		
How the faculty motivate you as a learner.		
How the faculty **organize** the coursework in this program.		
[redacted]	Sufficient	
[redacted]	Insufficient	
Please describe necessary improvements for *insufficient* rating:		

FACTOR REVIEW **Domain: Academic Integration** **Factor: satisfaction with student-student academic interactions**	
Candidate Items. NOTE: Participants will be asked to rate their satisfaction level of each item using the following scale: Very High—High—Medium—Low—Very Low	Place *X* to select item
The **quality** of academic-related interactions you have with other students.	
The **frequency** of academic-related interactions you have with other students.	
The willingness of students to provide academic -related help to other students.	
The opportunities you have to learn from your fellow students.	
The amount of constructive feedback you receive from your fellow students.	
The amount of academic-based interactions you have with your fellow students.	

The level of cooperation with your fellow students when completing program requirements.		
The ways you communicate with your fellow students on academic matters (consider all synchronous, asynchronous, formal, and informal communications).		
	Sufficient	
	Insufficient	
Please describe necessary improvements for *insufficient* rating:		

DOMAIN REVIEW **Domain: Academic Integration**		
Place an *X* next to the *sufficient* box if the three factors in aggregate fully measure the academic integration domain—nothing more, nothing less. If any aspects or characteristics are missing, or if there are aspects or characteristics included that should not be, please place an *X* next to *insufficient* and describe necessary improvements in the spaces provided.		
	Sufficient	
	Insufficient	
Please describe necessary improvements for *insufficient* rating:		

Social Integration Section

Social integration for doctoral students in DE programs: *The satisfaction level with the nature and quality of student-student and student-faculty non-academic interactions within the doctoral program.*

FACTOR REVIEW **Domain: Social Integration** **Factor: satisfaction with student-student non-academic interactions**	
Candidate Items. NOTE: Participants will be asked to rate their satisfaction level of each item using the following scale: Very High—High—Medium—Low—Very Low	Place *X* to select item
The personal relationships you have developed with your fellow students.	
How your fellow students accept you as a real person.	

How much you matter to your fellow students.		
The level of mutual trust among the students in this program.		
The amount of social interactions you have with your fellow students.		
How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.		
The sense of social connectedness between you and your fellow students.		
How you can openly discuss personal difficulties with one or more of your fellow students.		
Your feelings of being able to personally confide with at least one fellow student in this program.		
The **quality** of social interactions you have with your fellow students.		
The **amount** of social interactions you have with your fellow students.		
[redacted]	Sufficient	
[redacted]	Insufficient	
Please describe necessary improvements for *insufficient* rating:		

FACTOR REVIEW **Domain: Social Integration** **Factor: satisfaction with student-faculty non-academic interactions**	
Candidate Items. NOTE: Participants will be asked to rate their satisfaction level of each item using the following scale: Very High—High—Medium—Low—Very Low	Place *X* to select item
How the faculty care about you as a real person.	
Your feelings of personal connectedness with at least one faculty member in this program.	
How well faculty members foster feelings that you personally belong in this program	
Your level of trust for the faculty.	
The collegial relationships you have developed with at least one faculty member.	
How well faculty members keep you from feeling neglected.	
The encouragement faculty members provide you.	
How easily you can approach faculty members with your personal concerns.	
How the faculty care about you as a real person.	
How the faculty care about your success.	

	Sufficient	
	Insufficient	
Please describe necessary improvements for *insufficient* rating:		

DOMAIN REVIEW **Domain: Social Integration**		
Place an *X* next to the *sufficient* box if the two factors in aggregate fully measure the social integration domain—nothing more, nothing less. If any aspects or characteristics are missing, or if there are aspects or characteristics included that should not be, please place an *X* next to *insufficient* and describe necessary improvements in the spaces provided.		
	Sufficient	
	Insufficient	
Please describe necessary improvements for *insufficient* rating:		

APPENDIX F

The Distance Doctoral Integration Scale (DDIS)-Pilot

When completing the DDIS, consider your current distance education doctoral program. Please rate your SATISFACTION level with each of the DDIS items using the following scale:

5=Very High (VH) 4=High 3=Medium 2=Low 1=Very Low (VL)

Item		5 (VH)	4	3	2	1 (VL)
1	The sequencing of the coursework in your program.	☐	☐	☐	☐	☐
2	The encouragement faculty members provide you.	☐	☐	☐	☐	☐
3	The quality of academic-related interactions you have with other students.	☐	☐	☐	☐	☐
4	The collegial relationships you have developed with at least one faculty member.	☐	☐	☐	☐	☐
5	The quality of social interactions you have with your fellow students.	☐	☐	☐	☐	☐
6	How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.	☐	☐	☐	☐	☐
7	The quality of academic support in your program (e.g., statistics assistance, writing assistance, and research assistance).	☐	☐	☐	☐	☐
8	The quality of academic feedback provided by the faculty.	☐	☐	☐	☐	☐
9	How the dissertation process is preparing you, or will prepare you, for your goals.	☐	☐	☐	☐	☐
10	The enthusiasm faculty demonstrate for your academic work.	☐	☐	☐	☐	☐

11	The quality of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	☐	☐	☐	☐	☐
12	How easily you can approach faculty members with your personal concerns.	☐	☐	☐	☐	☐
13	The level of mutual trust among the students in this program.	☐	☐	☐	☐	☐
14	The level of social support you receive from fellow students.	☐	☐	☐	☐	☐
15	The personal relationships you developed with your fellow students.	☐	☐	☐	☐	☐
16	The level of cooperation with your fellow students when completing program requirements.	☐	☐	☐	☐	☐
17	The timeliness of academic feedback provided by the faculty.	☐	☐	☐	☐	☐
18	The amount of social interactions you have with your fellow students.	☐	☐	☐	☐	☐
19	The willingness of students to provide academic - related help to other students.	☐	☐	☐	☐	☐
20	How well faculty members foster feelings that you personally belong in this program.	☐	☐	☐	☐	☐
21	The quality of instruction in your program.	☐	☐	☐	☐	☐
22	The amount of constructive feedback you receive from your fellow students.	☐	☐	☐	☐	☐

