

Relationships Between Self-Directed Learning and
Character Strengths in Doctoral Students

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Dedication

This dissertation is dedicated to my family members, who have supported me throughout this process, while joking about whether I, as a “professional student,” would ever finish.

To my parents, who adopted me as an infant and gave me the opportunity to grow up in a household of love, faith, and learning, with the opportunities to build a wonderful life.

Specifically, to my father, John Wallace Noblin, who raised me to be a strong, independent woman, even before that was a popular concept. In even my earliest memories, I remember him telling me that I could “do anything a boy can do.” As a first-generation college graduate, he highly values education, so he always advocated and facilitated quality educational experiences for me. He has continually supported my doctoral journey and is already planning for my hooding ceremony.

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Abstract

High doctoral attrition rates indicate a need to assist doctoral students in the transition from student to independent scholar. Self-directed learning skills are necessary for that transition. Identification of character strengths associated with self-directed learning would enable graduate schools to identify doctoral applicants who would benefit from assistance in developing these skills, building on their existing strengths. The purpose of this study was to identify character strengths associated with self-directed learning in doctoral students. The study utilized the Person Process Context (PPC) model of self-directed learning (SDL) developed by Hiemstra and Brockett (2012) and the VIA model of character strengths and virtues developed by Peterson and Seligman (2004). Analysis of data from 271 Ph.D. doctoral students identified 11 of 24 character strengths which were correlated with SDL, six of which were found to be statistically significant in models which simultaneously regressed SDL components/composite onto character strengths. Age was also correlated with SDL and was statistically significant when included in follow-up sequential regression models. Gender and stage of doctoral study were not correlated with SDL. Implications for practice in doctoral education and future research topics were addressed.

Note: In order to assist readers with locating information in referenced materials, page numbers are provided for many citations, in accordance with APA guideline 8.23 (7th ed., p. 269).

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Chapter 1

Introduction

A short vignette will precede the introduction to this quantitative study. It is loosely based on this researcher's personal perspective about the Ph.D. experience.

As the late summer sun shone through the leaves of the old oak trees, the newly minted doctoral student tossed her backpack over her shoulders and marched down the sidewalk from the parking lot to the building which would be her academic home for the next few years. As she confidently proceeded on her path, she contemplated the lifelong journey that had brought her to this moment. She had always loved learning, even before she knew about the concept of school. Her parents had exposed her to reading and to fun learning experiences, which made the transition to formal education easy. As she grew, she never wondered IF she would go to college; she just considered WHERE she would go. When she discovered that there were different kinds of degrees, she wanted them all – all the knowledge, all the experiences. The pinnacle was the Ph.D., so she decided that was the degree to pursue. She did all the right things along the way. She picked a field of study, one for which she had both aptitude and passion. She earned the prerequisite degrees and took the appropriate entrance exams, excelling in comparison to her peers and in relation to her own high standards. Sometimes her studies were hard, but the struggles were never insurmountable. On the rare occasions that she would ask herself if she had what it took to succeed, the answer would come as a confident affirmative. Today, as she walked, the familiar questions came again. What she didn't know was that the doctoral journey would stretch her in ways that she could not yet imagine. She would find her abilities, stamina, and perseverance tested to the breaking point. Would she survive those tests, or would she fail? What character strengths would help her as she pursued her dream?

This chapter will introduce the research problem of doctoral attrition, presenting the significance of the problem. The researcher will also explain the purpose of the current study, then provide research questions. Finally, an introduction to the models utilized in the study will furnish a basis for understanding of the literature review in the next chapter.

Significance of Research Problem

Students seeking to pursue a doctoral degree expend considerable time, effort, and financial resources in getting admitted to a graduate school. They then expend even more of those precious resources in pursuing their studies. However, at various points during their journeys through doctoral work, many students find that they are no longer willing or able to pursue the doctoral degree, leaving their educational programs both for personal reasons and for reasons related to their programs of study (Golde, 2010, p. 92; Ruud et al., 2018, p. 288). When entering graduate programs, students feel that they give up time in the workforce and the financial gains which they could have accrued, as well as personal well-being (Sallai et al., 2023, p. 9). Professionals who seek a doctoral degree following several years in the workforce face additional challenges, such as forfeiture of financial security and influence from employment, as well as readjustments to academic culture and how to balance doctoral work and personal life (Jordan et al., 2022, p. 2-3). They may also struggle with how to address commitments to spouses, children, and elderly parents, as well as their communities (Jordan et al., 2022, p. 4, 6). However, even students who begin doctoral work soon after completing a previous degree must face many of these challenges, as well.

Estimates indicate that approximately half of doctoral students across the United States discontinue their studies, though variations in numbers are seen across both disciplines and institutions (Gumport, 2016, p. 136; Mendoza & Gardner, 2010, p. 23). Indeed, data from

multiple decades indicate attrition rates ranging 40-60%, with distance options reflecting attrition rates 10-20% above those already high rates (Rockinson-Szapkiw, 2019, p. 239). The Council of Graduate Schools, recognizing that the number of students who ultimately graduated from doctoral programs was unsatisfactorily low, launched an extensive study of doctoral attrition and completion (Council of Graduate Schools [CGS], 2008, p. viii). This comprehensive research continues to be cited in the literature when information about these topics is needed (Gittings et al., 2018, p. 4; Lake et al., 2018, p. 201). When commencing, but not completing, doctoral study, individual doctoral students, as well as the institutions which they attended, committed significant resources of money, effort, and time, which arguably resulted in little or no benefit (Gravois, 2007, p. A1; CGS, 2008, p. vii). Certainly, both individuals and institutions would like to ensure wise investment of resources and prudently reduce the doctoral attrition rate in order to further those scholars' future contributions to "economic growth and civic engagement" (CGS, 2008, p. vii).

Some research has been published related to determining causes or correlates of doctoral attrition and persistence. One proposed explanation for the high doctoral attrition rate is that some students are unprepared for the requisite transition from student to independent scholar which must occur during the doctoral journey (Mendoza & Gardner, 2010, p. 19). Students must learn to engage in research, as well as write extensively and effectively. They must also believe in their ability, trust themselves to function independently, and determine to complete their programs (Sverdlik & Hall, 2020, p. 115). However, a doctoral student who is a self-directed learner is likely to more easily and successfully make such a transition (Kasworm & Bowles, 2010, p. 238). Lake et al. (2018) noted that models for graduate student retention should include a plan for cultivating self-directed learning (p. 200). Lew et al. (2020) supported the importance

of self-directed learning to graduate education, calling it “crucial” (p. 9). Porter et al. (2020) assert that fundamental efforts to restructure learning environments to foster SDL are warranted (p. 2). Furthermore, self-directed learning may more readily manifest in students who possess certain personality/character traits (Grow, 1991, p. 128). Indeed, “successful self-directed learning involves a learner who possesses psychological and personal characteristics conducive to self-directedness” (Hiemstra & Brockett, 2012, p. 159). Therefore, it would be helpful to determine what individual characteristics might predict self-directed learning in a doctoral student.

This researcher asserts that both institutions and individual students would be well-served by a selection process which concentrates on admitting doctoral students who would be likely complete the programs in which they enroll. Sverdlik et al. (2018) found in a meta-analysis that several factors external to doctoral students influenced their doctoral experience: the quality and fit of the supervision provided, expectations of and socialization by the student’s department, and funding availability (p. 361, 365-367). While institutional factors and procedures often influence student experiences, individual characteristics of students are also critical factors in completion of programs. Internal factors influencing doctoral students include motivation and self-regulation, writing ability, and academic identity (Sverdlik et al., 2018, p. 361, 367, 368). If institutions can pinpoint what specific individual factors are most closely linked with success in doctoral programs, they can use the selection process to admit students who are likely to succeed at their institutions. This selection process would need to go beyond the examination of typical admission criteria like undergraduate GPA, GRE scores, etc., identifying character strengths which would help potential doctoral students in development from student to scholar. While expanded admission criteria would allow institutions to seek candidates with great potential for

success, it would also allow for screening for students who might be lacking in some areas, particularly self-directed learning. Once those students are admitted to doctoral programs, institutions can further doctoral students' development, nurturing self-directed learning in order to foster program persistence and completion. Information about those students' character strengths would assist institutions in building on those strengths in developing capacity for self-directed learning specifically, but also student success in doctoral work generally, thereby reducing attrition rates. Indeed, Porter et al. (2020) contend that combining learners who exhibit self-directed learning competencies with SDL doctoral program environments would facilitate doctoral completion (p. 13-14).

This researcher became interested in the connection between positive psychology and self-directed learning during the coursework phase of her doctoral study. This study is intended to build upon the tradition of joint exploration of these two fields which has been prevalent at the University of Tennessee - Knoxville in recent years. Some UTK-affiliated researchers have explored the relationship between self-directed learning and positive psychology topics such as wellness (Teal et al., 2015; Owen, 1996), resilience (Beeler, 2018; Robinson, 2003), creativity (Cox, 2002), gratitude (Vess, 2015), hope (Dieffenderfer, 2014), and grit (Ruttencutter, 2018). This researcher adds to this body of research by exploring connections between self-directed learning and character strengths.

Purpose of the Study

The purpose of this study, then, was to identify character strengths that are associated with self-directed learning in doctoral students. [The researcher used positive psychology's VIA Classification for Character Strengths and Virtues developed by Peterson & Seligman (2004) and

the PPC (Person Process Context) model of self-directed learning by Hiemstra and Brockett (2012).]

Research Questions

The researcher explored two research questions in this study.

RQ1: Which character strengths, if any, are associated with self-directed learning in doctoral students? [The researcher used the VIA model developed by Peterson & Seligman (2004) and the PPC model by Hiemstra and Brockett (2012).]

RQ2: To what extent are relationships between character strengths and self-directed learning influenced by doctoral students' personal characteristics, specifically gender, age, and stage of doctoral study?

Theoretical Frameworks/Models

When designing a research study, the researcher must explicitly establish the theoretical frameworks relevant to the study. These frameworks provide the researcher with ways to comprehend the phenomena under investigation, promoting further development and refinement of theory through a research agenda guided by pursuit of understanding through well-designed exploration (Bordens & Abbott, 2022, p. 58). Based on the theoretical frameworks, the variables of interest are then specifically defined and operationalized to allow the researcher to test hypotheses (Bordens & Abbott, 2022, p. 102). For this dissertation study, the researcher utilized the PPC model developed by Hiemstra and Brockett (2012), as well as the VIA model by Peterson and Seligman (2004).

PPC (Person Process Context) Model of Self-Directed Learning – Hiemstra & Brockett (2012)

The PPC (Person Process Context) model by Hiemstra and Brockett (2012) is an updated version of their PRO (Personal Responsibility Orientation) model (p. 155). Rather than a

revision of their model, it represents a clarification of their ideas and the relationships among elements of the model (Hiemstra & Brockett, 2012, p. 157). The emphasis of the PPC model is the interconnection and balance which is evident among the model's primary components (person, process, and context) in the optimal expression of self-directed learning (Hiemstra & Brockett, 2012, p. 159). The echo of Long's (1989) pioneering work in self-directed learning, which indicated psychological, pedagogical, and sociological components, is evident in the PPC model's corresponding elements (p. 2). The three elements of the PPC model are the person, process, and context of self-directed learning, all of which are considered equally important to self-directed learning (Hiemstra & Brockett, 2012, p. 158). The Person element of the model consists of all personal characteristics of the learner which can affect self-directed learning (Hiemstra & Brockett, 2012, p. 158). This component includes the personality of the individual and thus the individual's character traits (Garrison, 1997, p. 20). The Process component refers to details of both the teaching and learning portions of the self-directed learning experience (Hiemstra & Brockett, 2012, p. 158). The Context factor encompasses any environmental, social, political, or cultural facets which affect the learning event (Hiemstra & Brockett, 2012, p. 158). The PPC model emphasizes that self-directed learning occurs most effectively when the person, process, and context elements are balanced (Hiemstra & Brockett, 2012, p. 159). In this favorable case, the learner is prepared to engage in SDL, the teaching and learning techniques experienced by the learner promote SDL, and the learning climate is favorable for SDL (Hiemstra & Brockett, 2012, p. 159). Thus, the components are balanced for an optimal SDL learning experience.

Positive Psychology's VIA Model for Character Strengths and Virtues – Peterson & Seligman (2004)

This VIA model is situated within the field of positive psychology and stresses the importance of building fulfilling lives through individuals' own positive traits, specifically their character strengths (Peterson & Seligman, 2004, p. 4, 5). Because the exploration of moral excellence is a relatively new field in the broader scope of the discipline of psychology, Peterson and Seligman (2004) sought to determine what general traits were considered desirable across various cultures and historical periods, labeling those as virtues (p. 6, 8). They consider these universal and foundational elements vital to human survival (Peterson & Seligman, 2004, p. 13). Furthermore, they contend that all six virtues must necessarily be present in order to affirm that an individual is "of good character" (Peterson & Seligman, 2004, p. 13). Peterson and Seligman (2004) then contemplated what character strengths would fall under each of these virtues, determining criteria for specific strengths to be included in or excluded from their classification system, as well as differentiating various strengths from each other (p. 6). They view the character strengths as distinguishable elements of the virtues, ways in which the virtues may be manifest (Peterson & Seligman, 2004, p. 13). Notably, they emphasize that determination of good character does not require individuals to exhibit all strengths within a virtue but could be evident with demonstration of only a single character strength within the virtue (Peterson & Seligman, 2004, p. 13). Furthermore, when a character strength is listed with alternate traits, it means that each of these terms conveys relevant nuances which reflect the complexity of the character strength (Peterson & Seligman, 2004, p. 16). The character strengths are considered stable over time and across contexts, but also may be fostered by institutions or activities in which an individual participates (Peterson & Seligman, 2004, p. 12, 23, 27). The 24 character

strengths are organized under six virtues: wisdom and knowledge (creativity, curiosity, open-mindedness, love of learning, perspective), courage (bravery, persistence, integrity, vitality), humanity (love, kindness, social intelligence), justice (citizenship, fairness, leadership), temperance (forgiveness and mercy, humility/modesty, prudence, self-regulation), and transcendence (appreciation of beauty and excellence, gratitude, hope, humor, spirituality) (Peterson & Seligman, 2004, p. 29-30).

Study Assumptions

The researcher has made certain assumptions for the design and execution of the study. The researcher assumed that the study participants were honest and candid when responding to the instruments provided for completion. While this is a common assumption for most studies, the researcher assumed that the study sample of doctoral students was dedicated to the integrity of academic research. The researcher assumed that these participants, particularly, were likely to take seriously the responsibility of participating in a study and providing accurate data. Furthermore, the various instruments completed by participants did not contain sensitive items which might make participants uncomfortable, so the researcher expected that participants provided frank and sincere responses.

Study Scope and Delimitations

This study was bounded, in part, by choices which the researcher made when designing the study. One of these delimitations was the inclusion of only the character strengths in Peterson and Seligman's VIA model, as the researcher was interested in only this particular positive psychology model for the study. This model is well-developed, and much research is ongoing using it and its associated instruments for measurement. This researcher also chose to limit the study participants to doctoral students enrolled in Ph.D. programs at an R1 university in the

southeastern United States. The researcher chose not to include those enrolled in professional schools (law, medicine, pharmacy, veterinary medicine, etc.), unless also enrolled in a Ph.D. program. This approach was chosen in order to avoid any differences in these students' experiences which, as confounding variables, might have affected the outcomes of the study. Finally, the researcher used Likert-type survey instruments only for character strengths and self-directed learning, rather than including open-ended items. While this limited the data collected, the survey was simpler and quicker for respondents to complete. Because of the constraints on doctoral students' available time, the researcher anticipated that the participants would be more likely to complete all items in this type of survey. The researcher also limited data collection to a 34-day period in a single spring semester.

Limitations

This study sample was limited to a single, large R1 public university in the southeastern United States, which may limit the generalizability of the study to other contexts. In addition, professional school doctoral students (ex. medicine, pharmacy, law, veterinary medicine, etc.) were excluded from the sample, unless also enrolled in a Ph.D. program, as their experiences might differ to such a degree as to introduce confounding variables. Another limitation of the study was that the sample contained only current doctoral students. The study, therefore, could not examine any differences between Ph.D. completers and non-completers regarding self-directed learning, character traits, or demographic characteristics.

Another weakness of the study was the use of the later PPC model for self-directed learning in coordination with the PRO-SDLS instrument, which was based on the earlier PRO model. However, because the PPC model simply clarifies the earlier PRO model, the researcher feels that this instrument was the best choice (Hiemstra & Brockett, 2012, p. 157). An additional

weakness of the design was the use of the shortened version of the character strength instrument. However, because of the need to minimize attrition, the researcher deemed this shortened version a reasonable option for the study (Colton & Covert, 2007, p. 296).

In summary, the problem of high attrition rates in doctoral programs has led researchers to explore possible causes and solutions. This research study was designed to examine the possible association between character strengths and self-directed learning in doctoral students, as well as whether those relationships might be affected by gender, age, and/or stage of doctoral study. Chapter 2 will explore the academic literature relevant to this study, specifically the topics of character strengths and self-directed learning. Chapter 3 will examine this current research study, providing a detailed description of the study methodology. Chapter 4 will provide specific results of the study, including description of the data and data analysis. This dissertation will conclude with Chapter 5, a closing discussion of the results of this study and recommendations for further research.

Chapter 2

Literature Review

This chapter will provide information about self-directed learning and character strengths which are relevant to the current research study. Details about models and frameworks will be presented, as well as information about measurement of the constructs. Discussion will be provided about existing research into character strengths in relation to learning.

Self-Directed Learning

This research study is grounded in the field of self-directed learning, which has produced several influential models. As prolific researchers in the field of adult learning, Merriam et al. (2007) acknowledge the importance of self-directed learning within the larger sphere of adult learning (p. 105). Its influence extends from formal, post-secondary education, where extending SDL is considered a worthy goal, to informal, personal experiences, where SDL is sometimes not even recognized because it integrates so organically into people's activities (Merriam et al., 2007, p. 105). While adult educators often perceive self-directed learning in myriad ways, this range of conceptualizations allows a broad and loyal following for the field (Candy, 1991, p. 6). Tough's (1971) work early in the exploration of self-directed learning identified SDL as a pervasive exercise in adults' lives, though individuals often did not consciously identify themselves as attempting to learn until they engaged in further discussion about their activities (p. 3-4). Grow (1991) likewise affirmed the influence of self-directed learning, referring to it as "the North Star of adult education" (p. 128). Similarly, Knowles, who is widely considered the founder of adult education and developer of theoretical and practical andragogy, endorsed self-directed learning (Henry, 2011, p. 1, 2). Indeed, Knowles (1975), as a self-avowed missionary of the gospel of self-directed learning, proclaimed self-directed learning as an ideal (p. 10). He

further contended that as an individual matures, both the need and the potential to be self-directed increase, as the individual increasingly exercises control over personal decision-making (Knowles, 1975, p. 15, 20).

Goals of Self-Directed Learning

From even the early literature in self-directed learning, its goals and advantages have been discussed comprehensively. Knowles (1975), as an early advocate, asserted that the learner trajectory toward more independent learning allows for broader, deeper, more purposeful learning which is then applied more effectively across contexts (p. 14-16). The rapid development of information in the computer age necessitates that learners use their skills of independent inquiry to adapt to and engage with a continually changing world on a lifelong basis (Knowles, 1975, p. 15-17). While self-directed learning exists as a distinct field of research and study within adult education, its goals extend further, often stretching into and influencing other areas beyond adult education, such as social/collective action (Merriam et al., 2007, p. 107-108). The primary goal of self-directed learning is for learners “to plan, carry out, and evaluate their own learning” (Merriam et al., 2007, p. 107). Bentley et al. (2014) assert that individuals’ success should be measured by their own standards and perceptions, rather than those of others (p. 8). While institutional measures of success may be warranted, they have little to do with success of the learner from a self-directed learning perspective (Bentley et al., 2014, p. 6). This personal growth emphasis obliges adult educators to assist learners to amplify their SDL skills and to equip them for further SDL learning endeavors (Merriam et al., 2007, p. 107). Adult learners can then exercise “personal autonomy and free will to make individual choices” (Merriam et al., 2007, p. 108). Learners may gain different knowledge, adapt the learning environment differently, form different connections with other learners, and leverage their

experience differently (Bentley et al., 2014, p. 5-6). Indeed, success may be realized far later than what is typically thought of as the end of the learning experience, as learners apply concepts and knowledge in new ways in other contexts (Bentley et al., 2014, p. 6). As the adult learners apply SDL principles more extensively, their applications may extend beyond typical learning/educational experiences to other areas of their lives, wherein they experience transformation (Merriam et al., 2007, p. 108).