23	The guidance faculty provide about the dissertation process in this program.	☐	☐	☐	☐	☐
24	The availability of the faculty to discuss academic issues.	☐	☐	☐	☐	☐
25	How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).	☐	☐	☐	☐	☐
26	The sense of social connectedness between you and your fellow students.	☐	☐	☐	☐	☐
27	How the coursework prepares students for the dissertation process.	☐	☐	☐	☐	☐
28	The quality of the curriculum in your program.	☐	☐	☐	☐	☐
29	The relevancy of the curriculum to your goals.	☐	☐	☐	☐	☐
30	Your level of trust in the faculty.	☐	☐	☐	☐	☐
31	The opportunities you have to learn from your fellow students.	☐	☐	☐	☐	☐
32	The frequency of academic-related interactions you have with other students.	☐	☐	☐	☐	☐
33	How the faculty care about you as a real person.	☐	☐	☐	☐	☐
34	The amount of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	☐	☐	☐	☐	☐

APPENDIX G

Demographic Questions for DDIS

1. Please indicate your gender.

   ☐ Male
   ☐ Female

2. Please indicate your country of citizenship.

   ☐ United States
   ☐ Other (please specify) Click here to enter text.

3. Please indicate your race.

   ☐ African-American ☐ Hispanic
   ☐ Asian ☐ American Indian
   ☐ Caucasian ☐ Other (please specify) Click here to enter text.

4. Please indicate your age range.

   ☐ Under 20 ☐ 40-49 ☐ 70-79
   ☐ 20-29 ☐ 50-59 ☐ 80 or older
   ☐ 30-39 ☐ 60-69

5. Please indicate your marital status.

   ☐ Single ☐ Divorced
   ☐ Married ☐ Other (please specify) Click here to enter text.
   ☐ Widowed

6. Do you have children (18 or under) living in your home?

   ☐ Yes

      a. If yes, how many? Click here to enter text.
      b. What ages? Click here to enter text.

   ☐ No

7. What is your work status?

   ☐ Full time

   ☐ Part time

   ☐ Not currently employed

8. If employed, please indicate your occupation Click here to enter text.

9. If employed, please indicate how many hours you work per week.

   ☐ More than 60 hours
   ☐ 40-59 hours
   ☐ 20-39 hours
   ☐ 1-19 hours
   ☐ 0 hours

10. How many years has it been since you were last in school for formal education prior to starting your doctoral program?

    ☐ Less than one year
    ☐ 1-2 years
    ☐ 3-4 years
    ☐ 5-6 years
    ☐ 7-8 years
    ☐ 8-9 years
    ☐ More than 10 years

11. How many previous online courses did you take and successfully complete prior to starting your doctoral program?

☐ None	☐ 4	☐ 8
☐ 1	☐ 5	☐ 9
☐ 2	☐ 6	☐ 10
☐ 3	☐ 7	☐ More than 10

University Demographic Questions

12. What best describes your university?

    ☐ Private for profit

    ☐ Private not for profit

    ☐ Public

13. What degree are you pursuing?

    ☐ Ed.D.

    ☐ Ph.D.

    ☐ Other:

14. What is your area of study (please select the one that most closely describes your program)

☐ Curriculum and Instruction ☐ Educational Leadership ☐ Adult Education ☐ Higher Education Leadership and Management ☐ Higher Education ☐ Educational Psychology	☐ Distance Education ☐ K-12 School Leadership ☐ Special Education ☐ Instructional Design and Technology ☐ Counselor Education and Supervision ☐ Other (please specify)

15. How many credit hours are needed to complete your degree? 54 Hours
16. How many credits have you successfully completed toward finishing your degree by the end of the current semester? 15 hours
17. What stage of the doctoral process are you in this semester?

    ☐ 1st year of Coursework

    ☐ 2nd year of Coursework through the Comprehensive Exam

    ☐ Dissertation

18. If in the dissertation phase, have you defended your proposal successfully?

    ☐ Yes

    ☐ No

19. Are you in a cohort?

    ☐ Yes

    ☐ No

20. Does your program require an orientation?

    ☐ Yes

    ☐ No

APPENDIX H

Approval Letter from IRB to Proceed with Study

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

July 28, 2017

Joseph Holmes
IRB Approval 2926.072817: Developing an Instrument to Measure Academic and Social Integration of Doctoral Students in Distance Education Programs

Dear Joseph Holmes,

We are pleased to inform you that your study has been approved by the Liberty University IRB. This approval is extended to you for one year from the date provided above with your protocol number. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB, and we wish you well with your research project.

Sincerely,

G. Michele Baker, MA, CIP
Administrative Chair of Institutional Research
The Graduate School

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APPENDIX I

Rubric Three

Pilot Study Feedback Form (Template Only)

Please complete the following feedback form on the DDIS-section questions only (no feedback is requested on the demographics questions section. It is important to be thorough and descriptive in your responses. Please be assured your responses will remain confidential as described on the consent form. Once completed, please send (either as saved or scanned documents) the completed Consent Form, completed DDIS, and completed Pilot Study Feedback to me at [redacted].

Thank you for your participation.

Candidate Item 1 (actual item written here).	**Click box below selected answer**				
	5 (VH)	4	3	2	1 (VL)
	☐	☐	☐	☐	☐
Please describe in your own words what you believe this question is asking. : Click here to enter text.					
Please explain why you chose the selected response over the other choices. : Click here to enter text.					
If you were to reword the question for clarity, how would it be worded? Please indicate if you believe no rewording is necessary. : Click here to enter text.					
Please select how relevant you feel this question is to you as a distance doctoral student: 5=Very Relevant; 1=Not at all Relevant	5	4	3	2	1
	☐	☐	☐	☐	☐

Candidate Item 2 (actual item written here).	**Click box below selected answer**				
	5 (VH)	4	3	2	1 (VL)
	☐	☐	☐	☐	☐
Please describe in your own words what you believe this question is asking. : Click here to enter text.					
Please explain why you chose the selected response over the other choices. : Click here to enter text.					
If you were to reword the question for clarity, how would it be worded? Please indicate if you believe no rewording is necessary. : Click here to enter text.					
Please select how relevant you feel this question is to you as a distance doctoral student: 5=Very Relevant; 1=Not at all Relevant	5	4	3	2	1
	☐	☐	☐	☐	☐

	Click box below selected answer

Candidate Item 3 (actual item written here).	5 (VH)	4	3	2	1 (VL)
	☐	☐	☐	☐	☐
Please describe in your own words what you believe this question is asking. : Click here to enter text.					
Please explain why you chose the selected response over the other choices. : Click here to enter text.					
If you were to reword the question for clarity, how would it be worded? Please indicate if you believe no rewording is necessary. : Click here to enter text.					
Please select how relevant you feel this question is to you as a distance doctoral student: 5=Very Relevant; 1=Not at all Relevant	5	4	3	2	1
	☐	☐	☐	☐	☐
Candidate Item 4 (actual item written here).	**Click box below selected answer**				
	5 (VH)	4	3	2	1 (VL)
	☐	☐	☐	☐	☐
Please describe in your own words what you believe this question is asking. : Click here to enter text.					
Please explain why you chose the selected response over the other choices. : Click here to enter text.					
If you were to reword the question for clarity, how would it be worded? Please indicate if you believe no rewording is necessary. : Click here to enter text.					
Please select how relevant you feel this question is to you as a distance doctoral student: 5=Very Relevant; 1=Not at all Relevant	5	4	3	2	1
	☐	☐	☐	☐	☐
Candidate Item 5 (actual item written here).	**Click box below selected answer**				
	5 (VH)	4	3	2	1 (VL)
	☐	☐	☐	☐	☐
Please describe in your own words what you believe this question is asking. : Click here to enter text.					
Please explain why you chose the selected response over the other choices. : Click here to enter text.					
If you were to reword the question for clarity, how would it be worded? Please indicate if you believe no rewording is necessary. : Click here to enter text.					
Please select how relevant you feel this question is to you as a distance doctoral student: 5=Very Relevant; 1=Not at all Relevant	5	4	3	2	1
	☐	☐	☐	☐	☐

NOTE: Representation of Rubric Three. There were 34 actual candidate items.

APPENDIX J

Email Invitation to Participate in Pilot Study

Greetings Fellow Distance Education Doctoral Student!

My name is Joseph L. Holmes, and I am a doctoral candidate at Liberty University pursing my Ed.D. The purpose of my research is to develop and validate the Distance Doctoral Integration Scale (DDIS).

By sending this email, I am inviting you to participate in the DDIS development process. Criteria for participation is as follows. You must be:

- A doctoral student currently enrolled either full-time or part-time in a United States' public or private university.
- Pursuing a terminal degree (Ed.D. or Ph.D.) in education.
- Studying via distance methodologies, where at least 80% of the program is completed via an asynchronous online format.

The intent of the pilot study is to ensure the DDIS has good *face validity* (instrument items measure what is intended to be measured). A secondary goal is to get an initial estimate of the time it takes to complete the instrument. The pilot study data is gathered by having a small number of participants from the representative population complete the instrument and provide feedback on responses so further analysis can be completed.

By participating in this study, you will not only be helping me complete my degree (a goal we all strive toward), you will also help move the DDIS one step closer to providing decision makers with a valid and reliable instrument available for use in mitigating high attrition rates of doctoral students in DE programs.

As a bonus for participating, I will randomly select 12 study participants to receive one of the following prizes: Two first prizes—a $25 Amazon© Gift Card; and 10 second prizes—a $10 Amazon© Gift Card. This portion of the study (and eligibility to be entered into the prize drawing) will close on [INSERT DATE].

Your participation should require no more than 90 minutes. Email addresses will be the only personally identifiable information (PII) collected during this study, and I will make every effort to maintain participant confidentiality. I will follow strict confidentiality procedures, and these procedures are explained in the *Consent Form* (*Pilot Study-Consent Form.docx* attached to this email).

If you are willing to participate in this portion of the study, please complete the Consent Form. The form contains additional information about my study and the procedures I will follow. Please carefully read the form, and if you are willing to participate, complete the sections indicating that you have read the consent information and would like to take part in the study.

Please follow the instructions for completing the study exactly. After completing the Consent Form:

- Open the DDIS (*Pilot Sudy-DDIS.docx* attached to this email).
- Record the time when you **START the DDIS**.

- Complete the DDIS a*s you would any normal survey*.
- Once finished, record the **FINISH time** and the **TOTAL TIME** to complete the DDIS.
- Open and complete the Pilot Study Feedback Form (*Pilot Study-Feedback Form.docx* attached to this email) on the DDIS (not demographic) items only. Please complete this form to ascertain the reasoning behind your responses.
- It should take no more than 90 minutes to complete the demographic, DDIS, and Pilot Study Feedback Form.
- If you want to be considered for one of the random prize drawings (see Compensation and Confidentiality sections in the Consent Form), place your email in the appropriate field. If you do not want to participate in the random prize drawing, please leave the email field blank.
- Save (or scan) the Consent Form, DDIS, and Pilot Study Feedback Form, and email them back to me at [redacted] (this address will also be at the bottom of the forms to return).

I thank you in advance for your willingness to participate and ultimately in taking steps to help reduce the high attrition rates of our fellow doctoral students in DE programs.

If you have any questions about the DDIS or the purpose of this research, please contact me at [redacted].

Sincerely,

Joe

Joseph L. Holmes,
Liberty University, Doctoral Candidate

APPENDIX K

Online Consent Form to Participate in Pilot Study

You are invited to participate in a study to investigate the validity and reliability of the Distant Doctoral Integration Scale (DDIS). You were selected as a possible participant because you meet the following criteria—you are:

- A doctoral student currently enrolled either full-time or part-time in a United States' public or private university.
- Pursuing a terminal degree (Ed.D. or Ph.D.) in education.
- Studying via distance methodologies, where at least 80% of the program is completed via an asynchronous online format.

Please read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Joseph L. Holmes, a doctoral candidate in the School of Education at Liberty University.

Background Information: The overall purpose of this study is to investigate the validity and reliability of the Distant Doctoral Integration Scale (DDIS). The primary research questions are below, however, this portion of the study only focusses on RQ1:

> **RQ1**: Is the DDIS a valid instrument for measuring academic integration and social integration of doctoral students in DE programs?
>
> **RQ2**: Is the DDIS a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs?
>
> **RQ3**: What are the underlying factors that explain integration of doctoral students in DE programs?

Procedures: If you agree to participate in this pilot study, I would ask you to do the following things:

> Open the DDIS.
>
> Record the time when you **START the DDIS**.
>
> Complete the DDIS a*s you would any normal survey*.
>
> Once finished, record the **FINISH time** and the **TOTAL TIME** to complete the DDIS.
>
> Open and complete the Pilot Study Feedback Form on the DDIS (not demographic) items only. Please complete this form to ascertain the reasoning behind your responses.