Theories/Models of Self-Directed Learning

Psychological/Pedagogical Theory - Long

Long's conception of self-directed learning considers multiple influential components. He identifies two contrasting sociological views of SDL within adult education (Long, 1989, p. 3). In the first, the learner is isolated, and the learning is guided by an expert who serves as the initiator and controller of the learning environment (Long, 1989, p. 2-3). In the second, the learner functions independently and without external constraints, allowing personal control over the learning environment (Long, 1989, p. 2-3). Long (1989) thus distinguishes the two important sociological components as the degree of the learner's isolation and the degree of the learner's power in the learning environment (p. 2). While these conceptions of the sociological aspects of learning are important to Long (1989), he emphasizes the pedagogical elements of learning more heavily, specifically the degree of influence that the learner can exert to make choices about the learning process (p. 3). He further acknowledges that even the sociological model places great interest on pedagogical processes (Long, 1989, p. 3). However, he ultimately asserts that the distinguishing component of self-directed learning is the critical psychological dimension, through which the learner actively exerts control over the learning environment (Long, 1989, p. 3). Indeed, for Long (1989), the psychological component "is the necessary and sufficient cause

for self-directed learning” (p. 4). Long’s (1989) theory assesses the probability of effective self-directed learning based on the psychological and pedagogical conditions present in the learning environment (p. 9; see Figure 1). When espousing his vision of the psychological element of self-directed learning, Long (1989) defers to one of his contemporaries in self-directed learning for a detailed explanation (p. 3). Kasworm (1988) contends that a learner who demonstrates active psychological control in the learning environment consciously takes responsibility for ongoing decision-making, rather than shifting decisions to an instructor (p. 69). For Long (1989), pedagogical control can be described as the degree to which the instructor is exerting control over the learning environment (p. 4). Both psychological control by the student and pedagogical control by the instructor exist on continuums (Long, 1989, p. 9). Effective self-directed learning occurs when the student has high psychological control and the learning is characterized by low pedagogical control (Long, 1989, p. 9). Self-directed learning is unlikely to occur under the opposite conditions of low student psychological control and high pedagogical control in the learning environment (Long, 1989, p. 9). However, under either of these sets of conditions, the learner is likely to be satisfied with the learning environment (Long, 1989, p. 9). In contrast, when student psychological control and the learning environment’s pedagogical control are either both high or both low, the learner will likely experience dissatisfaction and anxiety (Long, 1989, p. 9).

Dimensional Layered Continuum Model - Candy

Candy’s (1991) model distinguishes self-directed learning which occurs *within* formal educational institutions from that which occurs *outside* those environments, which he labels “autodidaxy” (p. 13). In his view, the key components are the locus of control in the

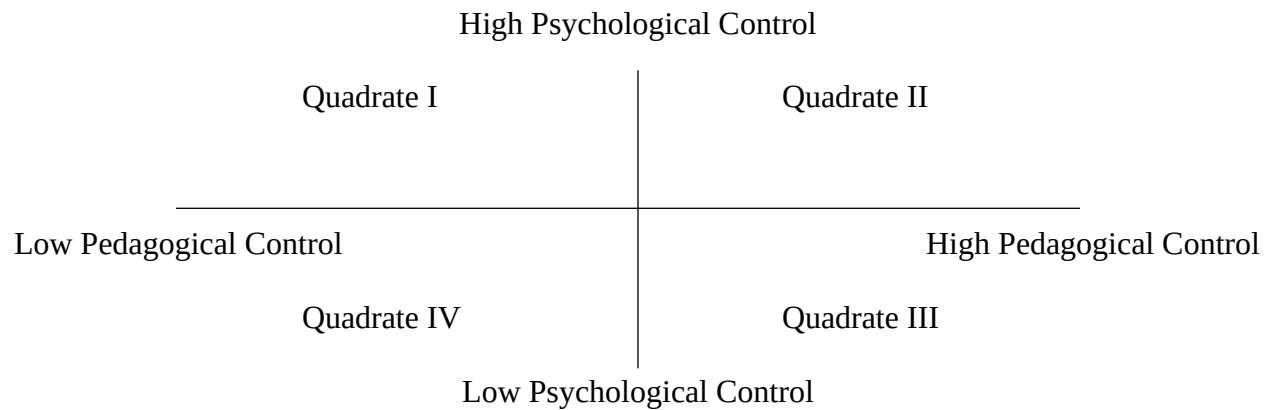


Figure 1 - *Long's Illustration of Self-Directed Learning*

Note. From "Self-Directed Learning: Emerging Theory and Practice," by Long, H. B., 1989, in H. B. Long (Ed.), *Self-directed learning: Emerging theory and practice* (pp. 1-12).

Norman, OK: Oklahoma Research Center for Continuing Professional and Higher Education of the University of Oklahoma.

instructional environment and the degree to which the learner seeks assistance or guidance from one or more knowledgeable individuals (Candy, 1991, p. 16). Specifically, instructional control exists on a continuum in a formal educational setting, with the teacher exercising almost exclusive control on one end and the learner exerting almost complete control on the other end (Candy, 1991, p. 16). Likewise, an assistance continuum exists within autodidaxy, extending from a learner's substantial use of outside assistance on one end to the learner's reliance on self and personal resources at the other end (Candy, 1991, p. 16). Candy (1991) contends that an observer might not be able to distinguish between a formal setting with learner control and an autodidactic setting with considerable outside assistance, as the learning activities in which the learner engages might appear very similar (p. 16-17). However, Candy (1991) asserts that these situations are subjectively different because of who holds ownership (p. 17). Even if the learner is exerting control in the formal setting, the instructor still inherently holds some amount of power and influence (Candy, 1991, p. 17-18). Therefore, in Candy's (1991) model, the formal learning context and the autodidaxy context are depicted as layered, not overlapping, contexts (see Figure 2).

SSDL Model - Grow

The Staged Self-Directed Learning (SSDL) Model developed by Grow approaches self-directed learning differently. Grow utilizes management theory to frame the ways in which educators may facilitate increased self-directed learning behaviors of students within formal institutions of learning (Grow, 1991, p. 125, 127). Grow (1991) affirms the value of self-directed learning for the lifelong learner, but his model prioritizes the practical teaching element over theory, asserting the importance of responding to learner needs and providing learners appropriate levels of choice within the educational process (p. 127-128).

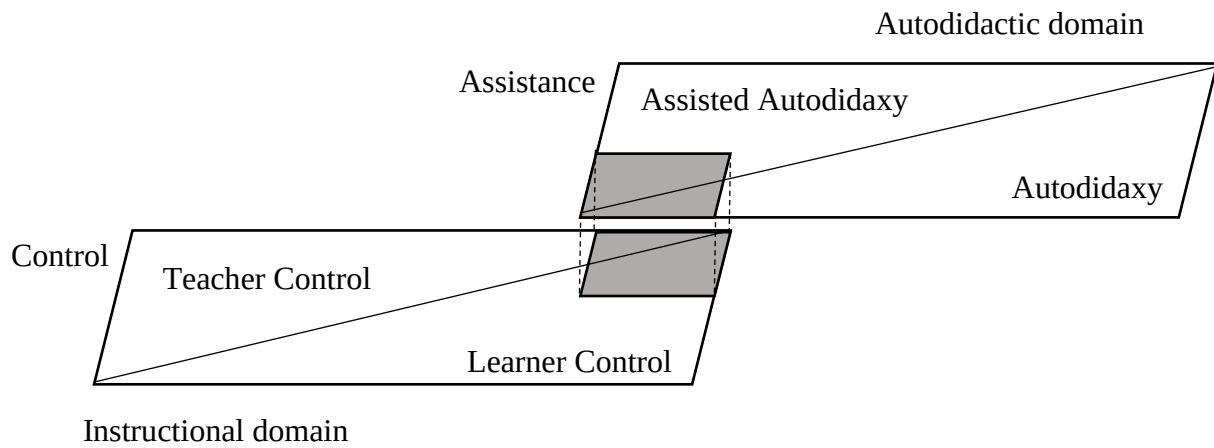


Figure 2 - *Candy's Model of Self-Directed Learning*

Note. From *Self-Direction for Lifelong Learning: A Comprehensive Guide to Theory and Practice*, by Candy, P. C., 1991, p. 17-18.

The emphasis of the model is aligning the educator's instructional efforts with the student's level of self-directed learning, with the expectation for the student to move from greater to lesser dependency on the instructor and lesser to greater self-directed learning (Grow, 1991, p. 136, 142; see Figure 3). In this way, both Grow and Candy acknowledge the idea of a continuum within self-directed learning. Grow (1991) acknowledges that while the SSDL model is a stage model, the actual process of student development would better be served by a non-linear, iterative model (p. 144). The model is further limited by its emphasis on the instructor and the formal educational context (Grow, 1991, p. 146).

Collaborative Constructivist Model - Garrison

Garrison's model approaches self-directed learning with different emphases. He combines elements of motivation, cognition/metacognition, and control of the learning environment to advance "a collaborative constructivist perspective" (Garrison, 1997, p. 21-22). In Garrison's view, learning is characterized by interaction of three elements: "teacher, student, and content" (Long, 1989, p. 6). His model's starting point is motivation for both entering the learning opportunity and engaging in the task (Garrison, 1997, p. 21). These motivations then influence the way that learners construct meaning, monitor their learning, engage in critical thinking, and manage learning activities, likely in concert with others (Garrison, 1997, p. 21-23, 25). Garrison further contends that others who form social connections with the learner in the learning environment are needed to affirm whether the learning is worthwhile (Garrison, 1997, p. 19; see Figure 4). Garrison (1997) thus imbues others in the learning process with a great deal of influence in his view of self-directed learning, while also making the model less applicable outside a formal learning setting (p. 23).

S4: Self-Directed Learner			Independent projects. Student-directed discussions. Discovery learning. Instructor as expert, consultant, and monitor.	
S3: Involved Learner		Application of material. Facilitated discussion. Teams working closely with instructor on <u>real</u> problems. Critical thinking. Learning strategies.		
S2: Interested Learner	Intermediate material. Lecture-Discussion. Applying the basics in a stimulating way. Instructor as motivator.			
S1: Dependent Learner	Introductory material. Lecture. Drill. Immediate correction.			
	T1: Authority, Expert	T2: Salesperson, Motivator	T3: Facilitator	T4: Delegator

Figure 3 - *Grow's Model Applied to a Course*

Note: S1 through S4 represent learner types. T1 through T4 represent teacher types. Grow's model illustrates the learner's gradual transition from S1 to S4, with the teacher's corresponding gradual transition from T1 to T4, though the correspondence is neither one-to-one nor guaranteed to progress to completion. From "Teaching Learners to be Self-Directed," by Grow, G. O., 1991, *Adult Education Quarterly*, 41(3), p. 143.

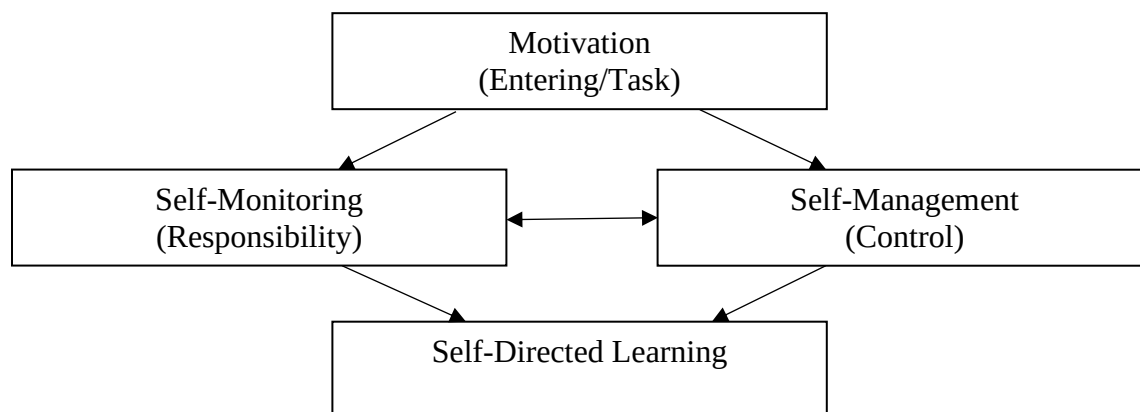


Figure 4 - *Garrison's Model of Self-Directed Learning*

Note. From "Self-Directed Learning: Toward a Comprehensive Model," by Garrison, D. R., 1997, *Adult Education Quarterly*, 48(1), p. 22.

PPC Model – Hiemstra and Brockett

The PPC (Person Process Context) model by Hiemstra and Brockett (2012) is an updated version of their PRO (Personal Responsibility Orientation) model (p. 155). Rather than a revision of their model, it represents a clarification of their ideas and the relationships among elements of the model (Hiemstra & Brockett, 2012, p. 157). The emphasis of the PPC model is the interconnection and balance which is evident among the model's primary components (person, process, and context) in the optimal expression of self-directed learning (Hiemstra & Brockett, 2012, p. 159; see Figure 5). Long's (1989) pioneering work in self-directed learning, which indicated psychological, pedagogical, and sociological components, is reflected in the PPC model's corresponding elements (p. 2). The three elements of the PPC model are the person, process, and context of self-directed learning, all of which are considered equally important to self-directed learning (Hiemstra & Brockett, 2012, p. 158). The Person element of the model consists of all of the personal characteristics of the learner which can affect self-directed learning (Hiemstra & Brockett, 2012, p. 158). This component includes the personality of the individual and thus the individual's character traits (Garrison, 1997, p. 20). The Process component refers to details of both the teaching and learning portions of the self-directed learning experience (Hiemstra & Brockett, 2012, p. 158). The Context factor encompasses any environmental, social, political, or cultural facets which affect the learning event (Hiemstra & Brockett, 2012, p. 158). Self-directed learning occurs most effectively when the person, process, and context elements are balanced (Hiemstra & Brockett, 2012, p. 159). In this favorable case, the learner is prepared to engage in SDL, the teaching and learning techniques promote SDL, and the learning climate is favorable for SDL (Hiemstra & Brockett, 2012, p. 159).

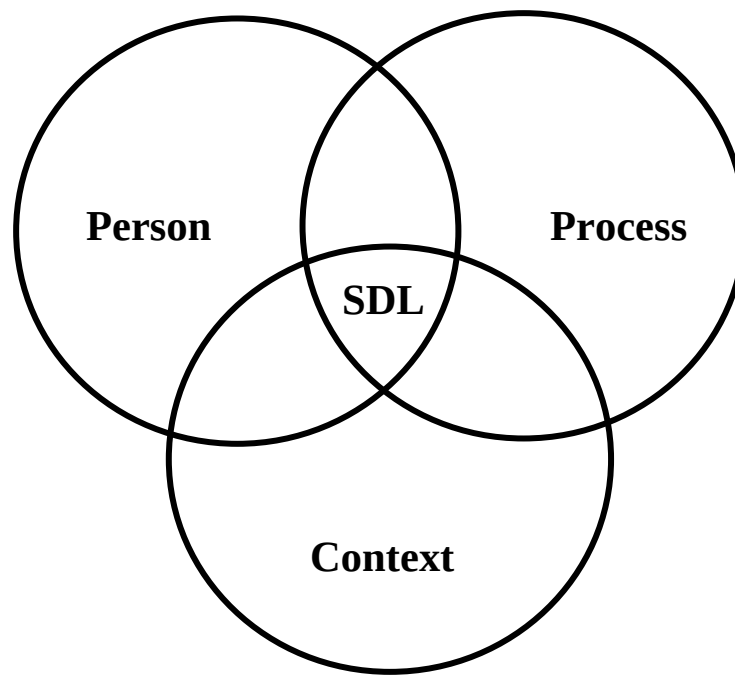


Figure 5 – *Hiemstra and Brockett's PPC Model of Self-Directed Learning*

Note. From “Reframing the Meaning of Self-Directed Learning: An Updated Model,” by Hiemstra, R., & Brockett, R. G., 2012, *Proceedings of the Adult Education Research Conference*, p.158.

<http://newprairiepress.org/aerc/2012/papers/22>

Thus, the components are balanced for an optimal SDL learning experience. Some of the studies which have used the PRO/PPC models of SDL include Ruttencutter (2018), Beard (2016), Vess (2015), Conner (2012), and Holt (2011).

VIA Model for Character Strengths and Virtues

This framework is situated within the field of positive psychology, which stresses the importance of using people's strengths to build fulfilling lives (Peterson & Seligman, 2004, p. 4). The 24 character strengths are organized under six virtues: wisdom and knowledge (creativity, curiosity, open-mindedness, love of learning, perspective), courage (bravery, persistence, integrity, vitality), humanity (love, kindness, social intelligence), justice (citizenship, fairness, leadership), temperance (forgiveness and mercy, humility/modesty, prudence, self-regulation), and transcendence (appreciation of beauty and excellence, gratitude, hope, humor, spirituality) (Peterson & Seligman, 2004, p. 29-30; see Figure 6).

The character strengths under the virtue of wisdom and knowledge might seem to be the most obvious choices for research investigating any link between positive psychology and self-directed learning, but researchers have suggested the importance of exploring strengths categorized under other virtues, as well (Teal et al., 2015, p. 21). Furthermore, while the 24 character strengths consistently remain in the VIA model, some studies which examined the grouping of those character strengths have favored a model with only three virtues: caring (moral domain), inquisitiveness (intellectual domain), and self-control (self-regulatory domain) (McGrath, 2015, p. 407, 422; McGrath & Brown, 2020, p. 4).

Criteria for Character Strengths

Character strengths were included in the framework based on a set of criteria. When formulating their character strengths framework, Peterson and Seligman (2004)

Virtue	Character Strengths
Wisdom and Knowledge	Creativity Curiosity Open-mindedness Love of Learning Perspective
Courage	Bravery Persistence Integrity Vitality
Humanity	Love Kindness Social Intelligence
Justice	Citizenship Fairness Leadership
Temperance	Forgiveness and Mercy Humility/Modesty Prudence Self-regulation
Transcendence	Appreciation of Beauty and Excellence Gratitude Hope Humor Spirituality

Figure 6 - *Peterson and Seligman's Six Virtues and Associated Character Strengths*

Note. From *Character Strengths and Virtues: A Handbook and Classification*, by C. Peterson and M. E. P. Seligman, 2004, p. 29-30. Copyright 2004 by the American Psychological Association.

determined that only character strengths which were entirely or predominantly consistent with their ten criteria were to be included (p. 16-17). First, the character strength will contribute to individual fulfillment through the enhancement of quality of life for self and others (Peterson & Seligman, 2004, p. 17). Second, the strength has inherent moral value, regardless of any auxiliary benefits which may result from it (Peterson & Seligman, 2004, p. 19). Third, when an individual exhibits a character strength, others are not negatively affected, but may indeed be inspired (Peterson & Seligman, 2004, p. 21). Fourth, any antonym of a character strength is generally a negative characteristic (Peterson & Seligman, 2004, p. 22). Fifth, character strengths are manifested in behavior, applicable in varied situations, stable over time, and measurable (Peterson & Seligman, 2004, p. 23). Sixth, a character strength is a uniquely distinguishable trait, having characteristics which differentiate it from other positive attributes or groups of attributes (Peterson & Seligman, 2004, p. 24). Seventh, a character strength can be exemplified by a real person (famous or not) or legendary/mythical being who epitomizes that trait (Peterson & Seligman, 2004, p. 24). Eighth, some character strengths may have prodigies who exhibit the strengths very early and at high levels (Peterson & Seligman, 2004, p. 25). Ninth, a character strength can be completely absent in an individual (Peterson & Seligman, 2004, p. 26). Tenth, character strengths are societally fostered and maintained (Peterson & Seligman, 2004, p. 27). These ten criteria formed the basis for inclusion or exclusion of various proposed character strengths within the framework.