It should take no more than 90 minutes to complete the demographic, DDIS, and Pilot Study Feedback Form.

If you want to be considered for one of the random prize drawings (see Compensation and Confidentiality sections below), place your email in the appropriate field at the end of this Consent Form. If you do not want to participate in the random prize drawing, please leave the email field blank.

Save (or scan) the Consent Form, DDIS, and Pilot Study Feedback Form and email them back to me at [redacted] (this address will also be at the bottom of the forms to return).

Risks and Benefits of Participation: The risks of participation in this study are minimal and no more than the participant would encounter in everyday life. Participants should not expect to receive a direct benefit from taking part in this study. However, by participating in this study, you will contribute to the validity and reliability of the DDIS. The DDIS may be used by doctoral-conferring institutions with DE doctoral programs to provide decision makers with a valid and reliable instrument for use in mitigating the high attrition rates of doctoral students in DE programs.

Compensation: As a bonus for participating, I will conduct a drawing to randomly select 12 participants to receive one of the following prizes: Two first prizes—a $25 Amazon© Gift Card; and 10 second prizes—a $10 Amazon© Gift Card. To be eligible, you must indicate your desire to participate in the drawing by providing your valid email address in the appropriate place on the DDIS and submit this online consent form during the open period (DD-MM-YYYY- DD-MM-YYYY). Forms received outside these dates or with incomplete/inaccurate email addresses will be disqualified from the drawing. By providing your email, you are indicating your permission for me to contact you via email to notify you in the event you are drawn for a prize. Failure to complete all DDIS questions will NOT adversely affect your chances to receive one of the aforementioned participation prizes.

Confidentiality: The records of this study will be kept private. Email addresses will be the only personally identifiable information (PII) collected during this study, and they will only be used to communicate with participants regarding this study (such as informing random prize drawing winners and invitations to complete the DDIS) and for correlating participant responses. I will make NO attempt to match DDIS responses with participant data, nor will I make any attempt to ascertain additional PII (e.g., name, address, etc.). In any sort of report I might publish, I will not include any information that will make it possible to identify a participant or link participant answers to DDIS data. The data gathered during this research may be used in follow-on research, however, no PII will be included. All demographic information gathered will be used only for the purpose of analysis related to this study and will not be used to identify individual respondents. Research records will be stored securely, and only I will have access to the records. I will retain informed consent forms and completed DDIS forms electronically in a password-protected file on a removable jump-drive stored in a locked file cabinet in my home for a period of three years. After three years, I will completely destroy all data files using a data-shredding

program such as Digital File Shredder© or FileBoss©. Limits to confidentiality are limited to those posed by outside malicious or deliberate attempts to gain access to the data.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University or any other institution. Your willingness to participate and your responses to the DDIS items will not be used to evaluate your performance as a doctoral student in any way. If you decide to participate, you are free to skip any question without answering, and you may withdraw (e.g., not complete the DDIS) from the study at any time with no adverse repercussions.

How to Withdraw from the Study: If you choose to withdraw from the study, simply do not complete the DDIS and do not return any documents to me. Your information will not be recorded or included in the study.

Contacts and Questions: The researcher conducting this study is Joseph L. Holmes. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact me at [redacted]. The dissertation chair for this research is Dr. Amanda Rockinson-Szapkiw who may be reached at [redacted]. The Liberty University committee member for this research is Dr. Lucinda S. Spaulding who may be reached at [redacted]. If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher or his committee, please contact the Institutional Review Board, 1971 University Blvd, Green Hall Ste. 1887, Lynchburg, VA, 24502, or email at [redacted].

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

☐ I have read and understood the above information. I have asked questions and have received answers. By checking this box, I acknowledge that I meet the aforementioned criteria for participation, and I consent to participate in this study.

☐ By checking this box, I indicate I would like to participate in the random prize drawing, and give the researcher permission to contact me via the email address below.

Email:_____

APPENDIX L

Email Reminder to Participate in Study

Greetings Dr. _____

Please forward the below email reminder to potential participants so they can participate in the DDIS study. I greatly appreciate your assistance! As always, if you have any questions about the survey or the purpose of this research, please contact me at [redacted].

Best,

Joe

> If you have not yet participated in the study to evaluate the reliability and validity of the Distance Doctoral Integration Scale (DDIS), I urge you to do so as soon as possible. Remember, your participation will greatly benefit future doctoral students in DE programs like yourselves. Additionally, by participating you are eligible to be entered in the drawing for one of the random prizes! This study (and eligibility for the prize drawing) will close on [INSERT DATE].
>
> Thank you for your willingness to participate in this research.
>
> You may access the DDIS at link to DDIS
>
> Thank You!!
>
> Joseph L. Holmes
>
> Doctoral Candidate, Liberty University

If you have any questions about the survey or the purpose of this research, please contact me at [redacted].

APPENDIX M

Cognitive Testing Open Coding Results

Item #	CTI #	Issue	Response
4	1	It appears two respondents interpreted *collegial* as professional (academic); not social.	Change. Remove the term *collegial* from item. Change to *The relationships you have developed with at least one faculty member*.
5	3	Comment: "Not sure what to recommend for rewording. I'm a bit curious about the rationale behind this question, though. In my opinion, there are a lot of assumptions imbedded: 1] The students are in a cohort. 2] The students have spent quite a bit of time together to get to the social interaction point. 3] The polled cohort is beyond year 1."	The assumptions mentioned by first commenter were not actual assumptions related to this item. However, the second commenter had a different issue—appearing to be confused if the item refers to only interactions within the confines of the school's learning management system (LMS), or if referring to interactions outside of school. The question was not intended to differentiate between LMS and non-LMS interactions. The question also does not assume a cohort or non-cohort. Reviewed comments with chair and we decided wording was fine as-is. No Change—will see how this question loads during EFA.
	3	Comment: "Perhaps clarify if you mean social interactions online with the LMS or personal, friendly interactions.	
6	3	Rewording suggestion: "How the usage of various distance communication methods (e.g., telephone, video, online chat, email and/or social media sites) has helped you feel personally connected to the class"	Reviewed comments with chair and we decided wording was fine as-is. The suggestion to change from *students* to *class* reduces the measure from the program to individual classes or courses. Also the DDIS was purposely randomized so no items influenced answers to other items. No Change—will see how this question loads during EFA.
	3	Item order suggestion: "My only suggestion would be to precursor this with a question about what methods have been used by the participant, so your data is not skewed by people that haven't used the various methods	
9	3	Comment: "Question: What 'goals' are you referencing? Career goals or goal to successfully defend the dissertation. The goals are not clear."	The goals are not meant to be specified by the item…the item refers to any goal identified by the respondent. No Change—will see how this question loads during EFA.

14	3	Comment: "You might want to consider explaining 'social' a bit. Do you mean academic support via discussions or personal support (family, kids, etc.)."	Social support is not the same as academic support. No other respondents had any confusion. No Change—will see how this question loads during EFA.
17	3	Comment: "Question: Wouldn't timeliness be included in quality [#8]? If you prefer to keep them as separate entities, it may be beneficial to change the order and have them be back-to-back questions. Speaking of changing the order, you may want to do something similar for the entire survey."	Timeliness and quality are both related to academic integration, but separate. Great feedback can be very late, and poor feedback can be very timely. Also as stated earlier the DDIS was randomized on purpose. No change.
19	3	Two respondents stated the question was similar to another.	The similarity refers to *level of cooperation* and *willingness to cooperate.* No Change—will see how this question loads during EFA.

Note: CTI=Cognitive Test Item. CTI-1= Please describe in your own words what you believe this question is asking. CTI-2= Please explain why you chose the selected response over the other choices. CTI-3= If you were to reword the question, how would it be worded? Please indicate if you believe no rewording is necessary.

APPENDIX N

DDIS-EFA

When completing the DDIS, consider your current distance education doctoral program. Please rate your SATISFACTION level with each of the DDIS items using the following scale:

5=Very High (VH) 4=High 3=Medium 2=Low 1=Very Low (VL)

Item		5 (VH)	4	3	2	1 (VL)
1	The sequencing of the coursework in your program.	☐	☐	☐	☐	☐
2	The encouragement faculty members provide you.	☐	☐	☐	☐	☐
3	The quality of academic-related interactions you have with other students.	☐	☐	☐	☐	☐
4	The relationships you have developed with at least one faculty member.	☐	☐	☐	☐	☐
5	The quality of social interactions you have with your fellow students.	☐	☐	☐	☐	☐
6	How using various distance methods to communicate (e.g., telephone, live video, online chat, email, and/or social media sites) has helped you feel personally connected with other students.	☐	☐	☐	☐	☐
7	The quality of academic support in your program (e.g., statistics assistance, writing assistance, and research assistance).	☐	☐	☐	☐	☐
8	The quality of academic feedback provided by the faculty.	☐	☐	☐	☐	☐
9	How the dissertation process is preparing you, or will prepare you, for your goals.	☐	☐	☐	☐	☐
10	The enthusiasm faculty demonstrate for your academic work.	☐	☐	☐	☐	☐
11	The quality of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	☐	☐	☐	☐	☐
12	How easily you can approach faculty members with your personal concerns.	☐	☐	☐	☐	☐
13	The level of mutual trust among the students in this program.	☐	☐	☐	☐	☐

14	The level of social support you receive from fellow students.	☐	☐	☐	☐	☐
15	The personal relationships you developed with your fellow students.	☐	☐	☐	☐	☐
16	The level of cooperation with your fellow students when completing program requirements.	☐	☐	☐	☐	☐
17	The timeliness of academic feedback provided by the faculty.	☐	☐	☐	☐	☐
18	The amount of social interactions you have with your fellow students.	☐	☐	☐	☐	☐
19	The willingness of students to provide academic - related help to other students.	☐	☐	☐	☐	☐
20	How well faculty members foster feelings that you personally belong in this program.	☐	☐	☐	☐	☐
21	The quality of instruction in your program.	☐	☐	☐	☐	☐
22	The amount of constructive feedback you receive from your fellow students.	☐	☐	☐	☐	☐
23	The guidance faculty provide about the dissertation process in this program.	☐	☐	☐	☐	☐
24	The availability of the faculty to discuss academic issues.	☐	☐	☐	☐	☐
25	How you are finding the coursework in your program to be a good fit for you (e.g., there is good alignment with personal interests, application to future job goals, application to real life, or other similar reasons).	☐	☐	☐	☐	☐
26	The sense of social connectedness between you and your fellow students.	☐	☐	☐	☐	☐
27	How the coursework prepares students for the dissertation process.	☐	☐	☐	☐	☐
28	The quality of the curriculum in your program.	☐	☐	☐	☐	☐
29	The relevancy of the curriculum to your goals.	☐	☐	☐	☐	☐
30	Your level of trust in the faculty.	☐	☐	☐	☐	☐
31	The opportunities you have to learn from your fellow students.	☐	☐	☐	☐	☐
32	The frequency of academic-related interactions you have with other students.	☐	☐	☐	☐	☐

33	How the faculty care about you as a real person.	☐	☐	☐	☐	☐
34	The amount of academic-related contact you have with faculty (consider all synchronous and asynchronous interactions).	☐	☐	☐	☐	☐

APPENDIX O

Email Invitation to Participate in Large Group Study

Greetings Fellow Distance Education Doctoral Student!

My name is Joseph L. Holmes, and I am a doctoral candidate at Liberty University pursing my Ed.D. The purpose of my research is to develop and validate the Distance Doctoral Integration Scale (DDIS).

By sending this email, I am inviting you to participate in the DDIS development process. Criteria for participation is as follows. You must be:

- A doctoral student currently enrolled either full-time or part-time in a United States' public or private university.
- Pursuing a terminal degree (Ed.D. or Ph.D.) in education.
- Studying via distance methodologies, where at least 80% of the program is completed at a distance (e.g., online).

The intent of this portion of the development process is to investigate the validity and reliability of the DDIS by having a large number of participants from the representative population complete the DDIS.

By participating in this study, you will not only be helping me complete my degree (a goal we all strive toward), you will also help move the DDIS one step closer to providing decision makers with a valid and reliable instrument available for use in mitigating high attrition rates of doctoral students in DE programs.

As a bonus for participating, I will randomly select 12 study participants to receive one of the following prizes: Two first prizes—a $25 Amazon© Gift Card; and 10 second prizes—a $10 Amazon© Gift Card. This study (and eligibility for the prize drawing) will close on [INSERT DATE].