Virtues and Associated Character Strengths

The VIA model has strong research interest within the field of positive psychology, supported by the VIA Institute on Character (viacharacter.org), which has promoted research about this model since the early 2000's (viacharacter.org/about). The model and its associated

surveys are widely used and/or endorsed by well-known companies and recognized psychological researchers (viacharacter.org/about). VIA surveys have been taken by over 25 million people worldwide (viacharacter.org/faq). Despite its popularity, or perhaps because of it, little revision has occurred to the primary model over the years, but some instruments were revised or developed in the mid-2010s based on the existing model (McGrath, 2019, p. 4). McGrath (2015) acknowledges that his research proceeds under the fundamental assumption that the VIA Model of character strengths is valid (p. 421). He focuses, instead, on how those character strengths can best be assigned to virtue categories (McGrath, 2015, p. 409). Consistent with other researchers, he found the character strengths loading onto 2-5 factors with the three-component model the most promising, though concerns remain regarding oversimplification (McGrath, 2015, p. 408, 418, 421, 422; see Figure 7). However, the classification of some of the character strengths within the three-factor model has been problematic (McGrath, 2015, p. 420; McGrath et al., 2018, p. 386). In addition, researchers have cautioned that the three-factor model should not be considered universally applicable to all contexts, though it seems to intuitively classify the character strengths by their relationships to oneself, others, and one's context/environment (McGrath, 2015, p. 421; McGrath et al., 2018, p. 384). Still, because of character strengths' importance in helping both individuals and their communities to survive and flourish, they are considered fundamental to the evolutionary adaptation in and survival of the human species (McGrath & Brown, 2020, p. 5; McGrath, 2021, p. 441, 433). In order to more efficiently provide information about the VIA model, the descriptions of the character strengths are provided in Appendix A.

Virtue Component	Description	Associated Character Strengths	Target of Virtuous Action
Caring	Interpersonal interactions	Fairness Forgiveness Kindness Gratitude Love Spirituality	Others
Inquisitiveness	Interest in intellectual pursuits	Appreciation of Beauty Curiosity Creativity Love of Learning Perspective	Self
Self-Control	Effective behavior in one's environment	Honesty Judgment Perseverance Prudence Self-regulation	Physical world/ environment

Figure 7 - *Details of McGrath's 3-Component Model of Virtues*

Note. Based on “Integrating psychological and cultural perspectives on virtue: The hierarchical structure of character strengths,” by R. E. McGrath, 2015, *The Journal of Positive Psychology*, 10(5), p. 418-419, 421, and “Darwin meets Aristotle: Evolutionary evidence for three fundamental virtues,” by R. E. McGrath, 2021, *The Journal of Positive Psychology*, 16(4), p. 432 (doi: 10.1080/17439760.2020.175781).

The relationship between character strengths and learning in college students has received some attention in the literature. While character strengths of an individual are likely evident in all parts of a person's life, some character strengths would manifest more distinguishably in particular life domains (ex. love of learning in educational contexts) (Wagner et al., 2021, p. 2). However, character strengths are sometimes perceived to be less relevant in educational endeavors (Wagner et al., 2021, p. 12). Park and Peterson (2009) identified perseverance, love, gratitude, hope, and perspective as predictors of college students' academic achievement (p. 4). Lounsbury et al. (2009) reported that self-regulation was associated with higher GPAs in college students (p. 63).

Individual characteristics of learners have some effect on character strengths. Heintz et al. (2019) conducted a meta-analysis which explored the relationship between gender and Peterson and Seligman's VIA model of character strengths, noting that gender-related research is a relative rarity in the field of character strengths (p. 103). Significant gender differences with at least a small effect size were found for only four of the 24 character strengths, as females outscored males in love, kindness, appreciation of beauty/excellence, and gratitude (Heintz et al., 2019, p. 106). While age was found to be a moderating variable, the meta-analysis lacked compelling evidence of age effects for adults across the character strengths, as age differences were primarily found between the adults and the adolescents/children (Heintz et al., 2019, p. 109).

SDL, Character Strengths, and Demographic Variables

The relationships between self-directed learning, character strengths, and demographic variables can be informed by some of the published literature. Conducting research in the closely related field of personality, Kirwan et al. (2010) found that the Big Five and some other

personality traits were related to self-direction in learners (p. 21). The evidence for correlation of self-directed learning and demographic variables is mixed. Oliveira & Simões (2006), consistent with other research findings, found no gender association with self-directedness, but did find that age was associated with self-directedness, though indirectly (p. 2, 5, 7). Reio and Davis (2005) similarly found age differences but no gender differences (p. 40). Kirwan et al. (2010) found that age and gender had little effect on self-direction. Likewise, Van Duyne (2017) found no statistically significant association between self-direction and the age and gender variables (p. 8).

Recent studies specific to college students using the VIA model have focused on academic performance (Villacís et al., 2021; Karris Bachik et al., 2021), academic satisfaction (Owens et al., 2021), and academic persistence (Browning et al., 2018; Sverdlik et al., 2018), finding many positive associations between character strengths and these specific outcomes. However, no studies appeared to examine how character strengths related to a specific type of learning, particularly self-directed learning.

Doctoral stage as a variable has received minimal attention in the literature relating it to topics similar to SDL components. Sverdlik and Hall (2020) found that self-efficacy was at its lowest in doctoral students in the comprehensive exam phase of doctoral study (p. 115). Students in the dissertation phase had the highest self-efficacy levels, while those still in coursework ranked between the other two groups (Sverdlik & Hall, 2020, p. 115). Furthermore, personal motivation was higher during the coursework phase of doctoral study, while students were less motivated and invested in their work during comprehensive exam and dissertation phases (Sverdlik & Hall, p. 115-116). Grover (2007) indicates that self-regulation is especially important in the stage(s) following comprehensive exams (p. 15).

This chapter has provided discussion of relevant theoretical models. Details have been provided about the two theoretical models used in this study, Heimstra and Brockett's PPC model of self-directed learning and Peterson and Seligman's VIA model of character strengths and virtues from the field of positive psychology. Building upon this foundational knowledge of the models, Chapter 3 will describe the researcher's current study exploring the association between self-directed learning and character strengths, as well as how those associations may be affected by personal characteristics of age and/or gender.

Chapter 3

Methodology

This methodology chapter will describe the current study, including crucial aspects of the research design. Population and variables will be described, along with the instruments used for measurement. Data collection procedures will be explained, along with those for data cleaning and analysis. Assumptions, delimitations, and limitations of the study will also be discussed.

Research Design and Purpose

This study explored character strengths as correlates of self-directed learning in doctoral students. The purpose of the study, specifically, was to identify character strengths of doctoral students that are associated with self-directed learning. The researcher used positive psychology's VIA Classification for Character Strengths and Virtues framework for character strengths and virtues developed by Peterson and Seligman (2004) and the PPC (Person Process Context) model of self-directed learning by Hiemstra and Brockett (2012).

Population and Sample

The researcher conducted this study at a large, public R1 research university in the southeastern United States. To ensure that an appropriately sized sample was used for the study, the researcher conducted a power analysis using G*Power 3.1 software (Faul et al., 2009). The purpose of the power analysis was to determine the sample size required for the statistical tests to reject a null hypothesis if it was false (Faul et al., 2007, p. 175). The researcher calculated the required sample size using the following inputs for the G*Power menu: Test family (F tests), Statistical test (Linear multiple regression: Fixed model, R^2 deviation from 0), Type of power analysis (A priori: Compute required sample size – given α , power, and effect size), Effect size f^2 (0.15), α err prob (0.05), Power (1- β err prob) (0.80), and Number of predictors (27).

G*Power 3.1 calculated the required total sample size as 178. Applying a projected response rate of 10% and rounding up to the nearest hundred, the researcher requested and was granted approval for email addresses for a random sample of 1800 doctoral students enrolled in Ph.D. programs at the university. In coordination with the appropriate office at the university, the researcher obtained the email addresses for the doctoral students, and they were given the opportunity to participate in the study.

Composition of Study Sample

Of the 350 participants who created a data record in Qualtrics, one (.3%) declined participation in the study. Seventy-two (20.6%) participants did not respond to some PRO-SDLS and/or VIA-IS-P items of the survey, resulting in data which did not fit the parameters for inclusion in the analysis. An additional six participants (1.7%) did not respond to some or all of the three required demographic items or entered invalid responses. Following data cleaning, 271 (77.4%) participant records remained for data analysis. These 271 participants represented 15.1% of the 1800 Ph.D. doctoral students who were invited by email to participate in the study.

Of the 271 participants, 153 (56.5%) identified as female, 106 (39.1%) identified as male, 11 (4.1%) identified as non-binary/third gender, and 1 (.4%) chose the response option indicating that they preferred not to answer. Female participation approximated their representation in the graduate and professional schools (56.6%), while men were only slightly underrepresented in the sample compared to their representation in the graduate and professional schools (43.4%). University gender data were reported with only dichotomous categories of men and women.

Many participants were in their mid- to late-twenties, and 125 (46.1%) indicated ages 24-29. An extended age range of 24-34 encompassed 186 (68.6%) participants. The university did not provide age data in the fact book data for graduate and professional students.

When asked about the stage of their doctoral studies, 150 (55.4%) participants were still in the coursework or comprehensive exam stages prior to candidacy. The remaining 121 (44.6%) participants were Ph.D. candidates and were engaged in work related to their dissertations. The university characterized 2278 (91.1%) of 2501 doctoral students as early stage, with the remaining 223 (8.9%) characterized as late stage. The sample seems to contain a higher percentage of late-stage doctoral students than the population, but some of this difference may be due to record-keeping and classification of the students' doctoral studies. More likely, however, is that doctoral students who are in the dissertation phase may be more inclined to participate in a fellow doctoral student's research, as they realize the importance and difficulty of obtaining an adequate sample size for a study. Of the 271 participants, 227 (83.8%) were enrolled full-time, with the remaining 44 (16.2%) enrolled part-time. University data indicated that of 2601 doctoral students, 1262 (50.5%) were enrolled full-time, while 1239 (49.5%) were enrolled part-time. Full-time doctoral students were, therefore, overrepresented in the sample, compared to their representation in the overall group of Ph.D. doctoral students.

Of the 271 participants included in the analysis, 51 (18.8%) indicated that they were international students, 219 indicated that they were not international students, and one (.4%) chose not to respond to the item. University data for the 6766 graduate and professional students indicated that 953 (14.1%) were international students, while 5813 (85.9%) were not international students. These percentages were comparable for the sample and the entire Ph.D. student group. For the 6766 graduate and professional students, including international students, data indicated that they were 4835 (71.5%) white, 467 (6.9%) Black or African American, 368 (5.4%) Hispanic, 763 (11.3%) Asian or Pacific Islander, 181 (2.7%) two or more races, 14 (.2%) Native American or Alaska Native, and 138 (2.0%) unknown. The 271 participants in the study

were 212 (78.2%) white, 14 (5.2%) Black or African American, 11 (4.1%) Hispanic, 19 (7.0%) Asian or Pacific Islander, 7 (2.6%) two or more races, and 0 (0.0%) Native American or Alaska Native. Eight (3.0%) participants chose the response indicating that they preferred not to respond to the item, while one (.4%) additional participant omitted the item. The percentages for race representation were similar for the sample and the entire group of Ph.D. doctoral students.

The sample of 271 participants represented multiple colleges within the university: Agriculture 6 (2.2%); Architecture and Design 0 (0.0%); Arts and Sciences 83 (30.6%); Business 7 (2.6%); Communication and Information 7 (2.6%); Education, Health, and Human Sciences 67 (24.7%); Engineering 56 (20.7%); Intercollegiate 7 (2.6%); Nursing 22 (8.1%); and Social Work 13 (4.8%). Two (.7%) participants chose the response indicating that they preferred not to respond to the item, while one (.4%) additional participant omitted the item. Data by college for Ph.D. students only were not available. Meanwhile, 5801 graduate students at the university were enrolled in Spring, 2023, in those colleges as follows: Agriculture 341 (5.9%); Architecture and Design 75 (1.3%); Arts and Sciences 1140 (19.7%); Business 752 (13.0%); Communication and Information 505 (8.7%); Education, Health, and Human Sciences 1059 (18.3%); Engineering 1063 (18.3%); Intercollegiate 143 (2.5%); Nursing 196 (3.4%); and Social Work 527 (9.1%). Some differences in percentages between the Ph.D. sample and the general graduate enrollment are likely due to differences between colleges in prevalence of doctoral programs in general and Ph.D. programs specifically. For example, in some fields of study, the master's degree is the terminal degree. In other fields, the terminal degree may be a doctoral degree, but not specifically a Ph.D.

Composition of the Graduate/Doctoral Enrollment at the R1 University

The researcher obtained demographic information from the large public R1 university's institutional research branch through publicly available data in fact books published on the university website. According to the university's available data for 2022, the university enrolled 6766 graduate and professional students, with a gender distribution of 2938 (43.4%) men and 3828 (56.6%) women. Specifically, 5988 (88.5%) of these students were enrolled in the standard graduate school, while 778 (11.5%) of these students were enrolled in professional schools. Doctoral students comprised 2501 (41.8%) of the 5988 standard graduate school students. Of these doctoral students, 1262 (50.5%) were enrolled full-time, while 1239 (49.5%) were enrolled part-time. However, the subset of late-stage doctoral students was more likely to be enrolled part-time (78.0%) than full-time (22.0%).

Race/Ethnicity data for the 6766 graduate and professional students were reported as 4697 (69.4%) White, 366 (5.4%) Black or African American, 183 (2.7%) Asian or Pacific Islander, 14 (.2%) American Indian or Alaska Native, 177 (2.6%) two or more races, 307 (4.5%) Hispanic of any race, 69 (< .1%) unknown, and 953 (14.1%) international. Specifically, the university data indicated that race/ethnicity for international students was 138 (14.5%) White, 101 (10.6%) Black or African American, 580 (60.9%) Asian or Pacific Islander, 0 (0%) American Indian or Alaska Native, 4 (< .1%) two or more races, 61 (6.4%) Hispanic of any race, and 69 (7.8%) unknown.

A strength of the study is that the researcher included Ph.D. doctoral students from any colleges/departments within the university in the sample, rather than limiting the study to doctoral students from a single or limited number of colleges/departments. By choosing this broader sampling frame, which ensured that the sample more effectively represented the

population of interest (all doctoral students) across disciplines, the researcher likely improved generalizability of this study to doctoral students at similar institutions (Creswell & Guetterman, 2019, p. 139). However, the sample is still limited to one large, public R1 research university in the southeastern United States, so the study's generalizability is limited. The researcher chose not to include doctoral students enrolled in professional schools (law, veterinary medicine, etc.), unless also enrolled in a Ph.D. program, as differences in these types of programs could have introduced confounding influences.

Instrumentation

When choosing instruments to be used in a research study, it is important to consider both reliability and validity issues (Bordens & Abbott, 2022, p. 174). “The **reliability** of a measure concerns its ability to produce similar results when repeated measurements are made under identical conditions” (Bordens & Abbott, 2022, p. 175). Assessments of reliability for an instrument could be accomplished using split-half reliability, test-retest reliability, or parallel forms reliability (Bordens & Abbott, 2022, p. 176). Reliability can be enhanced by ensuring that administration of instruments takes place under conditions which are as close to identical as possible for all participants each time the instrument is used (Heale & Twycross, 2015, p. 67). Bordens and Abbott (2022) assert that an instrument's reliability is considered high if r is greater than or equal to .95 (p. 176). Kalkbrenner (2021) discusses the importance of requiring stronger reliability evidence for instruments which are used for high-stakes purposes, rather than simply using an immutable definition of acceptable reliability (p. 11). Furthermore, the test developer should provide sufficient supporting evidence for whatever reliability estimates are being reported as acceptable (Kalkbrenner, 2021, p. 11; Taber, 2018, p. 1293). Based on his evaluation of numerous journal articles, Taber (2018) notes that the minimum value of .7 for reliability

seems to be commonly reported, but there is wide variability of Cronbach's alpha values that are labeled excellent, strong, low, or the ever-popular "acceptable" (p. 1278).

"The **validity** of a *measure* is the extent to which it measures what you intend it to measure" (Bordens & Abbott, 2022, p. 178). When examining an instrument, researchers seek to establish content validity (subtype: face validity), criterion-related validity (subtypes: concurrent validity, predictive validity), and/or construct validity (Bordens & Abbott, 2022, p. 178-179; Heale & Twycross, 2015, p. 66). Face validity is often established by expert opinion of an instrument's ability to measure an intended construct (Heale & Twycross, 2015, p. 66). Validity is further enhanced by the evidence that one's research instrument of choice correlates highly with other instruments which measure the construct, wherein the instruments provide similar results, or by evidence of the ability to predict future behavior (Heale & Twycross, 2015, p. 66).

The measurement instruments for the study are existing instruments for which some reliability and/or validity information is available.

Variables

The dependent variables were the individual doctoral student's levels of self-directed learning composite and components. These variables were measured using the Personal Responsibility Orientation to Self-Direction in Learning Scale (PRO-SDLS) (Stockdale, 2003). The composite SDL score and the four components of self-directed learning measured by the PRO-SDLS (initiative, control, self-efficacy, and motivation) were individually explored as dependent variables. The researcher recognized that it was possible that any relationship between the independent variable(s) and one or more of the four SDL components would be different than the relationship between the independent variable(s) and the composite SDL variable. The study explored several individual student variables as likely predictors of the

dependent variable, specifically Peterson and Seligman's (2004) 24 character strengths, as well as gender, age, and stage of doctoral study. Character strengths were measured using an instrument available from the VIA Institute on Character, specifically the 96 item VIA Inventory of Strengths VIA-IS-P (VIA Inventory of Strengths-P (VIA-IS-P), "VIA Survey," 2019). Gender, age, and stage of doctoral study data were gathered from demographic survey items presented to each participant.

PRO-SDLS

Because the researcher used the PPC model of self-directed learning as a framework, she chose the PRO-SDLS instrument for this study. The PRO-SDLS was developed by Stockdale (2003) for the purpose of measuring self-directed learning, based on the PRO model introduced by Brockett and Hiemstra in 1991 (p. 3). The PRO model was the precursor to the model used in this dissertation study – the similar, yet updated, PPC model by Hiemstra and Brockett (2012, p. 157). Reliability statistics were reported for the PRO-SDLS, with a coefficient α value of .91 for the entire scale (25 items) and .78 to .82 for the four subscales (initiative, control, self-efficacy, and motivation) (Stockdale & Brockett, 2011, p. 170). Although Guglielmino's SDLRS is widely used in self-directed learning research, Stockdale's instrument shows incremental validity by explaining some variance in self-directed learning beyond what is accounted for with the SDLRS (Stockdale & Brockett, 2011, p. 173). Stockdale & Brockett (2011) examined congruent validity between the PRO-SDLS instrument and Guglielmino's SDLRS, finding that the correlation between the two full scales was significant ($r = .79, p < .01$) (p. 172). The PRO-SDLS teaching-learning transaction (TLT) component scores correlated with SDLRS scores ($r = .70, p < .01$), as did subcomponent scores for control ($r = .51, p < .01$) and motivation ($r = .65, p < .01$) (Stockdale & Brockett, 2011, p. 172). The PRO-SDLS learner characteristic (LC)

component scores correlated with SDLRS scores ($r = .73, p < .01$), as did subcomponent scores for initiative ($r = .64, p < .01$) and self-efficacy ($r = .65, p < .01$) (Stockdale & Brockett, 2011, p. 172). Stockdale & Brockett (2011) explored construct validity by attempting to establish convergent validity between the PRO-SDLS scale and professor ratings of self-directedness (p. 173). However, convergent validity was evident only for initiative, one of the four subcomponents, which represents results similar to those found for the SDLRS (Stockdale & Brockett, 2011, p. 173-174). Attempts to establish criterion-related validity for any of several scales purported to measure it have been ineffective, leading most researchers to use variables like GPA, educational progress/attainment, self-reported self-directedness, or even age as proxy indicators, regardless of inherent disadvantages of doing so (Stockdale & Brockett, 2011, p. 173-174). Because the PRO-SDLS is specifically designed to measure self-directed learning as reflected in the PRO model, the researcher concluded the PRO-SDLS was the most appropriate instrument for measuring self-directed learning for this study. While the PRO-SDLS has been adapted for specific populations, only one version of the original PRO-SDLS is available. While it is not positively keyed like the VIA-IS-P, it is relatively short and did not place an undue burden on participants due to this characteristic.

The PRO-SDLS consists of 25 items. Three of the four components of SDL (initiative, control, and self-efficacy) are measured using six items. One of the four components of SDL (motivation) is measured using seven items. All items are measured on a five-point Likert scale, with some items requiring reverse coding. Scores on each item range from one to five, with one indicating a low score for the component and five indicating a high score for the component. Scores for items related to each separate component are summed to obtain the component scores. For the initiative, control, and self-efficacy components, the six-item component scores can

range from six to 30. For the motivation component, the seven-item component score can range from 7 to 35. To obtain the SDL composite score, the scores from the four components are summed. The SDL composite score can range from 25 to 125.