Your participation should require no more than 20 minutes. Email addresses will be the only personally identifiable information (PII) collected during this study, and I will make every effort to maintain participant confidentiality. I will follow strict confidentiality procedures, and these procedures are explained in the *Consent Form* (accessed at the beginning of participation).

If you are willing to participate in this study, please click on the DDIS link below. The link will direct you to the *Consent Form.* The form contains additional information about my study and the procedures I will follow. Please carefully read the form, and if you are willing to participate, click on the ***NEXT*** button at the end of the form to indicate that you have read the consent information and would like to take part in the study.

I thank you in advance for your willingness to participate, and ultimately in taking steps to help reduce the high attrition rates of our fellow doctoral students in DE programs.

If you have any questions about the DDIS or the purpose of this research, please contact me at [redacted].

Please click on the following link to access the DDIS: Link to DDIS

Sincerely,

Joe

Joseph L. Holmes,
Liberty University, Doctoral Candidate

APPENDIX P

Online Consent Form to Participate in Large Group Study

You are invited to be in a research study to investigate the validity and reliability of the Distant Doctoral Integration Scale (DDIS). You were selected as a possible participant because you meet the following criteria—you are:

- A doctoral student currently enrolled either full-time or part-time in a United States' public or private university.
- Pursuing a terminal degree (Ed.D. or Ph.D.) in education.
- Studying via distance methodologies, where at least 80% of the program is completed at a distance (e.g., online).

Please read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Joseph L. Holmes, a doctoral candidate in the School of Education at Liberty University.

Background Information: The purpose of this study is to investigate the validity and reliability of the Distant Doctoral Integration Scale (DDIS). The primary research questions for this study are as follows:

> **RQ1**: Is the DDIS a valid instrument for measuring academic integration and social integration of doctoral students in DE programs?
>
> **RQ2**: Is the DDIS a reliable instrument for measuring academic integration and social integration of doctoral students in DE programs?
>
> **RQ3**: What are the underlying factors that explain integration of doctoral students in DE programs?

Procedures: If you agree to be in this study, I would ask you to do the following things:

> Click on the ***NEXT*** button below to begin DDIS.
>
> Complete the DDIS.
>
> If you want to be considered for one of the random prize drawings (see Compensation and Confidentiality sections below), place your email in the appropriate field at the end of the DDIS. If you do not want to participate in the random prize drawing, please leave the email field blank.
>
> Once you are finished, click ***SURVEY COMPLETE*** so your answers will be recorded.
>
> It should take no more than 20 minutes to complete the DDIS.

Risks and Benefits of Participation: The risks of participation in this study are minimal and no more than the participant would encounter in everyday life. Participants should not expect to receive a direct benefit from taking part in this study. However, by participating in this study, you will contribute to the validity and reliability of the DDIS. The DDIS may be used by doctoral-conferring institutions with DE doctoral programs to provide decision makers with a valid and reliable instrument for use in mitigating the high attrition rates of doctoral students in DE programs.

Compensation: As a bonus for participating, I will conduct a drawing to randomly select 12 participants to receive one of the following prizes: Two first prizes—a $25 Amazon© Gift Card; and 10 second prizes—a $10 Amazon© Gift Card. To be eligible, you must indicate your desire to participate in the drawing by providing your valid email address in the appropriate place on the DDIS and submit this online consent form during the open period (DD-MM-YYYY- DD-MM-YYYY). Forms received outside these dates or with incomplete/inaccurate email addresses will be disqualified from the drawing. By providing your email, you are indicating your permission for me to contact you via email to notify you in the event you are drawn for a prize. Failure to complete all DDIS questions will NOT adversely affect your chances to receive one of the aforementioned participation prizes.

Confidentiality: The records of this study will be kept private. Email addresses will be the only personally identifiable information (PII) collected during this study, and they will only be used to communicate with participants regarding this study (such as informing random prize drawing winners and invitations to complete the DDIS) and for correlating participant responses. I will make NO attempt to match DDIS responses with participant data, nor will I make any attempt to ascertain additional PII (e.g., name, address, etc.). In any sort of report I might publish, I will not include any information that will make it possible to identify a participant or link participant answers to DDIS data. The data gathered during this research may be used in follow-on research, however, no PII will be included. All demographic information gathered will be used only for the purpose of analysis related to this study and will not be used to identify individual respondents. Research records will be stored securely, and only I will have access to the records. I will retain informed consent forms and completed DDIS forms electronically in a password-protected file on a removable jump-drive stored in a locked file cabinet in my home for a period of three years. After three years, I will completely destroy all data files using a data-shredding program such as Digital File Shredder© or FileBoss©. Limits to confidentiality are limited to those posed by outside malicious or deliberate attempts to gain access to the data.

Voluntary Nature of the Study: Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University or any other institution. Your willingness to participate and your responses to the DDIS items will not be used to evaluate your performance as a doctoral student in any way. If you decide to participate, you are free to skip any question without answering, and you may withdraw (e.g., not click the ***SURVEY COMPLETE*** button at the end of the DDIS) from the study at any time with no adverse repercussions.

How to Withdraw from the Study: If you choose to withdraw from the study, simply exit the survey and close your internet browser prior to clicking the ***SURVEY COMPLETE*** button at the end of the DDIS. Your responses will not be recorded or included in the study.

Contacts and Questions: The researcher conducting this study is Joseph L. Holmes. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact me at [redacted]. The dissertation chair for this research is Dr. Amanda Rockinson-Szapkiw who may be reached at [redacted]. The Liberty University committee member for this research is Dr. Lucinda S. Spaulding who may be reached at [redacted]. If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher or his committee, please contact the Institutional Review Board, 1971 University Blvd, Green Hall Ste. 1887, Lynchburg, VA, 24502, or email at [redacted].

Please notify the researcher if you would like a copy of this information for your records.

Statement of Consent: I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

(NOTE: DO NOT AGREE TO PARTICIPATE UNLESS IRB APPROVAL INFORMATION WITH CURRENT DATES HAS BEEN ADDED TO THIS DOCUMENT.)