Some of the studies which have used the PRO-SDLS or an adaptation include Lew et al. (2020), Beeler (2018), Ruttencutter (2018), Beard (2016), Conner (2012), and Holt (2011). Notably, Ruttencutter's (2018) study found that the doctoral students in her sample scored higher than the means reported by the scale's creator. Permission to use the PRO-SDLS was obtained from the creator of the instrument.

VIA-IS-P

The 96-item VIA-IS-P, available through the VIA Institute on Character, was used to measure doctoral students' character strengths. To measure each of the 24 character strengths, the VIA-IS-P uses a 4-item subset of the items on the VIA-IS-R (the 192-item version of the strengths inventory) (McGrath, 2019, p. 13, 29). Correlations between the VIA-IS-P (short version) scores and the VIA-IS-R (long version) scores ranged from .83 to .95 ($M = .92$), with only three correlations below .90 (McGrath, 2019, p. 43). The VIA-IS-P is recommended when the researcher needs an instrument which is both psychometrically sound and of limited length (McGrath, 2019, p. 29). As the character strength instrument was only one of several instruments which was administered in this study, the shorter version was a preferable option, as obtaining accurate responses and good response rates were both significant considerations (Colton & Covert, 2007, p. 296). All items of the VIA-IS-P are positively keyed, which is intended to make survey completion easier for those who might find negatively keyed items confusing (VIA Inventory of Strengths-P (VIA-IS-P), "VIA Survey," 2019). Indeed, Colton and Covert (2007) suggest that all items on a survey be written in a consistent direction, such that

they are all positively worded or all negatively worded (p. 189). Because the dissertation study sample likely included participants whose primary language is not English, the clear language of this version of the instrument was an appropriate choice. Furthermore, because of the academic time pressures faced by doctoral students, they would likely be more inclined to complete a survey which was clearly worded and easy to interpret. The VIA website provides researcher access to the instrument, which can then be used on an online survey platform of the researcher's choice, including access to VIA's own website (McGrath, 2019, p. 31). The researcher chose to administer all instruments through the university's Qualtrics platform in order to simplify the participants' survey experience. Reliability statistics are reported for VIA-IS-P, with α values ranging from .65 to .87 ($M = .77$), with only four α values below .70 (McGrath, 2019, p. 44). Interestingly, the VIA technical report, when comparing results for longer and shorter versions, indicates that use of the shorter VIA-IS-P scale actually results in an overlap reduction among the strength scales (McGrath, 2019, p. 14).

The technical report for the VIA-IS group of instruments discusses how both principal components analysis and item response theory affected the content of the instruments (McGrath, 2019, p. 9-11). McGrath (2019) also cites evidence of discriminant validity (p. 2). However, McGrath (2019) acknowledges that much about the development of the instrument and its items is unknown due to death of one of the authors, which makes the instrument's evaluation in relation to the VIA model dependent largely on face validity (p. 2-4). It should be noted that the VIA-IS-P uses labels for the character strengths which may differ from the primary labels used in the original model of Peterson and Seligman's (2004) book. A clarification of the labels used in the 2004 volume and the VIA-IS-P instrument is provided (see Figure 8).

Virtue	Character Strengths - Book	Character Strengths – VIA-IS-P
Wisdom and Knowledge	Creativity Curiosity Open-mindedness Love of Learning Perspective	Creativity Curiosity Judgment Love of Learning Perspective
Courage	Bravery Persistence Integrity Vitality	Bravery Perseverance Honesty Zest
Humanity	Love Kindness Social Intelligence	Love Kindness Social Intelligence
Justice	Citizenship Fairness Leadership	Teamwork Fairness Leadership
Temperance	Forgiveness and Mercy Humility and Modesty Prudence Self-regulation	Forgiveness Humility Prudence Self-Regulation
Transcendence	Appreciation of Beauty and Excellence Gratitude Hope Humor Spirituality	Appreciation of Beauty and Excellence Gratitude Hope Humor Spirituality

Figure 8 – *Comparison of Book Labels and VIA-IS-P Labels for Character Strengths.*

Note. Adapted from *Character Strengths and Virtues: A Handbook and Classification*, by C.

Peterson and M. E. P. Seligman, 2004, p. 29-30. Copyright 2004 by the American Psychological Association.

The VIA-IS-P consists of 96 items. Each of the 24 character strengths is measured using four items. All items are measured on a five-point Likert scale. No items require reverse coding, because they are all positively keyed. Scores on each item range from one to five, with one indicating a low score for the character strength and five indicating a high score for the character strength. Scores for items related to each separate character strength are summed to obtain the character strength scores. Each character strength score can range from four to 20.

The VIA battery of instruments has been utilized by many individuals and researchers, resulting in a large group of research studies which are searchable on the VIA website by topic and/or population (VIA Institute on Character, n.d.). Permission to use the VIA-IS-P was obtained using the VIA researcher webpage (<https://www.viacharacter.org/research/conduct-a-study>). (See Appendix B.)

Demographic Items

The researcher prepared demographic items to be completed by the participants (see Appendix C). The demographic survey items requested information about each participant's gender, age, race/ethnicity, college of doctoral study, part-time/full-time enrollment, international/domestic student status, and stage of doctoral study. Demographic information was used to determine the extent to which the sample was representative of the population of doctoral students at the university. Further, the data obtained from the demographic items allowed the researcher to examine to what extent relationships between character strengths and self-directed learning might be influenced by doctoral students' personal characteristics, specifically gender, age, and stage of doctoral study, as required by the second research question.

Procedures

Data Collection

Doctoral students enrolled in Ph.D. programs received email invitations to participate in the research study (see Appendix D). Potential participants were provided with information about the study and asked to give their informed consent to participate in the study (see Appendix E).

In conjunction with her advisor, the researcher requested the email addresses of a random sample of 1800 enrolled Ph.D. students through Data Central, the appropriate channel for obtaining such information at the university. Upon receipt of the email list, the researcher contacted each Ph.D. student via email and invited each student to participate in the study (see Appendix D). Each student was provided with a link to informed consent documentation consistent with requirements of the IRB (see Appendix E). If the student wished to participate in the study, he/she/they continued to the survey items, thereby providing informed consent. If the student chose not to participate in the study, he/she/they viewed a message of thanks for their time. The participant could choose to discontinue participation at any time while taking the survey.

The researcher administered survey items utilizing the university-supported online survey platform, Qualtrics. The survey items consisted of items from the PRO-SDLS and VIA-IS-P, as well as non-identifying demographic items formulated by the researcher. The items were presented in that order for participants to complete. Estimated completion times were 10 minutes for the PRO-SDLS, 15 minutes for the VIA-IS-P, and less than 5 minutes for the demographic items, resulting in a total estimated completion time of less than 30 minutes for the

entire combined survey. The researcher requested assistance from IT personnel to confirm that the survey was formatted correctly to collect appropriate data.

Approval for this dissertation study was received from IRB on April 20, 2023. Email addresses for the sample of Ph.D. students were received the same week. The Qualtrics survey for this study was launched on April 28, 2023. One email reminder was provided for participants during the data collection. The data collection lasted 34 days. The first participant survey was received on April 28, 2023. The last data were collected on May 31, 2023, and the survey was closed by the researcher.

Data Analysis

Data analysis was conducted to explore the research questions pertinent to this research study.

Research Questions. This researcher considered two research questions.

RQ1: Which character strengths, if any, are associated with self-directed learning in doctoral students? [The researcher used positive psychology's VIA Classification for Character Strengths and Virtues developed by Peterson & Seligman (2004) and the PPC (Person Process Context) model of self-directed learning by Hiemstra and Brockett (2012).]

RQ2: To what extent are relationships between character strengths and self-directed learning influenced by doctoral students' personal characteristics, specifically gender, age, and stage of doctoral program?

Data Cleaning. The first step in the data analysis was the "cleaning" of the data. Data were exported from Qualtrics into SPSS, and appropriate data cleaning procedures were implemented. Exactly 350 participants clicked on the email link to enter the survey and provided at least one response to create a data record, which was a response rate of 19.4%. Some

respondents provided little or incomplete data, exiting the survey before completion. As this is common in survey research, the researcher had to decide how to address missing data (Fowler, 2014, p. 136-137). Options were to exclude participants responses from the analysis or to attempt an estimation of missing data (Fowler, 2014, p.137). According to Dai (2021), incomplete survey data for a respondent can occur when a person (a) fails to answer an item because of conscious decision or accidental omission but continues to respond to subsequent items, or (b) chooses not to answer a given item, as well as all remaining items (p. 673-674). Dai (2021) contends that excluding participants with less than complete data is not recommended, as it results in loss of valuable data and reduction of statistical power for a study (p. 676). (p. 673-674). Imputation is an appropriate alternative solution for missing data issues, as the goal is to replace the missing data point with a plausible score (Bernaards & Sijtsma, 2000, p. 358). Person mean imputation uses a person's available data to calculate a mean, which is then entered for the missing item(s) (Dai, 2021, p, 677). Bernaards and Sijtsma (2000) provide justification for this option, asserting that person mean imputation is the best estimation method of mean imputation for data related to a single construct (p. 333). Each person mean imputation considers the unique responses of a single participant to questions about a given trait and provides better results than other types of imputation because of its predictive nature (Bernaards & Sijtsma, 2000, p. 333, 357). Person mean imputation may, therefore, "lead to the most meaningful imputed score of all methods" (Bernaards & Sijtsma, 2000, p. 333).

Data analysis for this study required values for 32 variables: the composite SDL score (from PRO-SDLS), four SDL components (initiative, control, self-efficacy, and motivation from PRO-SDLS), 24 character strength scores (from VIA-IS-P), three demographic variables (gender, age, and doctoral stage from demographic items).

In order to be included in the analysis for this study, the researcher required that a value for each of the 32 variables be available. For the three demographic variables, only one item addressed each of those variables, so those three specific demographic items must have been answered by the participant. Participants who did not answer all three of these items were excluded from the analysis.

For both PRO-SDLS and VIA-IS-P, multiple items are used to compute composite scores for the instruments or their components. For the SDL component variables, six or seven items addressed each component. For the character strength variables, four items addressed each character strength. If a respondent answered more than 50% (at least 4) of the items for all SDL components and more than 50% (at least 3) of the items for all character strengths, the participant was retained for analysis. Person mean imputation was used to obtain plausible values for missing data (Dai, 2021, p, 677). If only 50% or fewer of the items were answered for any of the DSL components or character strengths, the participant was excluded from analysis. Any participant not excluded under previous conditions had the required data to compute final variable, the composite SDL score (obtained from the four composite scores).

Imputation is an appropriate alternative solution for missing data issues, as the goal is to replace the missing data point with a plausible score (Bernaards & Sijtsma, 2000, p. 358). Person mean imputation uses a person's available data to calculate a mean, which is then entered for the missing item(s) (Dai, 2021, p, 677). Bernaards and Sijtsma (2000) provide justification for this option, asserting that person mean imputation is the best estimation method of mean imputation for data related to a single construct (p. 333). Each person mean imputation considers the unique responses of a single participant to questions about a given trait and provides better results than other types of imputation because of its predictive nature (Bernaards

& Sijtsma, 2000, p. 333, 357). Person mean imputation may, therefore, “lead to the most meaningful imputed score of all methods” (Bernaards & Sijtsma, 2000, p. 333).

The researcher imputed values for 28 total items (20 VIA-IS-P items and eight PRO-SDLS items) over 17 participants using person mean imputation. Thirteen participants had only one imputed item, two participants had two imputed items, one participant had three imputed items, and one participant had eight imputed items. When performing mean imputation with rounding, there is sometimes concern about bias in the data (Wu et al., 2015, p. 484). To explore the plausibility of the person mean imputed values, the researcher compared the imputed means to the other measures of central tendency for those items. For 19 of the 28 items, the median, mode, and imputed mean for each item were equal. For four of 28 items, there was no mode, but median and imputed mean for each item were equal. One item was bimodal, with the imputed mean equal to one of the modes. For the remaining four of the 28 items, the mode and median for each item were equal, and the rounded imputed mean differed by only one increment on the Likert scale. These results supported the plausibility of the person mean imputations for the missing data values.

Sample for Data Analysis. Of the 350 participants who created a data record in Qualtrics, one (.3%) declined participation in the study. Seventy-two (20.6%) participants did not respond to some PRO-SDLS and/or VIA-IS-P items of the survey, resulting in data which did not fit the parameters for inclusion in the analysis. An additional six participants (1.7%) did not respond to some or all of the three required demographic items or entered invalid responses. Following data cleaning, 271 (77.4%) participant records remained for data analysis. These 271 participants represented 15.1% of the 1800 Ph.D. doctoral students who were invited by email to participate in the study.

Descriptive Statistics. Descriptive statistics for all independent variables, as well as dependent variables, were obtained using SPSS and reported in Chapter 4 of the dissertation, complete with appropriate tables and figures. The researcher also examined the data to determine how they were distributed (including whether the data were distributed normally, when appropriate), with applicable graphical and statistical analysis.

Correlations. Correlation of two variables provides a measure of the strength of the relationship between those variables, reported as a number between -1 and 1 (Gravetter & Wallnau, 2014, p. 450, 452). A correlation coefficient of 1 indicates a perfect positive correlation, wherein values of one variable increase as values of the other variable increase (Gravetter & Wallnau, 2014, p. 451-452). A correlation coefficient of -1 indicates a perfect negative correlation, wherein values of one variable decrease as the values of the other variable increase (Gravetter & Wallnau, 2014, p. 451-452). A correlation of 0 indicates no correlation between the two variables, wherein there is no relationship between the values of one variable and the values of the other variable (Gravetter & Wallnau, 2014, p. 452). Correlation does not indicate a causal relationship between variables (Keith, 2019, p.19).

The researcher correlated each of Peterson and Seligman's (2004, p. 29-30) 24 character strengths (IVs) with all other character strengths, the three demographic variables of interest (gender, age, and stage of doctoral study – IVs), and the self-directed learning component and composite scores (DVs). The researcher also correlated the IVs of gender, age, and stage of doctoral program with the four self-directed learning components and the composite (DVs). The researcher used point biserial correlation for the correlations involving gender, as gender is generally considered a dichotomous variable. For gender correlations only, the 259 (95.6%) participants who provided a dichotomous "Female" or "Male" response for the gender were

included in the analyses. The 11 (4.1%) participants who provided responses of “Non-binary/third gender” and the one (.4%) participant who provided a response of “Prefer not to answer” were excluded from the gender analyses. Data for all 271 participants were included in all other correlations. For the correlations between stage of doctoral study and the self-directed learning components and composite, the researcher transformed each variable to ranked data and then obtained Spearman’s rho correlations. For all other correlations, the researcher used Pearson’s product moment correlation. While the SDL component scores, SDL composite score, and the VIA character strength scores were determined using Likert-style items, the PRO-SDLS and the VIA-IS-P treated the ordinal data from the individual items as interval data in computing the summary scores for the instruments. The aggregated scores, not those from individual items, are used as the units of analysis, and parametric methods of analysis, such as the Pearson correlation, have been shown to be appropriate (Harpe, 2015, p. 840, 842). Thus, data from Likert scales can be treated as continuous (Harpe, 2015, p. 842).

The purpose of the correlations was to determine which variables to include in the multiple regression. If correlations between any of the character strengths were high, the researcher intended to consider which character strength(s) to eliminate from further analysis, using correlations of character strengths (IVs) with the self-directed learning variables (DVs) obtained from the next step. For each set of highly correlated character strengths (if present), the researcher would include only the one with the highest correlation with the self-directed learning variable when considering independent variables for inclusion in the final multiple regression analysis, thus addressing the issues which might arise because of multicollinearity (Keith, 2019, p. 214). The $|.3|$ was the lower threshold for inclusion (Morrow, n.d., p. 12). Morrow (n.d.) suggests an upper threshold of $|.6|$ for correlations to avoid multicollinearity concerns (p. 12).

Keith (2019) asserts that even $|.8|$ would not be overly large (p. 214). The researcher chose to use the more liberal $|.8|$ correlation upper threshold, above which variables would be excluded, in an effort to explore the relationship of as many variables as possible to SDL. When correlations were examined, all correlations between character strengths were found to be within the acceptable parameters. The researcher noted that collinearity diagnostics should be carefully examined during the multiple regression phase of the data analysis (Keith, 2019, p. 215).

Multiple Regression. The researcher performed multiple regressions for two research questions.

Research Question 1: Which character strengths, if any, are associated with self-directed learning in doctoral students?

For the first research question, analysis of the correlations guided the multiple regression. The researcher first simultaneously regressed each SDL component and composite (DVs) on the character strength IVs which were correlated with the SDL DV at $|.3|$ or higher, without including Age in the regression. If any character strengths were found to not be statistically significant in the model, they were removed from the model and an updated regression was performed.

Research Question 2: To what extent are relationships between character strengths and self-directed learning influenced by doctoral students' personal characteristics, specifically gender, age, and stage of doctoral program?

In a second multiple regression set for SDL DVs, each of the SDL components and composite were sequentially regressed on Age (block 1) and the group of character strengths correlated with each DV (block 2). Age was entered in block 1 because of time precedence,

meaning that a participant's age is determined before character strengths develop (Keith, 2019, p. 83).

Additionally, the researcher used multiple regression to consider the influence of age on the relationship between each individual character strengths found to be statistically significant in earlier multiple regression (IVs) and the self-directed learning component(s) and/or composite (DVs). For each of the character strength of interest, the researcher performed a simple linear regression between the character strength (IV) and associated self-directed learning variables (DVs). The researcher then sequentially regressed the self-directed learning variables (DVs) on age and the individual character strength.

Multiple Regression – Assumptions. Four primary assumptions must be considered in multiple regression, as the researcher wishes to obtain credible regression results which can be interpreted using regression coefficients (Keith, 2019, p. 201). A researcher should consider the importance of each assumption, as well as robustness of multiple regression to - and consequences of - violation for each assumption (Keith, 2019, p. 201). The first assumption is that the relationship between the dependent variable and the independent variables is linear and can therefore be expressed with an appropriate regression equation (Keith, 2019, p. 201). The second assumption is the independence of error, resulting from the independence with which each element (participant, observation, etc.) of the sample is drawn from the population (Keith, 2019, p. 201). The third assumption is homoscedasticity, or that error variance is not related to the values of the independent variables (Keith, 2019, p. 201). The fourth assumption is that the distribution of the errors is normal (Keith, 2019, p. 201).

The results of violating the assumptions vary between assumptions. The violation of the first (linearity) assumption is most critical, because the researcher is unlikely to obtain values for

the population parameters which truly approximate the actual values (Keith, 2019, p. 201). The violation of any of the other three primary assumptions poses an interpretation issue, as accuracy of standard errors and significance tests will be adversely affected (Keith, 2019, p. 201). It should be noted, however, that violation of the third and fourth assumptions is a lesser problem, because multiple regression still performs rather robustly under these conditions (Keith, 2019, p. 201). The non-normal distribution of errors which would indicate a violation of the fourth assumption can, however, be a problem in multiple regression if sample sizes are small (Keith, 2019, p. 201).

Beyond the four basic assumptions of multiple regression, other assumptions are warranted in the case that a researcher seeks to interpret the effects of IVs on the DV using regression coefficients obtained during data analysis (Keith, 2019, p. 201). The researcher must assume no correlation between errors and IVs, which introduces three additional assumptions (the fifth, sixth, and seventh assumptions) for multiple regression analysis (Keith, 2019, p. 201). The fifth assumption is that the DV does not exert any influence on the IVs, indicating that reverse causation is not present (Keith, 2019, p. 201; Kenny, 1979, p. 51). The sixth assumption is that IVs will be measured perfectly, with no errors in the execution of the measurement and instrumentation which maintains complete reliability and validity (Keith, 2019, p. 201). This assumption is particularly applicable to multiple regression analyses in the social sciences, as accurate measurement of constructs is almost always a challenge in these fields (Keith, 2019, p. 202). Finally, the seventh assumption is that the regression will “include all common causes of the presumed cause and the presumed effect” (Keith, 2019, p. 201).

Multiple Regression – Diagnostics. Diagnostic analysis is important in the multiple regression process. Diagnostics were collected to determine possible problems with the data,

focusing first on distance, leverage, and influence (Keith, 2019, p. 208). In examining for distance, extreme cases within the dataset can be identified by examining the residuals (usually standardized) for large values and scatterplots for values which lie far from the regression line. (Keith, 2019, p. 208-209). Consideration of leverage involves the examination of independent variables only for unusual patterns, without reference to the dependent variable (Keith, 2019, p. 209). Influence is a function of both distance and leverage, combining those concepts to determine data cases which more highly impact the regression results, acting through the regression coefficient or the regression line (Keith, 2019, p. 209-212). Furthermore, the researcher obtained collinearity diagnostics from SPSS data analysis software, as multicollinearity can cause “misleading and sometimes bizarre regression results” (Keith, 2019, p. 213). The Variance Inflation Factor (VIF) and its reciprocal, tolerance, are both reported by SPSS as collinearity diagnostics (Keith, 2019, p. 215). Keith (2019) asserts that a VIF of 6 or 7 may indicate a multicollinearity issue, which is more stringent than the VIF of 10 commonly accepted as the “rule of thumb” (Keith, 2019, p. 215).

Study Assumptions

The researcher has made certain assumptions for the design and execution of the study. The researcher assumed that the study participants were honest and candid when responding to the instruments provided for completion. While this is a common assumption for most studies, the researcher assumed that the study sample of doctoral students was dedicated to the integrity of academic research. The researcher assumed that these participants, particularly, were likely to take seriously the responsibility of participating in a study and providing accurate data. Furthermore, the various instruments completed by participants did not contain sensitive items

which might make participants uncomfortable, so the researcher expected that participants provided frank and sincere responses.

Study Scope and Delimitations

This study was bounded, in part, by choices which the researcher made when designing the study. One of these delimitations was the inclusion of only the character strengths in Peterson and Seligman's VIA model, as the researcher was interested in only this particular positive psychology model for the study. This model is well-developed, and much research is ongoing using it and its associated instruments for measurement. This researcher also chose to limit the study participants to doctoral students enrolled in Ph.D. programs at an R1 university in the southeastern United States. The researcher chose not to include those enrolled in professional schools (law, medicine, pharmacy, veterinary medicine, etc.), unless also enrolled in a Ph.D. program. This approach was chosen in order to avoid any differences in these students' experiences which, as confounding variables, might have affected the outcomes of the study. Finally, the researcher used Likert-type survey instruments only for character strengths and self-directed learning, rather than including open-ended items. While this limited the data collected, the survey was simpler and quicker for respondents to complete. Because of the constraints on doctoral students' available time, the researcher anticipated that the participants would be more likely to complete all items in this type of survey. The researcher also limited data collection to a 34-day period in a single spring semester.

Limitations

This study sample was limited to a single, large R1 public university in the southeastern United States, which may limit the generalizability of the study to other contexts. In addition, professional school doctoral students (ex. medicine, pharmacy, law, veterinary medicine, etc.)

were excluded from the sample, unless also enrolled in a Ph.D. program, as their experiences might differ to such a degree as to introduce confounding variables. Another limitation of the study was that the sample contained only current doctoral students. The study, therefore, could not examine any differences between Ph.D. completers and non-completers regarding self-directed learning, character traits, or demographic characteristics.

Another weakness of the study was the use of the later PPC model for self-directed learning in coordination with the PRO-SDLS instrument, which was based on the earlier PRO model. However, because the PPC model simply clarifies the earlier PRO model, the researcher feels that this instrument was the best choice (Hiemstra & Brockett, 2012, p. 157). An additional weakness of the design was the use of the shortened version of the character strength instrument. However, because of the need to minimize attrition, the researcher deemed this shortened version a reasonable option for the study (Colton & Covert, 2007, p. 296).

This chapter has provided details about the current study, which examines the relationships between character strengths and self-directed learning, as well as the influence of age and gender on those relationships. The detailed explanation of the methodology provides a framework for understanding the results of the study, which will be reported in Chapter 4.

Chapter 4

Results

This chapter will provide the results of the data analyses for the study. The researcher will provide information about the composition of the sample. Descriptive statistics for the data collected will also be reported. The statistical analyses used to address the research questions will be detailed.

Composition of Sample

Of the 350 participants who created a data record in Qualtrics, one (.3%) declined participation in the study. Seventy-two (20.6%) participants did not respond to some PRO-SDLS and/or VIA-IS-P items of the survey, resulting in data which did not fit the parameters for inclusion in the analysis. An additional six participants (1.7%) did not respond to some or all of the three required demographic items or entered invalid responses. Following data cleaning, 271 (77.4%) participant records remained for data analysis. These 271 participants represented 15.1% of the 1800 Ph.D. doctoral students who were invited by email to participate in the study.

Of the 271 participants, 153 (56.5%) identified as female, 106 (39.1%) identified as male, 11 (4.1%) identified as non-binary/third gender, and 1 (.4%) chose the response option indicating that they preferred not to answer. Female participation approximated their representation in the graduate and professional schools (56.6%), while men were only slightly underrepresented in the sample compared to their representation in the graduate and professional schools (43.4%). University gender data were reported with only dichotomous categories of men and women.

Many participants were in their mid- to late-twenties, and 125 (46.1%) indicated ages 24-29. An extended age range of 24-34 encompassed 186 (68.6%) participants. The university did not provide age data in the fact book data for graduate and professional students.

When asked about the stage of their doctoral studies, 150 (55.4%) participants were still in the coursework or comprehensive exam stages prior to candidacy. The remaining 121 (44.6%) participants were Ph.D. candidates and were engaged in work related to their dissertations. The university characterized 2278 (91.1%) of 2501 doctoral students as early stage, with the remaining 223 (8.9%) characterized as late stage. The sample seems to contain a higher percentage of late-stage doctoral students than the population, but some of this difference may be due to record-keeping and classification of the students' doctoral studies. More likely, however, is that doctoral students who are in the dissertation phase may be more inclined to participate in a fellow doctoral student's research, as they realize the importance and difficulty of obtaining an adequate sample size for a study. Of the 271 participants, 227 (83.8%) were enrolled full-time, with the remaining 44 (16.2%) enrolled part-time. University data indicated that of 2601 doctoral students, 1262 (50.5%) were enrolled full-time, while 1239 (49.5%) were enrolled part-time. Full-time doctoral students were, therefore, overrepresented in the sample, compared to their representation in the overall group of Ph.D. doctoral students.

Of the 271 participants included in the analysis, 51 (18.8%) indicated that they were international students, 219 indicated that they were not international students, and one (.4%) chose not to respond to the item. University data for the 6766 graduate and professional students indicated that 953 (14.1%) were international students, while 5813 (85.9%) were not international students. These percentages were comparable for the sample and the entire Ph.D. student group. For the 6766 graduate and professional students, including international students, data indicated that they were 4835 (71.5%) white, 467 (6.9%) Black or African American, 368 (5.4%) Hispanic, 763 (11.3%) Asian or Pacific Islander, 181 (2.7%) two or more races, 14 (.2%) Native American or Alaska Native, and 138 (2.0%) unknown. The 271 participants in the study

were 212 (78.2%) white, 14 (5.2%) Black or African American, 11 (4.1%) Hispanic, 19 (7.0%) Asian or Pacific Islander, 7 (2.6%) two or more races, and 0 (0.0%) Native American or Alaska Native. Eight (3.0%) participants chose the response indicating that they preferred not to respond to the item, while one (.4%) additional participant omitted the item. The percentages for race representation were similar for the sample and the entire group of Ph.D. doctoral students.

The sample of 271 participants represented multiple colleges within the university: Agriculture 6 (2.2%); Architecture and Design 0 (0.0%); Arts and Sciences 83 (30.6%); Business 7 (2.6%); Communication and Information 7 (2.6%); Education, Health, and Human Sciences 67 (24.7%); Engineering 56 (20.7%); Intercollegiate 7 (2.6%); Nursing 22 (8.1%); and Social Work 13 (4.8%). Two (.7%) participants chose the response indicating that they preferred not to respond to the item, while one (.4%) additional participant omitted the item. Data by college for Ph.D. students only were not available. Meanwhile, 5801 graduate students at the university were enrolled in Spring, 2023, in those colleges as follows: Agriculture 341 (5.9%); Architecture and Design 75 (1.3%); Arts and Sciences 1140 (19.7%); Business 752 (13.0%); Communication and Information 505 (8.7%); Education, Health, and Human Sciences 1059 (18.3%); Engineering 1063 (18.3%); Intercollegiate 143 (2.5%); Nursing 196 (3.4%); and Social Work 527 (9.1%). Some differences in percentages between the Ph.D. sample and the general graduate enrollment are likely due to differences between colleges in prevalence of doctoral programs in general and Ph.D. programs specifically. For example, in some fields of study, the master's degree is the terminal degree. In other fields, the terminal degree may be a doctoral degree, but not specifically a Ph.D.

Descriptive Statistics

The researcher obtained descriptive statistics for both dependent and independent variables for all retained participants ($N = 271$). Essential results are reported in this section (see Table 1). Information about dependent variables is reported first, followed by information about the demographic independent variables. Character strength independent variables are reported last and are arranged by virtue categories. For each of the SDL and character strength scales, the reliability measure of Cronbach's alpha is reported for this study and compared to the Cronbach's alpha reported by the creators of the scales. It should be noted that Stockdale and Brockett's (2011) PRO-SDLS sample consisted primarily of undergraduate college students with very few graduate students, while this dissertation study targeted doctoral Ph.D. students only. The composition of the VIA-IS-P sample was not clear from the documentation (McGrath, 2019).

All Variables – Normality Tests

The researcher ran tests for normality, both the Kolmogorov-Smirnov test and the Shapiro-Wilk test, to determine the degree to which the data could be considered normally distributed. For all variables, the tests were significant ($\alpha < .05$), indicating that the data were not normally distributed.

SDL Variables

In order to compare average scores for the SDL variables, the researcher calculated the average item score for each of the four SDL components and the SDL composite. This was necessary because SDL Initiative, Control, and Self-Efficacy were based on 6-item scales, while SDL Motivation was based on a 7-item scale. Furthermore, the SDL Composite score was based on all 25 items included in the four component scales.

Table 1

Descriptive Statistics for Age, Character Strengths, and SDL Components and Composite

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	Median	Mode	Min	Max	Range	Skewness	Kurtosis	Chronbach's α
Age	271	32.59	8.91	30	28	21	76	55	1.592	2.767	
Appreciation B&E	271	15.32	3.03	16	16	5	20	15	-0.515	-0.113	0.793
Bravery	271	13.94	2.86	14	15	5	20	15	-0.430	0.400	0.707
Creativity	271	14.43	2.82	15	16	6	20	14	-0.335	0.007	0.769
Curiosity	271	15.93	2.58	16	17	8	20	12	-0.592	0.175	0.679
Fairness	271	16.13	2.75	16	16	4	20	16	-0.927	1.616	0.812
Forgiveness	271	14.20	3.08	14	15	4	20	16	-0.374	0.124	0.721
Gratitude	271	14.34	3.23	14	14	4	20	16	-0.271	-0.418	0.745
Honesty	271	16.44	2.32	17	16	5	20	15	-0.957	2.220	0.683
Hope	271	14.64	3.10	15	16	5	20	15	-0.571	0.019	0.740
Humility	271	14.44	2.44	14	14	6	20	14	-0.401	0.482	0.610
Humor	271	15.59	3.28	16	19	4	20	16	-0.652	0.111	0.839
Judgment	271	15.86	2.14	16	16	9	20	11	-0.237	0.070	0.662
Kindness	271	16.04	2.44	16	17	7	20	13	-0.501	0.264	0.694
Leadership	271	14.50	3.30	15	14	4	20	16	-0.610	0.249	0.842
Love	271	14.63	3.76	15	16	4	20	16	-0.634	-0.150	0.882
Love of Learning	271	15.96	2.43	16	16	7	20	13	-0.646	0.326	0.720
Perseverance	271	12.77	3.17	13	14	4	20	16	-0.362	-0.111	0.810
Perspective	271	15.28	2.74	16	16	4	20	16	-0.675	1.074	0.791
Prudence	271	14.77	3.00	15	15	4	20	16	-0.619	0.510	0.813
Self-Regulation	271	12.87	3.22	13	14	4	20	16	-0.378	-0.275	0.761
Social Intelligence	271	14.62	2.89	15	16	7	20	13	-0.507	-0.082	0.702
Spirituality	271	13.16	4.48	13	16	4	20	16	-0.204	-0.973	0.831
Teamwork	271	14.11	2.81	14	16	5	20	15	-0.667	0.599	0.693
Zest	271	12.56	3.57	13	13	4	20	16	-0.271	-0.451	0.814
SDL Initiative	271	21.12	3.75	21	22	9	30	21	0.049	0.025	0.753
SDL Control	271	22.47	4.11	23	22	6	30	24	-0.614	0.715	0.815
SDL Self-Efficacy	271	23.73	4.08	24	23	11	30	19	-0.585	0.022	0.825
SDL Motivation	271	24.93	5.39	26	27	8	35	27	-0.459	-0.132	0.859
SDL Composite	271	92.25	13.40	93	92	43	125	82	-0.365	0.332	0.905

The average item score is reported for the four SDL components and the SDL composite. Lower scores for any SDL component or the SDL composite indicated that a participant would exhibit lower quantities of self-directed learning in that area. Higher scores for any SDL component or the SDL composite indicated that a participant would exhibit higher quantities of self-directed learning in that area.

SDL Initiative. SDL Initiative was measured with the PRO-SDLS using six Likert-style items. With possible scale values of 6 to 30, participants scored from 9 to 30 ($M = 21.12$, $SD = 3.75$) on the Initiative scale. The average item score for SDL Initiative items was 3.52 on a 5-point scale for an individual item. This study's Cronbach's α for Initiative was .75, while Stockdale and Brockett (2011) reported .81 for this scale (see Table 2).

SDL Control. SDL Control was measured with the PRO-SDLS using six Likert-style items. With possible scale values of 6 to 30, participants scored from 6 to 30 ($M = 22.47$, $SD = 4.11$) on the Control scale. The average item score for SDL Control items was 3.74 on a 5-point scale for an individual item. This study's Cronbach's α for Control was .82, while Stockdale and Brockett (2011) reported .78 for this scale.

SDL Self-Efficacy. SDL Self-efficacy was measured with the PRO-SDLS using six Likert-style items. With possible scale values of 6 to 30, participants scored from 11 to 30 ($M = 23.73$, $SD = 4.08$) on the Self-efficacy scale. The average item score for SDL Self-efficacy items was 3.96 on a 5-point scale for an individual item. This study's Cronbach's α for Self-efficacy was .83, while Stockdale and Brockett (2011) reported .78 for this scale.

Table 2

Cronbach's α for VIA-IS-P and PRO-SDLS in This Study and as Reported by Instrument Developers

Variable	Chronbach's α - This Study	Chronbach's α - Stockdale & Brockett (2011)	Chronbach's α - McGrath (2019)
Independent Variable			
Appreciation B&E	0.79		0.83
Bravery	0.71		0.72
Creativity	0.77		0.83
Curiosity	0.68		0.74
Fairness	0.81		0.77
Forgiveness	0.72		0.71
Gratitude	0.75		0.82
Honesty	0.68		0.67
Hope	0.74		0.78
Humility	0.61		0.68
Humor	0.84		0.85
Judgment	0.66		0.65
Kindness	0.69		0.73
Leadership	0.84		0.81
Love	0.88		0.87
Love of Learning	0.72		0.78
Perseverance	0.81		0.83
Perspective	0.79		0.79
Prudence	0.81		0.79
Self-Regulation	0.76		0.79
Social Intelligence	0.70		0.72
Spirituality	0.83		0.83
Teamwork	0.69		0.69
Zest	0.81		0.83
Dependent Variable			
SDL Initiative	0.75	0.81	
SDL Control	0.82	0.78	
SDL Self-Efficacy	0.83	0.78	
SDL Motivation	0.86	0.82	
SDL Composite	0.91	0.91	

Note. Adapted from *Technical Report: The VIA Assessment Suite for Adults: Development and Initial Evaluation* (rev. ed.), by R. E. McGrath, 2019, p. 44. Copyright 2019 by the VIA Institute on Character. Adapted from *Development of the PRO-SDLS: A Measure of Self-Direction in Learning Based on Personal Responsibility Orientation Model* by S. L. Stockdale and R. G. Brockett, 2011, p. 170. Copyright 2011 by Sage Publishing.

SDL Motivation. SDL Motivation was measured with the PRO-SDLS using seven Likert-style items. With possible scale values of 7 to 35, participants scored from 8 to 35 ($M = 24.93$, $SD = 5.39$) on the Motivation scale. The average item score for SDL Motivation items was 3.56 on a 5-point scale for an individual item. This study's Cronbach's α for Motivation was .86, while Stockdale and Brockett (2011) reported .82 for this scale.

SDL Composite. SDL Composite was measured with the PRO-SDLS using 25 Likert-style items. With possible scale values of 25 to 125, participants scored from 43 to 125 ($M = 92.25$, $SD = 13.40$) on the Composite scale. The average item score for SDL Composite items was 3.69 on a 5-point scale for an individual item. This study's Cronbach's α for the Composite was .91, and Stockdale and Brockett (2011) likewise reported .91 for this scale.

Examining the average item scores for each SDL component and the SDL composite, the researcher noted that this study sample of doctoral students scored highest on the PRO-SDLS in SDL Self-efficacy (3.96), followed by SDL Control (3.74), SDL Composite (3.69), SDL Motivation (3.56), and SDL Initiative (3.52). (See Table 3 for comparison of the current study results to other studies using the PRO-SDLS.)

Demographic Variables

Gender. Of the 271 participants, 153 (56.5%) identified as female, 106 (39.1%) identified as male, 11 (4.1%) identified as non-binary/third gender, and 1 (.4%) chose the response option indicating a preference not to respond to the item.

Age. The item requesting the participant's age was a free response item which required a numeric response. Responses for age ranged from 21 to 76 ($M = 32.59$, $SD = 8.91$).

Table 3*Comparison of Current Study's Results to Other Studies Using the PRO-SDLS*

Variable	Current Study (2023)	Beeler (2018)	Ruttencutter (2018)	Beard (2016)	Conner (2012)	Holt (2011)	Stockdale & Brockett (2011)
SDL Initiative							
<i>M</i>	21.12	20.24	22.00	19.07		19.41	17.79
<i>SD</i>	3.75	3.7	3.80	4.05		3.72	3.89
<i>n</i>	271	70	118	102		565	199
<i>Avg. Item Score</i>	3.52	3.37	3.67	3.18		3.24	2.97
SDL Control							
<i>M</i>	22.47	24.14	23.71	22.95		22.48	20.24
<i>SD</i>	4.11	3.36	3.63	4.02		3.43	3.66
<i>n</i>	271	70	118	102		554	197
<i>Avg. Item Score</i>	3.74	4.02	3.95	3.83		3.75	3.37
SDL Self-Efficacy							
<i>M</i>	23.73	25.76	25.24	24.47		24.25	22.09
<i>SD</i>	4.08	3.15	3.48	3.44		3.50	3.48
<i>n</i>	271	70	118	102		548	199
<i>Avg. Item Score</i>	3.96	4.29	4.21	4.08		4.04	3.68
SDL Motivation							
<i>M</i>	24.93	25.61	27.00	24.98		22.88	20.17
<i>SD</i>	5.39	3.58	4.56	4.56		4.67	4.16
<i>n</i>	271	70	118	102		548	197
<i>Avg. Item Score</i>	3.56	3.66	3.86	3.57		3.27	2.88
SDL Composite							
<i>M</i>	92.25	95.76	97.86	91.47	92.87	89.13	80.05
<i>SD</i>	13.40	10.56	12.31	12.92	13.45	11.54	12.47
<i>n</i>	271	70	118	102	137	519	195
<i>Avg. Item Score</i>	3.69	3.83	3.91	3.66	3.71	3.57	3.20

Note. Comparison of the results of the current study and other SDL studies which used the PRO-SDLS. All researchers except Conner (2012) provided information about SDL components and SDL composite.

Stage of Doctoral Study. Of the 271 participants, 68 (25.1%) indicated that they were in the first half of their coursework, while 52 (19.2%) were in the last half of their coursework. Thirty (11.1%) participants were taking comprehensive exams. Forty-three (15.9%) participants were writing proposals for dissertations, while 41 (15.1%) were collecting data and/or writing the last parts of their dissertations. Thirty-seven (13.7%) participants had completed their dissertations, with their defenses either pending or already completed.

Character Strength Variables

Each character strength was measured with the VIA-IS-P using four Likert-style items. In order to provide comparable information for SDL variables and character strength variables, the researcher calculated the average item score for each of the 24 character strengths. Lower scores for any character strength indicated that a participant would exhibit lower quantities of that character strength. Higher scores for any character strength indicated that a participant would exhibit higher quantities of that character strength.