By selecting YES and clicking the NEXT button below, I acknowledge that I meet the aforementioned criteria for participation:

- A doctoral student currently enrolled either full-time or part-time in a United States' public or private university.
- Pursuing a terminal degree (Ed.D. or Ph.D.) in education.
- Studying via distance methodologies, where at least 80% of the program is completed at a distance (e.g., online), or a residential program.

and I consent to participate in this study.

☐ YES
☐ NO

APPENDIX Q

Thank You E-mail to DDIS Participants and Faculty

Hello Distance Education Doctoral Faculty and Students!

Thank you all for your participation in this research project to develop and validate the Distance Doctoral Integration Scale (DDIS). Thank you to the subject matter expert review panel for your initial critique and recommendations for the DDIS. Thank you to the faculty members who identified and forwarded the invitations to participate to all of the participants. Thank you to the pilot study group for providing rich feedback on individual items as sample participants and helping gauge the time it takes to complete the DDIS. Finally, thank you to all of the participants for taking the DDIS and providing me a large sample to conduct the required analysis.

Your participation will enable me to ascertain the validity and reliability of the DDIS for measuring academic integration and social integration of distance education (DE) doctoral students. While further assessment is needed, the DDIS is well on its way to being used by DE doctoral degree conferring institutions to help mitigate student attrition issues.

Again, my deepest appreciation to all of you who helped me get one step closer to the completion of this study!

All my best,

Joseph L. Holmes
Doctoral Candidate, Liberty University,
[redacted]

APPENDIX R

Demographics of DDIS Participants (Pilot N = 8; Large Group N = 282)

		Pilot		Large Grp.	
Variable	Category	Freq.	%	Freq.	%
Gender	Male	3	37.5	78	27.7
	Female	5	62.5	204	72.3
Country of Citizenship	United States	8	100	272	96.5
	Other			8	2.8
	NA			2	0.7
Ethnicity	African-American	3	37.5	43	15.2
	Asian			6	2.1
	Caucasian	5	62.5	208	73.8
	Hispanic			15	5.3
	American Indian			1	0.4
	Other			7	2.5
	NA			2	0.7
Age Range	20-29			20	7.1
	30-39	5	62.5	81	28.7
	40-49	2	25	105	37.2
	50-59	1	12.5	53	18.8
	60-69			21	7.4
	70-79			1	0.4
	80 or older			1	0.4
Marital Status	Single	3	37.5	33	11.7
	Married	3	37.5	221	78.4
	Widow / Widower			3	1.1
	Divorced	2	25	22	7.8
	Other			3	1.1
Children (18 or under) living with you	Yes	3	37.5	149	52.8
	No	5	62.5	132	46.8
	NA			1	0.4
# of children (18 or under) living with you	1			63	22.3
	2	2	25	49	17.4
	3			23	8.2
	4	1	12.5	10	3.5

	5			4	1.4
Work Status	Full time	8	100	226	80.1
	Part time			28	9.9
	Not currently employed			27	9.6
	NA			1	0.4
Hours Worked per Week	60 or more hours	2	25	27	9.6
	40-59 hours	5	62.5	182	64.5
	20-39 hours	1	12.5	34	12.1
	1-19 hours			11	3.9
	NA			28	9.9
Years Since Formal Education (prior to starting doctorate)	Less than 1 year	1	12.5	69	24.5
	1-2 years			46	16.3
	3-4 years	1	12.5	40	14.2
	5-6 years			36	12.8
	7-8 years	5	62.5	28	9.9
	9-10 years			16	5.7
	Over 10 years	1	12.5	47	16.7
Previous Online Courses Completed (prior to starting doctorate)	None	2	25	56	19.9
	1			23	8.2
	2			27	9.6
	3			14	5
	4			13	4.6
	5	1	12.5	8	2.8
	6			8	2.8
	7	1	12.5	1	0.4
	8			5	1.8
	9			3	1.1
	10			9	3.2
	More than 10	4	50	115	40.8
University Type	Private for profit			75	26.6
	Private not for profit	2	25	152	53.9
	Public	6	75	55	19.5
Degree Pursuing	Ed.D.	8	100	243	86.2
	Ph.D.			39	13.8

Program of Study	Curriculum and Instruction	8	100	101	35.8
	Educational Leadership			121	42.9
	Adult Education			2	0.7
	Higher Education Leadership and Management	1	12.5	12	4.3
	Higher Education			6	2.1
	K-12 School Leadership			2	0.7
	Special Education			2	0.7
	Instructional Design and Technology			13	4.6
	Counselor Education and Supervision			15	5.3
	Other Education			8	2.8
	Total			282	100
Frequency of Synchronous Program-related Activities Using DE Methods	Weekly			51	18.1
	Monthly			37	13.1
	Every 2-3 months			29	10.3
	Every 4-6 months			12	4.3
	About 1-2 times a year			49	17.4
	Less than once a year			39	13.8
	Never			65	23
Program Stage	Stage One	4	50	53	18.8
	Stage Two	1	12.5	83	29.4
	Stage Three	3	37.5	145	51.5
	NA			1	0.4
Successfully Defended Proposal	Yes	1	12.5	67	23.8
	No			214	75.9
	NA			1	0.4
Part of a Cohort	Yes	6	75	57	20.2
	No	2	25	224	79.4
	NA			1	0.4
	Yes	4	50	117	41.5

Program Requires Orientation	No	4	50	163	57.8
	NA			2	0.7

Note: NA=Not answered.

APPENDIX S

Descriptive Statistics—DDIS-EFA

Item	*M*	*SD*	*N*
1	1.85	.819	282
2	1.81	.887	282
3	2.43	1.049	282
4	2.17	1.216	282
5	2.86	1.179	282
6	2.69	1.157	282
7	2.32	1.122	282
8	1.96	.956	282
9	1.97	.963	282
10	1.96	.931	282
11	2.05	.893	282
12	2.10	1.126	282
13	2.29	1.040	282
14	2.73	1.240	282
15	3.02	1.281	282
16	2.35	1.120	282
17	1.84	.836	282
18	3.24	1.195	282
19	2.51	1.054	282
20	2.23	1.145	282
21	1.79	.897	282
22	2.83	1.121	282
23	2.16	1.070	282
24	1.88	.953	282
25	1.84	.907	282
26	3.16	1.196	282
27	2.16	1.070	282
28	1.81	.883	282
29	1.86	.892	282
30	1.78	.922	282
31	2.75	1.151	282
32	2.83	1.090	282
33	2.13	1.126	282
34	2.13	.979	282