Creativity (Virtue: Wisdom and Knowledge). With possible scale values of 4 to 20, participants scored from 6 to 20 ($M = 14.43$, $SD = 2.82$) on the Creativity scale. The average item score for Creativity items was 3.61 on a 5-point scale for an individual item. This study's Cronbach's α for Creativity was .77, while McGrath (2019) reported reliability of .83 for this scale.

Curiosity (Virtue: Wisdom and Knowledge). With possible scale values of 4 to 20, participants scored from 8 to 20 ($M = 15.93$, $SD = 2.58$) on the Curiosity scale. The average item score for Curiosity items was 3.98 on a 5-point scale for an individual item. This study's

Cronbach's α for Curiosity was .68, while McGrath (2019) reported reliability of .74 for this scale.

Judgment (Virtue: Wisdom and Knowledge). With possible scale values of 4 to 20, participants scored from 9 to 20 ($M = 15.86$, $SD = 2.14$) on the Judgment scale. The average item score for Judgment items was 3.96 on a 5-point scale for an individual item. This study's Cronbach's α for Judgment was .66, while McGrath (2019) reported reliability of .65 for this scale.

Love of Learning (Virtue: Wisdom and Knowledge). With possible scale values of 4 to 20, participants scored from 7 to 20 ($M = 15.96$, $SD = 2.43$) on the Love of Learning scale. The average item score for Love of Learning items was 3.99 on a 5-point scale for an individual item. This study's Cronbach's α for Love of Learning was .72, while McGrath (2019) reported reliability of .78 for this scale.

Perspective (Virtue: Wisdom and Knowledge). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 15.28$, $SD = 2.74$) on the Perspective scale. The average item score for Perspective items was 3.82 on a 5-point scale for an individual item. This study's Cronbach's α for Perspective was .79, while McGrath (2019) likewise reported reliability of .79 for this scale.

Bravery (Virtue: Courage). With possible scale values of 4 to 20, participants scored from 5 to 20 ($M = 13.94$, $SD = 2.86$) on the Bravery scale. The average item score for Bravery items was 3.49 on a 5-point scale for an individual item. This study's Cronbach's α for Bravery was .71, while McGrath (2019) reported reliability of .72 for this scale.

Perseverance (Virtue: Courage). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 12.77$, $SD = 3.17$) on the Perseverance scale. The average item score for Perseverance items was 3.19 on a 5-point scale for an individual item. This study's Cronbach's α for Perseverance was .81, while McGrath (2019) reported reliability of .83 for this scale.

Honesty (Virtue: Courage). With possible scale values of 4 to 20, participants scored from 5 to 20 ($M = 16.44$, $SD = 2.32$) on the Honesty scale. The average item score for Honesty items was 4.11 on a 5-point scale for an individual item. This study's Cronbach's α for Honesty was .68, while McGrath (2019) reported reliability of .67 for this scale.

Zest (Virtue: Courage). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 12.56$, $SD = 3.57$) on the Zest scale. The average item score for Zest items was 3.14 on a 5-point scale for an individual item. This study's Cronbach's α for Zest was .81, while McGrath (2019) reported reliability of .83 for this scale.

Love (Virtue: Humanity). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 14.63$, $SD = 3.76$) on the Love scale. The average item score for Love items was 3.66 on a 5-point scale for an individual item. This study's Cronbach's α for Love was .88, while McGrath (2019) reported reliability of .87 for this scale.

Kindness (Virtue: Humanity). With possible scale values of 4 to 20, participants scored from 7 to 20 ($M = 16.04$, $SD = 2.44$) on the Kindness scale. The average item score for Kindness items was 4.01 on a 5-point scale for an individual item. This study's Cronbach's α for Kindness was .69, while McGrath (2019) reported reliability of .73 for this scale.

Social Intelligence (Virtue: Humanity). With possible scale values of 4 to 20, participants scored from 7 to 20 ($M = 14.62$, $SD = 2.89$) on the Social Intelligence scale. The average item score for Social Intelligence items was 3.65 on a 5-point scale for an individual item. This study's Cronbach's α for Social Intelligence was .70, while McGrath (2019) reported reliability of .72 for this scale.

Teamwork (Virtue: Justice). With possible scale values of 4 to 20, participants scored from 5 to 20 ($M = 14.11$, $SD = 2.81$) on the Teamwork scale. The average item score for Teamwork items was 3.53 on a 5-point scale for an individual item. This study's Cronbach's α for Teamwork was .69, while McGrath (2019) likewise reported reliability of .69 for this scale.

Fairness (Virtue: Justice). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 16.13$, $SD = 2.75$) on the Fairness scale. The average item score for Fairness items was 4.03 on a 5-point scale for an individual item. This study's Cronbach's α for Fairness was .81, while McGrath (2019) reported reliability of .77 for this scale.

Leadership (Virtue: Justice). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 14.50$, $SD = 3.30$) on the Leadership scale. The average item score for Leadership items was 3.63 on a 5-point scale for an individual item. This study's Cronbach's α for Leadership was .84, while McGrath (2019) reported reliability of .81 for this scale.

Forgiveness (Virtue: Temperance). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 14.20$, $SD = 3.08$) on the Forgiveness scale. The average item score for Forgiveness items was 3.55 on a 5-point scale for an individual item. This study's Cronbach's α for Forgiveness was .72, while McGrath (2019) reported reliability of .71 for this scale.

Humility (Virtue: Temperance). With possible scale values of 4 to 20, participants scored from 6 to 20 ($M = 14.44$, $SD = 2.44$) on the Humility scale. The average item score for Humility items was 3.61 on a 5-point scale for an individual item. This study's Cronbach's α for Humility was .61, while McGrath (2019) reported reliability of .68 for this scale.

Prudence (Virtue: Temperance). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 14.77$, $SD = 3.00$) on the Prudence scale. The average item score for Prudence items was 3.69 on a 5-point scale for an individual item. This study's Cronbach's α for Prudence was .81, while McGrath (2019) reported reliability of .79 for this scale.

Self-Regulation (Virtue: Temperance). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 12.87$, $SD = 3.22$) on the Self-regulation scale. The average item score for Self-regulation items was 3.22 on a 5-point scale for an individual item. This study's Cronbach's α for Self-regulation was .76, while McGrath (2019) reported reliability of .79 for this scale.

Appreciation of Beauty and Excellence (Virtue: Transcendence). With possible scale values of 4 to 20, participants scored from 5 to 20 ($M = 15.32$, $SD = 3.03$) on the Appreciation of Beauty and Excellence scale. The average item score for Appreciation of Beauty and Excellence items was 3.83 on a 5-point scale for an individual item. This study's Cronbach's α for Appreciation of Beauty and Excellence was .79, while McGrath (2019) reported reliability of .83 for this scale.

Gratitude (Virtue: Transcendence). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 14.34$, $SD = 3.23$) on the Gratitude scale. The average item score for

Gratitude items was 3.58 on a 5-point scale for an individual item. This study's Cronbach's α for Gratitude was .75, while McGrath (2019) reported reliability of .82 for this scale.

Hope (Virtue: Transcendence). With possible scale values of 4 to 20, participants scored from 5 to 20 ($M = 14.64$, $SD = 3.10$) on the Hope scale. The average item score for Hope items was 3.66 on a 5-point scale for an individual item. This study's Cronbach's α for Hope was .74, while McGrath (2019) reported reliability of .78 for this scale.

Humor (Virtue: Transcendence). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 15.59$, $SD = 3.28$) on the Humor scale. The average item score for Humor items was 3.90 on a 5-point scale for an individual item. This study's Cronbach's α for Humor was .84, while McGrath (2019) reported reliability of .85 for this scale.

Spirituality (Virtue: Transcendence). With possible scale values of 4 to 20, participants scored from 4 to 20 ($M = 13.16$, $SD = 4.48$) on the Spirituality scale. The average item score for Spirituality items was 3.29 on a 5-point scale for an individual item. This study's Cronbach's α for Spirituality was .83, while McGrath (2019) likewise reported reliability of .83 for this scale. (See Table 4 for comparison of the current study results to Park et al.'s (2006) research study featuring VIA-IS results for character strengths.)

Correlations

To prepare for the multiple regressions required to explore the research questions for this study, the researcher needed to obtain correlations between variables. Based on these correlations, the researcher would then choose the variables to include in the multiple regressions. Correlations including the gender variable were performed using point-biserial correlations. Correlations including the variable of stage of doctoral study were performed using

Table 4

Comparison of Current Study's Results to Park et al.'s (2006) VIA-IS Character Strengths Study

Variable	Avg. Item Score - This Study (Rank) <i>n</i> = 271	Avg. Item Score - National Sample - Weighted (Rank) <i>n</i> = 83576	Avg. Item Score - National Sample - Unweighted (Rank) <i>n</i> = 83576
Appreciation B&E	3.83 (8)	3.76 (9)	3.82 (10)
Bravery	3.49 (20)	3.67 (16)	3.65 (16)
Creativity	3.61 (15/16)	3.75 (10)	3.77 (11)
Curiosity	3.98 (5)	3.86 (8)	3.99 (3)
Fairness	4.03 (2)	3.98 (2)	4.00 (1)
Forgiveness	3.55 (18)	3.65 (17)	3.65 (17)
Gratitude	3.58 (17)	3.94 (4)	3.96 (6)
Honesty	4.11 (1)	3.98 (3)	3.97 (4)
Hope	3.66 (11/12)	3.61 (18)	3.60 (19)
Humility	3.61 (15/16)	3.46 (23)	3.40 (23)
Humor	3.90 (7)	3.87 (7)	3.82 (9)
Judgment	3.96 (6)	3.91 (5)	3.99 (2)
Kindness	4.01 (3)	3.99 (1)	3.96 (5)
Leadership	3.63 (14)	3.71 (13)	3.74 (14)
Love	3.66 (11/12)	3.87 (6)	3.91 (7)
Love of Learning	3.99 (4)	3.67 (15)	3.89 (8)
Perseverance	3.19 (23)	3.59 (19)	3.62 (18)
Perspective	3.82 (9)	3.74 (11)	3.77 (12)
Prudence	3.69 (10)	3.47 (22)	3.50 (22)
Self-Regulation	3.22 (22)	3.27 (24)	3.27 (24)
Social Intelligence	3.65 (13)	3.74 (12)	3.75 (13)
Spirituality	3.29 (21)	3.55 (20)	3.53 (21)
Teamwork	3.53 (19)	3.68 (14)	3.66 (15)
Zest	3.14 (24)	3.48 (21)	3.57 (20)

Note. Comparison of this study's VIA-IS-P results for average item scores by character strength to Park et al.'s (2006) VIA-IS results for average item scores (p. 121).

Spearman rank correlations, facilitated by conversion to ranked data, because of the ordinal nature of the stage of doctoral study variable.

Because of debate surrounding assumptions of Pearson product-moment correlation, Schober et al. (2018) acknowledge that the literature sometimes presents conflicting information about whether assumptions and/or use of the Pearson correlation are appropriate (p. 1764). However, consideration of several factors can affect the ability of researchers to make justifiable inferences about data, so data analysis choices are critical (Schober et al., 2018, p. 1764). Schober et al. (2018) assert that the Pearson correlation is most appropriate when the following apply to data/variables: (a) random sampling, (b) independent measurements, (c) linear relationship, (c) absence of outliers, (d) continuous variables, (e) absence of outliers, and (f) normal distribution (p. 1764-1765). The Spearman rank correlation can be used as an alternative if data are converted to ranked data (Schober et al., 2018, p. 1766).

The researcher evaluated these conditions in relation to this study's data. The data were obtained through random sampling of doctoral students. Furthermore, the data were obtained through independent measurements. Examination of scatterplots revealed that the data appeared to follow linear relationships for the pairs of variables. While some of the scatterplots indicated weak/little/no correlations, there was no evidence of curvilinear or other nonlinear relationships. Because of the nature of the scales represented by most of the variables, outliers were not an issue except for the age variable. Examination of the data indicated the presence of some data points at the right tail which could be considered outliers, as the data were positively skewed.

The continuous variable issue must be addressed in the context of Likert scales, as most of the variables (all variables obtained from the PRO-SDLS and the VIA-IS-P) were obtained

from Likert-type scales. These scales are often referred to as aggregated rating scales, as they incorporate scores from multiple items to obtain a measure of a single trait (Harpe, 2015, p. 838-839). The aggregated scores, not those from individual items, are used as the units of analysis, and parametric methods of analysis, such as the Pearson correlation, have been shown to be appropriate (Harpe, 2015, p. 840, 842). Thus, data from Likert scales can be treated as continuous (Harpe, 2015, p. 842).

Normality of the distributions for each variable was also a concern in calculating correlations. The researcher examined Kolmogorov-Smirnov and Shapiro-Wilk normality tests, normal Q-Q plots, stem-and-leaf plots, and histograms, which indicated that the variables were not normally distributed. When performing parametric analyses such as correlations, violations of the normality assumption must be considered and addressed (Harpe, 2015, p. 842). Since distributions are rarely perfectly normal, researchers often consider whether use of parametric analyses are reasonable, as they in practice take into account sample sizes and whether the data are “normal enough” (Harpe, 2015, p. 842). Bishara and Hittner (2015) explain that overestimation of correlation coefficients is common when distributions are nonnormal, particularly with many data points in the tail(s) (p. 785). However, distortions due to nonnormality can also be underestimations of the true correlation value (Bishara & Hittner, 2015, p. 786). In an abundance of caution, the researcher elected to convert data for all variables of interest other than gender to ranked data, then perform Pearson correlations on the original data and Spearman correlations on the ranked data.

The purpose of the correlations was to determine which variables to include in the multiple regression, with $|.3|$ as the threshold for inclusion (Morrow, n.d., p. 12). Morrow (n.d.)

suggests an upper threshold of $|\ .6 |$ for correlations to avoid multicollinearity concerns (p. 12). Keith (2019) asserts that even $|\ .8 |$ would not be overly large (p. 214). The researcher chose to use the more liberal $|\ .8 |$ correlation threshold, above which variables would be excluded, in an effort to explore the relationship of as many variables as possible to SDL. She also noted that collinearity diagnostics should be carefully examined during the multiple regression phase of the data analysis (Keith, 2019, p. 215). (See Table 5 for correlations between pairs of independent and dependent variables included in multiple regressions. See Figure 9 for a visual of relationships between pairs of character strengths with correlations of .500 or greater for the current study.)

SDL Initiative

Correlations were performed to explore the relationship between the SDL Initiative dependent variable and the three demographic and 24 character strength independent variables. None of the three demographic variables correlated at $|\ .3 |$ or higher. Four character strength variables correlated at $|\ .3 |$ or higher. A positive relationship between Bravery and SDL Initiative was identified through the Pearson correlation [$r(269) = .382, p < .001$] and the Spearman correlation [$r_s(269) = .367, p < .001$]. A positive relationship between Creativity and SDL Initiative was identified through the Pearson correlation [$r(269) = .397, p < .001$] and the Spearman correlation [$r_s(269) = .393, p < .001$]. A positive relationship between Curiosity and SDL Initiative was identified through the Pearson correlation [$r(269) = .251, p < .001$] and the Spearman correlation [$r_s(269) = .317, p < .001$]. A positive relationship between Love of Learning and SDL Initiative was identified through the Pearson correlation [$r(269) = .427,$

Table 5

Correlations Between Pairs of Independent and Dependent Variables Included in Multiple Regressions

Independent Variable	Dependent Variable				
	SDL Initiative	SDL Control	SDL Self-Efficacy	SDL Motivation	SDL Composite
Age	.195 (.164)	.233 (.172)	.278 (.229)	.326 (.290)	.342 (.267)
Bravery	.382 (.367)				
Creativity	.397 (.393)				
Curiosity	.251 (.317)				
Fairness					.327 (.310)
Gratitude					.322 (.312)
Honesty		.310 (.319)	.368 (.350)		.353 (.355)
Hope		.400 (.396)	.416 (.412)	.363 (.356)	.457 (.479)
Love of Learning	.427 (.427)			.403 (.383)	.441 (.411)
Perseverance		.600 (.588)	.519 (.485)		.486 (.440)
Self-Regulation		.591 (.552)	.521 (.484)		.475 (.433)
Zest		.396 (.388)	.386 (.399)		.402 (.391)

Note. Correlations between pairs of independent and dependent variables included in multiple regressions are included. Both Pearson product moment and Spearman rho correlations were calculated for each pair of variables. Pearson correlations are listed first, with Spearman correlations in parentheses.

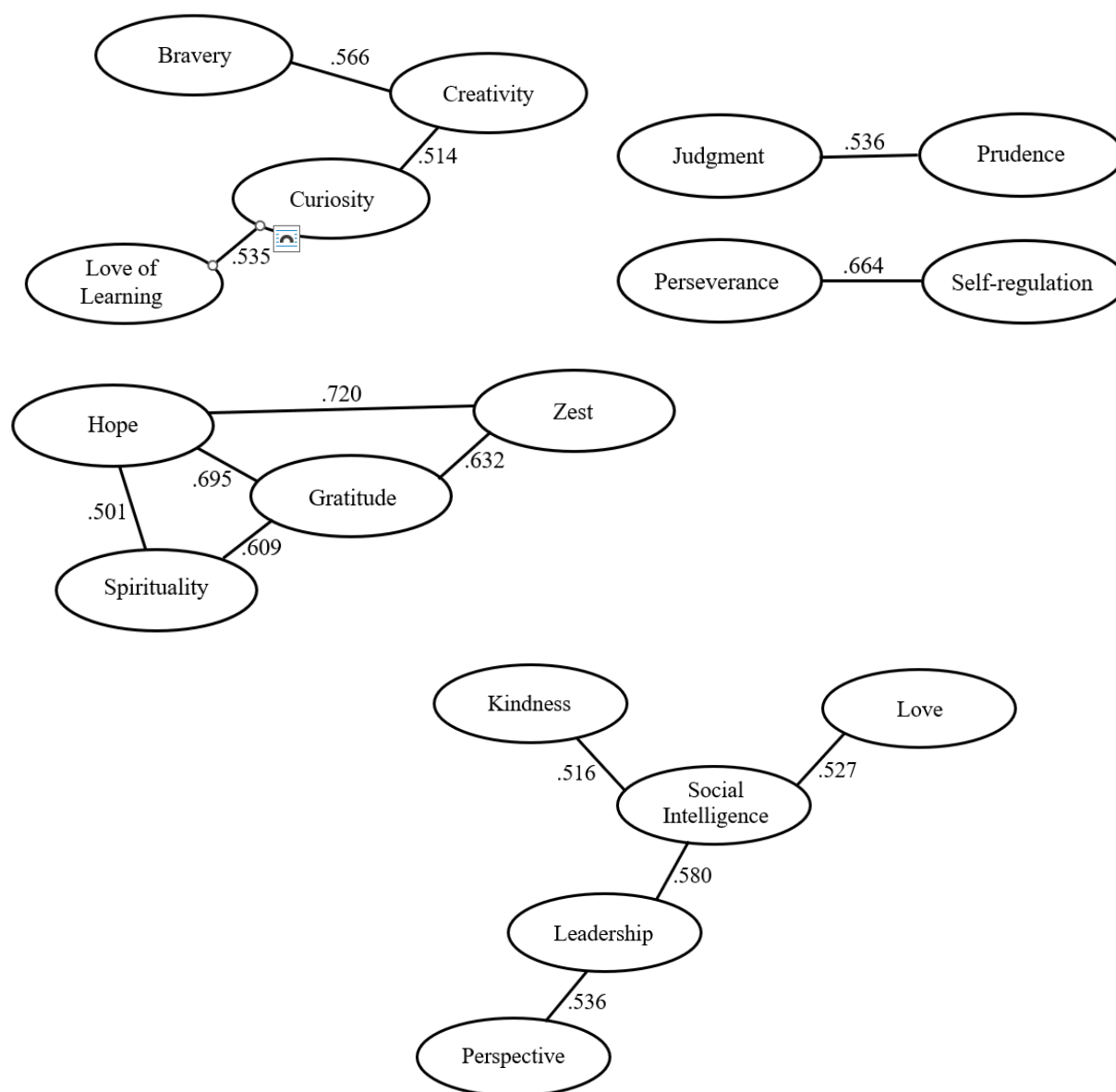


Figure 9 - Visual of Relationships Between Pairs of Character Strengths with Correlations of .500 or Greater for the Current Study

$p < .001$] and the Spearman correlation [$r_s(269) = .427, p < .001$]. Bravery, Creativity, Curiosity, and Love of Learning qualified for inclusion in the multiple regression for SDL Initiative.

SDL Control

Correlations were performed to explore the relationship between the SDL Control dependent variable and the three demographic and 24 character strength independent variables. None of the three demographic variables correlated at $|.3|$ or higher. Five character strength variables correlated at $|.3|$ or higher. A positive relationship between Honesty and SDL Control was identified through the Pearson correlation [$r(269) = .310, p < .001$] and the Spearman correlation [$r_s(269) = .319, p < .001$]. A positive relationship between Hope and SDL Control was identified through the Pearson correlation [$r(269) = .400, p < .001$] and the Spearman correlation [$r_s(269) = .396, p < .001$]. A positive relationship between Perseverance and SDL Control was identified through the Pearson correlation [$r(269) = .600, p < .001$] and the Spearman correlation [$r_s(269) = .588, p < .001$]. A positive relationship between Self-regulation and SDL Control was identified through the Pearson correlation [$r(269) = .591, p < .001$] and the Spearman correlation [$r_s(269) = .552, p < .001$]. A positive relationship between Zest and SDL Control was identified through the Pearson correlation [$r(269) = .396, p < .001$] and the Spearman correlation [$r_s(269) = .388, p < .001$]. Honesty, Hope, Perseverance, Self-regulation, and Zest qualified for inclusion in the multiple regression for SDL Control.

SDL Self-Efficacy

Correlations were performed to explore the relationship between the SDL Self-efficacy dependent variable and the three demographic and 24 character strength independent variables. None of the three demographic variables correlated at $|.3|$ or higher. Five character strength

variables correlated at $|\ .3 |$ or higher. A positive relationship between Honesty and SDL Self-efficacy was identified through the Pearson correlation [$r(269) = .368, p < .001$] and the Spearman correlation [$r_s(269) = .350, p < .001$]. A positive relationship between Hope and SDL Self-efficacy was identified through the Pearson correlation [$r(269) = .416, p < .001$] and the Spearman correlation [$r_s(269) = .432, p < .001$]. A positive relationship between Perseverance and SDL Self-efficacy was identified through the Pearson correlation [$r(269) = .519, p < .001$] and the Spearman correlation [$r_s(269) = .485, p < .001$]. A positive relationship between Self-regulation and SDL Self-efficacy was identified through the Pearson correlation [$r(269) = .521, p < .001$] and the Spearman correlation [$r_s(269) = .484, p < .001$]. A positive relationship between Zest and SDL Self-efficacy was identified through the Pearson correlation [$r(269) = .386, p < .001$] and the Spearman correlation [$r_s(269) = .399, p < .001$]. Honesty, Hope, Perseverance, Self-regulation, and Zest qualified for inclusion in the multiple regression for SDL Self-efficacy.

SDL Motivation

Correlations were performed to explore the relationship between the SDL Motivation dependent variable and the three demographic and 24 character strength independent variables. One of the three demographic variables, Age, correlated at $|\ .3 |$ or higher. A positive relationship between Age and SDL Motivation was identified through the Pearson correlation [$r(269) = .326, p < .001$] and the Spearman correlation [$r_s(269) = .290, p < .001$]. Two character strength variables correlated at $|\ .3 |$ or higher. A positive relationship between Hope and SDL Motivation was identified through the Pearson correlation [$r(269) = .363, p < .001$] and the Spearman correlation [$r_s(269) = .356, p < .001$]. A positive relationship between Love of Learning and SDL Motivation was identified through the Pearson correlation [$r(269) = .403, p <$

.001] and the Spearman correlation [$r_s(269) = .383, p < .001$]. Hope and Love of Learning qualified for inclusion in the multiple regression for SDL Motivation.

SDL Composite

Correlations were performed to explore the relationship between the SDL Composite dependent variable and the three demographic and 24 character strength independent variables. One of the three demographic variables, Age, correlated at $|.3|$ or higher. A positive relationship between Age and SDL Composite was identified through the Pearson correlation [$r(269) = .342, p < .001$] and the Spearman correlation [$r_s(269) = .267, p < .001$]. Eight character strength variables correlated at $|.3|$ or higher. A positive relationship between Fairness and SDL Composite was identified through the Pearson correlation [$r(269) = .327, p < .001$] and the Spearman correlation [$r_s(269) = .310, p < .001$]. A positive relationship between Gratitude and SDL Composite was identified through the Pearson correlation [$r(269) = .322, p < .001$] and the Spearman correlation [$r_s(269) = .312, p < .001$]. A positive relationship between Honesty and SDL Composite was identified through the Pearson correlation [$r(269) = .353, p < .001$] and the Spearman correlation [$r_s(269) = .355, p < .001$]. A positive relationship between Hope and SDL Composite was identified through the Pearson correlation [$r(269) = .457, p < .001$] and the Spearman correlation [$r_s(269) = .479, p < .001$]. A positive relationship between Love of Learning and SDL Composite was identified through the Pearson correlation [$r(269) = .441, p < .001$] and the Spearman correlation [$r_s(269) = .411, p < .001$]. A positive relationship between Perseverance and SDL Composite was identified through the Pearson correlation [$r(269) = .486, p < .001$] and the Spearman correlation [$r_s(269) = .440, p < .001$]. A positive relationship between Self-regulation and SDL Composite was identified through the Pearson

correlation [$r(269) = .475, p < .001$] and the Spearman correlation [$r_s(269) = .433, p < .001$]. A positive relationship between Zest and SDL Composite was identified through the Pearson correlation [$r(269) = .402, p < .001$] and the Spearman correlation [$r_s(269) = .391, p < .001$]. Fairness, Gratitude, Honesty, Hope, Love of Learning, Perseverance, Self-regulation, and Zest qualified for inclusion in the multiple regression for SDL Composite.

Multiple Regression

Character Strengths and Self-Directed Learning

RQ1: Which character strengths, if any, are associated with self-directed learning in doctoral students?

Multiple regression was used to further explore the relationships between character strengths and self-directed learning. In preparation for the multiple regression analyses, the researcher reviewed the assumptions of multiple regression in relation to this study.

Assumptions

Linear Relationships. To explore the relationships between independent and dependent variables, the researcher examined the scatterplots between pairs of independent and dependent variables. These scatterplots indicated no evidence of nonlinear relationships. Thus, this assumption was not violated in the multiple regressions for this study.

Independence of Errors. The researcher obtained a random sample of Ph.D. students for this study, and participants simply completed a survey online, requiring no contact with or awareness of other participants. Any errors would be completely independent. This assumption was not violated in this study.

Homoscedasticity. For each multiple regression, the researcher examined scatterplots of the residuals and the predicted values. Distribution of the error variances (residuals) indicated no patterns related to the independent variable values. This assumption was not violated in the multiple regressions.

Normal Distribution of Residuals. For each multiple regression, the researcher examined the P-P (Predicted Probability) plot to determine whether the errors were normally distributed. For each regression, the plotted points fell very close to the expected line. This assumption was not violated for the multiple regressions.

No Reverse Causation. Independent variables for this study were demographic variables and character strength variables, whereas the dependent variables were self-directed learning variables. Age and 11 character strength variables were included as independent variables in the multiple regressions, whereas five SDL variables were included as dependent variables. Logic dictates that age and character strengths likely developed in participants before self-directed learning behaviors. Therefore, there is little concern about reverse causation, and this assumption was not violated in the multiple regressions.

Perfect Measurement of Independent Variables. Measurement in the social sciences is often imperfect, so this assumption is always a challenge (Keith, 2019, p. 202). However, the researcher chose the instrumentation for this study carefully, with consideration of both reliability and validity, in an effort to minimize any violations of this assumption.

Inclusion of All Common Presumed Causes and Presumed Effects. Little research exists about the relationships between self-directed learning and the VIA character strengths. Therefore, the researcher had little insight into causes and effects of these variables, much less

those which might be common to both. The researcher had no evidence that would violate this multiple regression assumption.

Leverage, Distance, and Influence

The researcher calculated appropriate leverage and Cook's distance values for the regressions. She then examined extensive diagnostic output for each multiple regression, including case diagnostics and scatterplots. In all five multiple regressions, there were data which were problematic cases. However, the researcher determined that the data represented valid responses which should be retained for analysis. Though the values were atypical, they represented important information which should be included in the multiple regressions.

Details of Analyses

Multiple regression was used to explore the relationships between character strengths and self-directed learning, specifically the four components, SDL Initiative, SDL Control, SDL Self-efficacy, and SDL Motivation, and the SDL Composite variable. Using five separate multiple regressions, each of the SDL components and the SDL composite were simultaneously regressed on the character strengths correlated at $|\ .3 |$ or higher. Independent variables were examined for multicollinearity, with a conservative benchmark of a 6.0 maximum for variance inflation factor (VIF), corresponding to a tolerance of a .17 minimum, used as an indicator of multicollinearity (Keith, 2019, p. 215).

SDL Initiative

Using simultaneous multiple regression, the researcher regressed SDL Initiative on Bravery, Creativity, Curiosity, and Love of Learning (see Table 6). The overall multiple regression model was statistically significant ($R^2 = .270$, $F[4, 266] = 24.601$, $p < .001$). Bravery,

Table 6*Simultaneous Multiple Regressions for RQ1*

Variable	<i>b</i>	<i>SE b</i>	β	R^2	<i>p</i>
SDL Initiative				0.264	< .001
Constant	7.217	1.448			< .001
Bravery	0.245	0.084	0.187		0.004
Creativity	0.225	0.088	0.169		0.011
Love of Learning	0.453	0.090	0.294		< .001
SDL Control				0.426	< .001
Constant	10.690	0.857			< .001
Perseverance	0.480	0.080	0.371		< .001
Self-Regulation	0.439	0.079	0.345		< .001
SDL Self-Efficacy				0.324	< .001
Constant	13.518	0.924			< .001
Perseverance	0.398	0.086	0.309		< .001
Self-Regulation	0.399	0.085	0.315		< .001
SDL Motivation				0.209	< .001
Constant	8.037	2.056			< .001
Hope	0.413	0.104	0.237		< .001
Love of Learning	0.680	0.132	0.306		< .001
SDL Composite				0.395	< .001
Constant	35.449	4.666			< .001
Hope	0.702	0.250	0.162		0.005
Love of Learning	1.525	0.290	0.276		< .001
Perseverance	0.920	0.277	0.218		0.001
Self-Regulation	0.811	0.271	0.195		0.003

Note. Regression of dependent SDL variables onto independent character strength variables.

Creativity, Curiosity, and Love of Learning accounted for approximately 27% of the variance in SDL Initiative, with VIF values indicating no multicollinearity issues for the independent variables. Each of the four independent variables was examined for statistical significance, with Curiosity found to have no statistically significant effect on SDL Initiative ($b = -.142$, $t[266] = -1.462$, $p = .145$). Curiosity had been included in the multiple regression because the Spearman correlation was .317, while the Pearson correlation was only .251. The other independent variables in the model had a statistically significant effect on SDL Initiative: Bravery ($b = .249$, $t[266] = 2.968$, $p = .003$), Creativity ($b = .269$, $t[266] = 2.888$, $p = .004$), and Love of Learning ($b = .512$, $t[266] = 5.213$, $p < .001$).

The researcher removed Curiosity from the model and regressed SDL Initiative on only Bravery, Creativity, and Love of Learning. The overall multiple regression model was statistically significant ($R^2 = .264$, $F[3, 267] = 31.953$, $p < .001$). Bravery, Creativity, and Love of Learning accounted for approximately 26% of the variance in SDL Initiative, with VIF values independent variables was examined for statistical significance, with all found to have a statistically significant effect on SDL Initiative: Bravery ($b = .245$, $t[267] = 2.912$, $p = .004$), Creativity ($b = .225$, $t[267] = 2.548$, $p = .011$), and Love of Learning ($b = .453$, $t[267] = 5.043$, $p < .001$).

Following Keith's (2019) notation, a generic regression equation can be represented by:

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_nX_n + e, \quad (1)$$

where Y is the dependent variable, a is the regression constant, b_n is the coefficient for the n th independent variable, X_n is the n th independent variable, and e is the error. Using the results of regression, the predicted value of the dependent variable can be represented by the following:

$$Y' = a + b_1X_1 + b_2X_2 + \dots + b_nX_n, \quad (2)$$

where Y' is the predicted value of the dependent variable. This may also be represented as:

$$Y_{Predicted} = a + b_1X_1 + b_2X_2 + \dots + b_nX_n. \quad (3)$$

For this regression, the multiple regression equation was:

$$\begin{aligned} SDL\ Initiative_{Predicted} = & 7.217 + .245 (Bravery) + .225 (Creativity) \\ & + .453 (Love\ of\ Learning). \end{aligned} \quad (4)$$

Standardized coefficients (β s) allow a researcher “to compare the relative importance of several variables in a single regression equation” (Keith, 2019, p. 37). The value of the β s were obtained for the significant independent variables in this multiple regression: Bravery ($\beta = .187$), Creativity ($\beta = .169$), and Love of Learning ($\beta = .294$). These three character strengths were most highly correlated with SDL Initiative.

SDL Control

Using simultaneous multiple regression, the researcher regressed SDL Control on Honesty, Hope, Perseverance, Self-regulation, and Zest. The overall multiple regression model was statistically significant ($R^2 = .438$, $F[5, 265] = 41.275$, $p < .001$). Honesty, Hope, Perseverance, Self-regulation, and Zest accounted for approximately 44% of the variance in SDL Control, with VIF values indicating no multicollinearity issues for the independent variables. Each of the five independent variables was examined for statistical significance, with three of the five found to have no statistically significant effect on SDL Control: Honesty ($b = -.037$, $t[265] = -.397$, $p = .692$), Hope ($b = .099$, $t[265] = 1.081$, $p = .281$), and Zest ($b = .074$, $t[265] = .945$, $p = .346$). Each of these three variables had been included in the multiple regression with both the Spearman and Pearson correlations exceeding $|.3|$. The remaining two independent variables in

the model had a statistically significant effect on SDL Control: Perseverance ($b = .433$, $t[265] = 5.157$, $p < .001$) and Self-regulation ($b = .406$, $t[265] = 4.940$, $p < .001$).

The researcher removed Honesty, Hope, and Zest from the model and regressed SDL Control on only Perseverance and Self-regulation. The overall multiple regression model was statistically significant ($R^2 = .426$, $F[2, 268] = 99.376$, $p < .001$). Perseverance and Self-regulation accounted for approximately 43% of the variance in SDL Control, with VIF values indicating no multicollinearity issues for the independent variables. Both remaining independent variables were examined for statistical significance, and both were found to have a statistically significant effect on SDL Control: Perseverance ($b = .480$, $t[268] = 5.985$, $p < .001$) and Self-regulation ($b = .439$, $t[268] = 5.562$, $p < .001$). For this regression, the multiple regression equation was:

$$SDL\ Control = 10.690 + .480\ (Perseverance) + .439\ (Self-regulation). \quad (5)$$

The value of the β s were also obtained for the significant independent variables in this multiple regression: Perseverance ($\beta = .371$) and Self-regulation ($\beta = .345$). These two character strengths were most highly correlated with SDL Control.

SDL Self-Efficacy

Using simultaneous multiple regression, the researcher regressed SDL Self-Efficacy on Honesty, Hope, Perseverance, Self-regulation, and Zest. The overall multiple regression model was statistically significant ($R^2 = .359$, $F[5, 265] = 29.666$, $p < .001$). Honesty, Hope, Perseverance, Self-regulation, and Zest accounted for approximately 36% of the variance in SDL Self-efficacy, with VIF values indicating no multicollinearity issues for the independent variables. Each of the five independent variables was examined for statistical significance, with three of the five found to have no statistically significant effect on SDL Self-efficacy: Honesty (b

= .169, $t[265] = 1.684$, $p = .093$), Hope ($b = .173$, $t[265] = 1.776$, $p = .077$), and Zest ($b = .067$, $t[265] = .802$, $p = .423$). Each of these three variables had been included in the multiple regression with both the Spearman and Pearson correlations exceeding $|.3|$. The remaining two independent variables in the model had a statistically significant effect on SDL Self-efficacy: Perseverance ($b = .299$, $t[265] = 3.361$, $p < .001$) and Self-regulation ($b = .306$, $t[265] = 3.505$, $p < .001$).

The researcher removed Honesty, Hope, and Zest from the model and regressed SDL Self-efficacy on only Perseverance and Self-regulation. The overall multiple regression model was statistically significant ($R^2 = .324$, $F[2, 268] = 64.352$, $p < .001$). Perseverance and Self-regulation accounted for approximately 32% of the variance in SDL Self-efficacy, with VIF values indicating no multicollinearity issues for the independent variables. Both remaining independent variables were examined for statistical significance, and both were found to have a statistically significant effect on SDL Self-efficacy: Perseverance ($b = .398$, $t[268] = 4.599$, $p < .001$) and Self-regulation ($b = .399$, $t[268] = 4.694$, $p < .001$). For this regression, the multiple regression equation was:

$$SDL\ Self-Efficacy = 13.518 + .398 (Perseverance) + .399 (Self-regulation). \quad (6)$$

The value of the β s were also obtained for the significant independent variables in this multiple regression: Perseverance ($\beta = .309$) and Self-regulation ($\beta = .315$). These two character strengths were most highly correlated with SDL Self-efficacy.

SDL Motivation

Using simultaneous multiple regression, the researcher regressed SDL Motivation on Hope and Love of Learning. The overall multiple regression model was statistically significant

($R^2 = .209$, $F[2, 268] = 35.460$, $p < .001$). Hope and Love of Learning accounted for approximately 21% of the variance in SDL Motivation, with VIF values indicating no multicollinearity issues for the independent variables. Both independent variables were examined for statistical significance, with both found to have a statistically significant effect on SDL Motivation: Hope ($b = .413$, $t[268] = 3.983$, $p < .001$) and Love of Learning ($b = .680$, $t[268] = 5.134$, $p < .001$). Both of these variables had been included in the multiple regression with both the Spearman and Pearson correlations exceeding $|.3|$. For this regression, the multiple regression equation was:

$$SDL\ Motivation = 8.037 + .413 (Hope) + .680 (Love\ of\ Learning). \quad (7)$$

The value of the β s were also obtained for the significant independent variables in this multiple regression: Hope ($\beta = .237$) and Love of Learning ($\beta = .306$). These two character strengths were most highly correlated with SDL Motivation.

SDL Composite

Using simultaneous multiple regression, the researcher regressed SDL Composite on Fairness, Gratitude, Honesty, Hope, Love of Learning, Perseverance, Self-regulation, and Zest. The overall multiple regression model was statistically significant ($R^2 = .399$, $F[8, 262] = 21.773$, $p < .001$). Fairness, Gratitude, Honesty, Hope, Love of Learning, Perseverance, Self-regulation, and Zest accounted for approximately 40% of the variance in the SDL Composite, with VIF values indicating no multicollinearity issues for the independent variables. Each of the eight independent variables was examined for statistical significance, with four of the eight found to have no statistically significant effect on SDL Composite: Fairness ($b = .269$, $t[262] = .958$, $p = .339$), Gratitude ($b = -.177$, $t[262] = -.603$, $p = .547$), Honesty ($b = .210$, $t[262] = .617$,

$p = .538$), and Zest ($b = .059$, $t[262] = .210$, $p = .834$). Each of these four variables had been included in the multiple regression with both the Spearman and Pearson correlations exceeding $|.3|$. The remaining four independent variables in the model had a statistically significant effect on SDL Composite: Hope ($b = .725$, $t[262] = 2.081$, $p = .038$), Love of Learning ($b = 1.448$, $t[262] = 4.798$, $p < .001$), Perseverance ($b = .856$, $t[262] = 2.961$, $p = .003$), and Self-regulation ($b = .744$, $t[262] = 2.642$, $p = .009$).

The researcher removed Fairness, Gratitude, Honesty, and Zest from the model and regressed SDL Composite on only Hope, Love of Learning, Perseverance, and Self-regulation. The overall multiple regression model was statistically significant ($R^2 = .395$, $F[4, 266] = 43.358$, $p < .001$). Hope, Love of Learning, Perseverance, and Self-regulation accounted for approximately 40% of the variance in SDL Composite, with VIF values indicating no multicollinearity issues for the independent variables. The four remaining independent variables were examined for statistical significance, and all were found to have a statistically significant effect on SDL Composite: Hope ($b = .702$, $t[266] = 2.812$, $p = .005$), Love of Learning ($b = 1.525$, $t[266] = 5.261$, $p < .001$), Perseverance ($b = .920$, $t[266] = 3.319$, $p = .001$), and Self-regulation ($b = .811$, $t[266] = 2.988$, $p = .003$). For this regression, the multiple regression equation was:

$$\begin{aligned} \text{SDL Composite} = & 35.449 + .702 (\text{Hope}) + 1.525 (\text{Love of Learning}) \\ & + .920 (\text{Perseverance}) + .811 (\text{Self-regulation}). \end{aligned} \quad (8)$$

The value of the β s were also obtained for the significant independent variables in this multiple regression: Hope ($\beta = .162$), Love of Learning ($\beta = .276$), Perseverance ($\beta = .218$), and Self-

regulation ($\beta = .195$). These four character strengths were most highly correlated with SDL Composite.