APPENDIX T

Correlation Matrix of DDIS Items from DDIS-EFA (*n* = 34)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	—	.346**	.349**	.215**	.232**	.340**	.511**	.411**	.458**	.272**	.371**	.278**	.332**	.267**	.176**	.342**	.292**
2		—	.464**	.360**	.317**	.369**	.505**	.605**	.476**	.633**	.619**	.582**	.390**	.338**	.307**	.414**	.434**
3			—	.384**	.703**	.617**	.460**	.468**	.429**	.405**	.504**	.387**	.604**	.643**	.620**	.565**	.194**
4				—	.471**	.449**	.281**	.385**	.387**	.462**	.489**	.469**	.354**	.375**	.455**	.287**	.262**
5					—	.646**	.299**	.321**	.337**	.342**	.453**	.361**	.574**	.728**	.770**	.567**	.157**
6						—	.459**	.414**	.388**	.374**	.519**	.403**	.524**	.654**	.657**	.538**	.162**
7							—	.609**	.470**	.490**	.530**	.491**	.426**	.381**	.330**	.408**	.390**
8								—	.613**	.626**	.674**	.552**	.373**	.366**	.326**	.415**	.549**
9									—	.606**	.598**	.416**	.418**	.386**	.355**	.406**	.449**
10										—	.696**	.595**	.369**	.397**	.374**	.383**	.440**
11											—	.628**	.481**	.514**	.469**	.490**	.475**
12												—	.459**	.393**	.386**	.399**	.418**
13													—	.674**	.602**	.635**	.182**
14														—	.814**	.652**	.169**
15															—	.628**	0.11
16																—	.306**
17																	—

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Note: The — indicates a correlation of 1.0.

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
1	.212**	.226**	.387**	.500**	.341**	.344**	.364**	.413**	.235**	.503**	.502**	.511**	.412**	.377**	.278**	.350**	.344**
2	.323**	.270**	.621**	.506**	.426**	.500**	.534**	.491**	.373**	.501**	.468**	.466**	.619**	.406**	.379**	.642**	.502**
3	.581**	.483**	.435**	.491**	.603**	.394**	.431**	.403**	.624**	.405**	.472**	.465**	.485**	.605**	.569**	.456**	.408**
4	.428**	.316**	.467**	.329**	.342**	.438**	.441**	.276**	.400**	.315**	.261**	.245**	.361**	.351**	.307**	.511**	.463**
5	.722**	.536**	.407**	.380**	.570**	.282**	.397**	.302**	.753**	.331**	.348**	.356**	.387**	.607**	.544**	.411**	.343**
6	.628**	.491**	.406**	.445**	.605**	.327**	.434**	.388**	.674**	.398**	.425**	.427**	.401**	.629**	.546**	.463**	.406**
7	.335**	.357**	.540**	.555**	.473**	.442**	.572**	.448**	.351**	.519**	.539**	.473**	.511**	.515**	.472**	.569**	.533**
8	.326**	.309**	.594**	.692**	.449**	.503**	.601**	.502**	.323**	.577**	.586**	.510**	.624**	.453**	.408**	.561**	.507**
9	.313**	.288**	.494**	.569**	.408**	.567**	.523**	.556**	.331**	.682**	.554**	.574**	.601**	.422**	.391**	.506**	.442**
10	.374**	.325**	.687**	.522**	.423**	.560**	.592**	.477**	.393**	.571**	.488**	.451**	.656**	.462**	.460**	.678**	.557**
11	.462**	.449**	.666**	.609**	.518**	.538**	.647**	.537**	.506**	.550**	.604**	.540**	.663**	.528**	.517**	.669**	.676**
12	.422**	.371**	.614**	.492**	.442**	.497**	.624**	.419**	.409**	.430**	.473**	.474**	.586**	.444**	.379**	.720**	.570**
13	.571**	.578**	.468**	.461**	.573**	.322**	.404**	.376**	.628**	.386**	.452**	.460**	.469**	.525**	.481**	.460**	.390**
14	.769**	.666**	.451**	.417**	.667**	.306**	.397**	.367**	.761**	.352**	.396**	.435**	.438**	.639**	.614**	.444**	.422**
15	.776**	.593**	.393**	.400**	.590**	.288**	.375**	.330**	.799**	.328**	.350**	.341**	.386**	.591**	.528**	.413**	.379**
16	.623**	.693**	.543**	.462**	.669**	.335**	.449**	.437**	.627**	.395**	.450**	.429**	.497**	.619**	.590**	.502**	.455**
17	.171**	.172**	.509**	.449**	.295**	.427**	.552**	.408**	.137*	.440**	.422**	.404**	.484**	.310**	.298**	.417**	.444**
18	—	.652**	.446**	.378**	.623**	.320**	.402**	.297**	.850**	.340**	.361**	.385**	.358**	.645**	.608**	.429**	.418**

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Note: The — indicates a correlation of 1.0.

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
19	—	.457**	.315**	.652**	.307**	.365**	.297**	.637**	.285**	.348**	.339**	.375**	.552**	.557**	.398**	.418**
20		—	.581**	.549**	.508**	.612**	.488**	.461**	.530**	.544**	.491**	.650**	.547**	.531**	.771**	.621**
21			—	.462**	.478**	.546**	.586**	.372**	.624**	.770**	.666**	.654**	.494**	.390**	.534**	.512**
22				—	.366**	.432**	.440**	.668**	.444**	.473**	.492**	.488**	.714**	.685**	.500**	.487**
23					—	.582**	.440**	.333**	.605**	.506**	.443**	.551**	.377**	.373**	.508**	.520**
24						—	.469**	.384**	.538**	.550**	.487**	.586**	.462**	.471**	.638**	.653**
25							—	.321**	.550**	.639**	.725**	.601**	.470**	.463**	.505**	.491**
26								—	.344**	.384**	.394**	.374**	.697**	.636**	.460**	.402**
27									—	.664**	.581**	.552**	.479**	.426**	.499**	.453**
28										—	.765**	.656**	.552**	.486**	.530**	.538**
29											—	.611**	.525**	.466**	.479**	.472**
30												—	.509**	.465**	.642**	.568**
31													—	.742**	.522**	.501**
32														—	.477**	.571**
33															—	.640**
34																—

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).
Note: The — indicates a correlation of 1.0.