Effect Sizes

In addition to considering the statistical significance of research results, a researcher should also address the effect size relevant to those results (Keith, 2019, p. 62). A commonly accepted standard of effect size requires an f^2 minimum of .02 to be considered a small effect, .15 to be considered a medium effect, and .35 to be considered a large effect (Cohen et al., 2003, p. 95). Cohen's f^2 can be calculated using the formula

$$f^2 = \frac{R^2}{1-R^2} . \quad (9)$$

The researcher calculated Cohen's f^2 for each of the dependent variables: SDL Initiative ($f^2 = .359$; large effect), SDL Control ($f^2 = .742$; large effect), SDL Self-efficacy ($f^2 = .479$; large effect), SDL Motivation ($f^2 = .264$; medium effect), and SDL Composite ($f^2 = .653$; large effect).

Influence of Age on Relationships Between Character Strengths and SDL

RQ2: To what extent are relationships between character strengths and self-directed learning influenced by doctoral students' personal characteristics, specifically gender, age, and stage of doctoral program?

Previous analyses indicated that neither Gender nor Stage of Doctoral Study were meaningfully associated with the self-directed learning component and/or composite variables. Therefore, for the second research question, the researcher used multiple regression to consider (a) the influence of age on the relationships between *groups* of character strengths found to be statistically significant in earlier multiple regressions (IVs) and the self-directed learning

components and/or composite (DVs), and (b) the influence of age on the relationships between *individual* character strengths found to be statistically significant in earlier multiple regression (IVs) and the self-directed learning components and/or composite (DVs). For each *individual* character strength of interest, the researcher performed a simple linear regression between the character strength (IV) and associated self-directed learning variables (DVs). The researcher then sequentially regressed the self-directed learning variables (DVs) on age and the character strength.

Analyses of Groups of Character Strengths by SDL Component/Composite

SDL Initiative. Using sequential multiple regression, the researcher regressed SDL Initiative on Age (block 1) and Bravery, Creativity, and Love of Learning (block 2). (See Table 7.) Model 1, containing only Age as an IV, was statistically significant ($R^2 = .038$, $F[1, 269] = 10.649$, $p = .001$). Age accounted for approximately 4% of the variance in SDL Initiative. After the additional three IVs were entered in block 2, model 2 was also statistically significant ($R^2 = .268$, $F[4, 266] = 24.391$, $p < .001$). Model 2, containing Age, along with Bravery, Creativity, and Love of Learning, accounted for approximately 27% of total variance in SDL Initiative, with VIF values indicating no multicollinearity issues for the independent variables. The introduction of Bravery, Creativity, and Love of Learning accounted for the additional variance of about 23% after controlling for Age ($\Delta R^2 = .230$, $F[3, 266] = 27.906$, $p < .001$). In model 2, only Bravery ($b = .226$, $t[266] = 2.652$, $p = .008$), Creativity ($b = .226$, $t[266] = 2.558$, $p = .011$), and Love of Learning ($b = .440$, $t[266] = 4.861$, $p < .001$) showed statistically significant associations with SDL Initiative. Age was not statistically significant in this regression. Therefore, the researcher

Table 7
Sequential Multiple Regressions for RQ2

Variable	<i>b</i>	<i>SE b</i>	β	R^2	ΔR^2	<i>p</i>
SDL Initiative						
Step 1				0.038	0.038	0.001
Constant	18.445	0.849				
Age	0.082	0.025	0.195			
Step 2				0.268	0.230	< .001
Constant	6.760	1.494				< .001
Age	0.028	0.023	0.067			0.219
Bravery	0.226	0.085	0.173			0.008
Creativity	0.226	0.088	0.170			0.011
Love of Learning	0.440	0.090	0.285			< .001
Final Regression (Age Removed)				0.264	-0.004	< .001
Constant	7.217	1.448				< .001
Bravery	0.245	0.084	0.187			0.004
Creativity	0.225	0.088	0.169			0.011
Love of Learning	0.453	0.090	0.294			< .001
SDL Control						
Step 1				0.054	0.054	< .001
Constant	18.968	0.923				< .001
Age	0.107	0.027	0.233			< .001
Step 2				0.438	0.384	< .001
Constant	9.358	1.008				< .001
Age	0.053	0.022	0.115			0.015
Perseverance	0.450	0.080	0.348			< .001
Self-Regulation	0.438	0.078	0.344			< .001

Table 7 continued

Variable	<i>b</i>	<i>SE b</i>	β	<i>R</i> ²	ΔR^2	<i>p</i>
SDL Self-Efficacy						
Step 1				0.077	0.077	< .001
Constant	19.589	0.906				< .001
Age	0.127	0.027	0.278			< .001
Step 2				0.355	0.278	< .001
Constant	11.457	1.074				< .001
Age	0.082	0.023	0.179			< .001
Perseverance	0.352	0.086	0.273			< .001
Self-Regulation	0.398	0.083	0.314			< .001
SDL Motivation						
Step 1				0.106	0.106	< .001
Constant	18.502	1.178				< .001
Age	0.197	0.035	0.326			< .001
Step 2				0.256	0.146	< .001
Constant	5.833	2.078				0.005
Age	0.132	0.033	0.218			< .001
Hope	0.323	0.104	0.186			0.002
Love of Learning	0.631	0.130	0.284			< .001
SDL Composite						
Step 1				0.117	0.117	< .001
Constant	75.503	2.909				< .001
Age	0.514	0.086	0.342			< .001
Step 2				0.427	0.31	< .001
Constant	30.992	4.693				< .001
Age	0.283	0.073	0.189			< .001
Hope	0.533	0.247	0.123			0.032
Love of Learning	1.425	0.284	0.258			< .001
Perseverance	0.818	0.272	0.194			0.003
Self-Regulation	0.858	0.265	0.206			0.001

Note. Results of sequential regression of SDL dependent variables onto Age (block 1) and character strengths (block 2).

removed Age from the model and regressed SDL Initiative on only Bravery, Creativity, and Love of Learning. This was the same as the simultaneous multiple regression for RQ1. The overall multiple regression model was statistically significant ($R^2 = .264$, $F[3, 267] = 31.953$, $p < .001$). Bravery, Creativity, and Love of Learning accounted for approximately 26% of the variance in SDL Initiative, with VIF values indicating no multicollinearity issues for the independent variables. Each of the remaining three independent variables was examined for statistical significance, with all found to have a statistically significant effect on SDL Initiative: Bravery ($b = .245$, $t[267] = 2.912$, $p = .004$), Creativity ($b = .225$, $t[267] = 2.548$, $p = .011$), and Love of Learning ($b = .453$, $t[267] = 5.043$, $p < .001$). For this regression, the multiple regression equation was:

$$\begin{aligned} \text{SDL Initiative}_{\text{Predicted}} = & 7.217 + .245 (\text{Bravery}) + .225 (\text{Creativity}) \\ & + .453 (\text{Love of Learning}). \end{aligned} \quad (10)$$

The values of the β s were obtained for the significant independent variables in this multiple regression: Bravery ($\beta = .187$), Creativity ($\beta = .169$), and Love of Learning ($\beta = .294$).

SDL Control. Using sequential multiple regression, the researcher regressed SDL Control on Age (block 1) and Perseverance and Self-regulation (block 2). Model 1, containing only Age as an IV, was statistically significant ($R^2 = .054$, $F[1, 269] = 15.470$, $p < .001$). Age accounted for approximately 5% of the variance in SDL Control. After the additional two IVs were entered in block 2, model 2 was also statistically significant ($R^2 = .438$, $F[3, 267] = 69.485$, $p < .001$). Model 2, containing Age, along with Perseverance and Self-regulation, accounted for approximately 44% of total variance in SDL Control. The introduction of Perseverance and Self-regulation accounted for the additional variance of about 38% after controlling for Age (ΔR^2

= .384, $F[2, 267] = 91.299$, $p < .001$). In model 2, Age ($b = .053$, $t[267] = 2.449$, $p = .015$), Perseverance ($b = .450$, $t[267] = 5.600$, $p < .001$), and Self-regulation ($b = .438$, $t[267] = 5.604$, $p < .001$) all showed statistically significant associations with SDL Control. For this regression, the multiple regression equation was:

$$\begin{aligned} \text{SDL Control}_{\text{Predicted}} = & 9.358 + .053 (\text{Age}) + .450 (\text{Perseverance}) \\ & + .438 (\text{Love of Learning}). \end{aligned} \quad (11)$$

The values of the β s were obtained for the significant independent variables in this multiple regression: Age ($\beta = .115$), Perseverance ($\beta = .348$), and Self-regulation ($\beta = .344$).

SDL Self-Efficacy. Using sequential multiple regression, the researcher regressed SDL Self-efficacy on Age (block 1) and Perseverance and Self-regulation (block 2). Model 1, containing only Age as an IV, was statistically significant ($R^2 = .077$, $F[1, 269] = 22.494$, $p < .001$). Age accounted for approximately 8% of the variance in SDL Self-efficacy. After the additional two IVs were entered in block 2, model 2 was also statistically significant ($R^2 = .355$, $F[3, 267] = 48.983$, $p < .001$). Model 2, containing Age, along with Perseverance and Self-regulation, accounted for approximately 36% of total variance in SDL Control. The introduction of Perseverance and Self-regulation accounted for the additional variance of about 28% after controlling for Age ($\Delta R^2 = .278$, $F[2, 267] = 57.503$, $p < .001$). In model 2, Age ($b = .082$, $t[267] = 3.557$, $p < .001$), Perseverance ($b = .352$, $t[267] = 4.106$, $p < .001$), and Self-regulation ($b = .398$, $t[267] = 4.781$, $p < .001$) all showed statistically significant associations with SDL Self-efficacy. For this regression, the multiple regression equation was:

$$\begin{aligned} \text{SDL Self-Efficacy}_{\text{Predicted}} = & 11.457 + .082 (\text{Age}) + .352 (\text{Perseverance}) \\ & + .398 (\text{Love of Learning}). \end{aligned} \quad (12)$$

The values of the β s were obtained for the significant independent variables in this multiple regression: Age ($\beta = .179$), Perseverance ($\beta = .273$), and Self-regulation ($\beta = .314$).

SDL Motivation. Using sequential multiple regression, the researcher regressed SDL Motivation on Age (block 1) and Hope and Love of Learning (block 2). Model 1, containing only Age as an IV, was statistically significant ($R^2 = .106$, $F[1, 269] = 32.020$, $p < .001$). Age accounted for approximately 11% of the variance in SDL Motivation. After the additional two IVs were entered in block 2, model 2 was also statistically significant ($R^2 = .253$, $F[3, 267] = 30.115$, $p < .001$). Model 2, containing Age, along with Hope and Love of Learning, accounted for approximately 25% of total variance in SDL Motivation. The introduction of Hope and Love of Learning accounted for the additional variance of about 15% after controlling for Age ($\Delta R^2 = .146$, $F[2, 267] = 26.166$, $p < .001$). In model 2, Age ($b = .132$, $t[267] = 3.946$, $p < .001$), Hope ($b = .323$, $t[267] = 3.122$, $p = .002$), and Love of Learning ($b = .631$, $t[267] = 4.868$, $p < .001$) all showed statistically significant associations with SDL Motivation. For this regression, the multiple regression equation was:

$$\begin{aligned} \text{SDL Motivation}_{\text{Predicted}} = & 5.833 + .132 (\text{Age}) + .323 (\text{Hope}) \\ & + .631 (\text{Love of Learning}). \end{aligned} \quad (13)$$

The value of the β s were obtained for the significant independent variables in this multiple regression: Age ($\beta = .218$), Hope ($\beta = .186$), and Love of Learning ($\beta = .284$).

SDL Composite. Using sequential multiple regression, the researcher regressed the SDL Composite on Age (block 1) and Hope, Love of Learning, Perseverance, and Self-regulation (block 2). Model 1, containing only Age as an IV, was statistically significant ($R^2 = .117$, $F[1, 269] = 35.624$, $p < .001$). Age accounted for approximately 12% of the variance in SDL

Composite. After the additional four IVs were entered in block 2, model 2 was also statistically significant ($R^2 = .427$, $F[5, 265] = 39.472$, $p < .001$). Model 2, containing Age, along with Hope, Love of Learning, Perseverance, and Self-regulation accounted for approximately 43% of total variance in SDL Composite. The introduction of Hope, Love of Learning, Perseverance, and Self-regulation accounted for the additional variance of about 31% after controlling for Age ($\Delta R^2 = .310$, $F[4, 265] = 35.822$, $p < .001$). In model 2, Age ($b = .283$, $t[265] = 3.857$, $p < .001$), Hope ($b = .533$, $t[265] = 2.153$, $p = .032$), Love of Learning ($b = 1.425$, $t[265] = 5.023$, $p < .001$), Perseverance ($b = .818$, $t[265] = 3.011$, $p = .003$), and Self-regulation ($b = .858$, $t[265] = 3.238$, $p = .001$) all showed statistically significant associations with SDL Composite. For this regression, the multiple regression equation was:

$$\begin{aligned} \text{SDL Composite}_{\text{Predicted}} = & 30.992 + .283 (\text{Age}) + .533 (\text{Hope}) + 1.425 (\text{Love of Learning}) \\ & + .818 (\text{Perseverance}) + .858 (\text{Self-regulation}). \end{aligned} \quad (14)$$

The values of the β s were obtained for the significant independent variables in this multiple regression: Age ($\beta = .189$), Hope ($\beta = .123$), Love of Learning ($\beta = .258$), Perseverance ($\beta = .194$), and Self-regulation ($\beta = .206$).

Analyses of Individual Character Strengths

Bravery. The character strength of Bravery was associated with one SDL component variable, Initiative. Simple linear regression indicated that Bravery (IV) had a statistically significant relationship with dependent variable SDL Initiative ($R^2 = .146$, $F[1, 269] = 46.092$, $p < .001$). Bravery accounted for about 15% of the variance in SDL Initiative. The sequential multiple regression of SDL Initiative onto Age (block 1) and Bravery (block 2) was also statistically significant ($R^2 = .157$, $F[2, 268] = 24.923$, $p < .001$), accounting for approximately

16% of total variance in SDL Initiative. After controlling for Age, Bravery alone accounted for about 12% of additional variance ($\Delta R^2 = .119$, $F[1, 268] = 37.743$, $p < .001$). In the sequential multiple regression, Bravery ($b = .466$, $t[268] = 6.144$, $p < .001$) was statistically significant, while Age ($b = .045$, $t[268] = 1.831$, $p = .068$) was not. The inclusion of Age in the model reduced the variance accounted for by Bravery by about 4%.

Creativity. The character strength of Creativity was associated with one SDL component variable, Initiative. Simple linear regression indicated that Creativity (IV) had a statistically significant relationship with dependent variable SDL Initiative ($R^2 = .157$, $F[1, 269] = 50.273$, $p < .001$). Creativity accounted for about 16% of the variance in SDL Initiative. The sequential multiple regression of SDL Initiative onto Age (block 1) and Creativity (block 2) was also statistically significant ($R^2 = .175$, $F[2, 268] = 28.367$, $p < .001$), accounting for approximately 18% of total variance in SDL Initiative. After controlling for Age, Creativity alone accounted for about 14% of additional variance ($\Delta R^2 = .137$, $F[1, 268] = 44.367$, $p < .001$). In the sequential multiple regression, both Creativity ($b = .498$, $t[268] = 6.661$, $p < .001$) and Age ($b = .056$, $t[268] = 2.367$, $p = .019$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Creativity by about 4%.

Hope. The character strength of Hope was associated with two SDL variables, SDL Motivation and SDL Composite.

Motivation. Simple linear regression indicated that Hope (IV) had a statistically significant relationship with dependent variable SDL Motivation ($R^2 = .131$, $F[1, 269] = 40.721$, $p < .001$). Hope accounted for about 13% of the variance in SDL Motivation. The sequential multiple regression of SDL Motivation onto Age (block 1) and Hope (block 2) was also

statistically significant ($R^2 = .187$, $F[2, 268] = 30.722$, $p < .001$), accounting for approximately 19% of total variance in SDL Motivation. After controlling for Age, Hope alone accounted for about 8% of additional variance ($\Delta R^2 = .080$, $F[1, 268] = 26.401$, $p < .001$). In the sequential multiple regression, both Hope ($b = .513$, $t[268] = 5.138$, $p < .001$) and Age ($b = .148$, $t[268] = 4.258$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Hope by about 5%.

Composite. Simple linear regression indicated that Hope (IV) had a statistically significant relationship with dependent variable SDL Composite ($R^2 = .208$, $F[1, 269] = 70.847$, $p < .001$). Hope accounted for about 21% of the variance in SDL Composite. The sequential multiple regression of SDL Composite onto Age (block 1) and Hope (block 2) was also statistically significant ($R^2 = .259$, $F[2, 268] = 46.734$, $p < .001$), accounting for approximately 26% of total variance in SDL Composite. After controlling for Age, Hope alone accounted for about 14% of additional variance ($\Delta R^2 = .142$, $F[1, 268] = 51.197$, $p < .001$). In the sequential multiple regression, both Hope ($b = 1.694$, $t[268] = 7.155$, $p < .001$) and Age ($b = .350$, $t[268] = 4.256$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Hope by about 7%.

Love of Learning. The character strength of Love of Learning was associated with three SDL variables: SDL Initiative, SDL Motivation, and SDL Composite.

SDL Initiative. Simple linear regression indicated that Love of Learning (IV) had a statistically significant relationship with dependent variable SDL Initiative ($R^2 = .182$, $F[1, 269] = 59.954$, $p < .001$). Love of Learning accounted for about 18% of the variance in SDL Initiative. The sequential multiple regression of SDL Initiative onto Age (block 1) and Love of

Learning (block 2) was also statistically significant ($R^2 = .195$, $F[2, 268] = 32.453$, $p < .001$), accounting for approximately 20% of total variance in SDL Initiative. After controlling for Age, Love of Learning alone accounted for about 16% of additional variance ($\Delta R^2 = .157$, $F[1, 268] = 52.228$, $p < .001$). In the sequential multiple regression, both Love of Learning ($b = .624$, $t[268] = 7.227$, $p < .001$) and Age ($b = .048$, $t[268] = 2.057$, $p = .041$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Love of Learning by about 2%.

SDL Motivation. Simple linear regression indicated that Love of Learning (IV) had a statistically significant relationship with dependent variable SDL Motivation ($R^2 = .162$, $F[1, 269] = 52.170$, $p < .001$). Love of Learning accounted for about 16% of the variance in SDL Motivation. The sequential multiple regression of SDL Motivation onto Age (block 1) and Love of Learning (block 2) was also statistically significant ($R^2 = .226$, $F[2, 268] = 39.026$, $p < .001$), accounting for approximately 23% of total variance in SDL Initiative. After controlling for Age, Love of Learning alone accounted for about 12% of additional variance ($\Delta R^2 = .119$, $F[1, 268] = 41.242$, $p < .001$). In the sequential multiple regression, both Love of Learning ($b = .783$, $t[268] = 6.422$, $p < .001$) and Age ($b = .155$, $t[268] = 4.673$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Love of Learning by about 4%.

SDL Composite. Simple linear regression indicated that Love of Learning (IV) had a statistically significant relationship with dependent variable SDL Composite ($R^2 = .195$, $F[1, 269] = 65.113$, $p < .001$). Love of Learning accounted for about 20% of the variance in SDL Composite. The sequential multiple regression of SDL Composite onto Age (block 1) and Love

of Learning (block 2) was also statistically significant ($R^2 = .262$, $F[2, 268] = 47.640$, $p < .001$), accounting for approximately 26% of total variance in SDL Composite. After controlling for Age, Love of Learning alone accounted for about 15% of additional variance ($\Delta R^2 = .145$, $F[1, 268] = 52.796$, $p < .001$). In the sequential multiple regression, both Love of Learning ($b = 2.148$, $t[268] = 7.266$, $p < .001$) and Age ($b = .398$, $t[268] = 4.948$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Love of Learning by about 5%.

Perseverance. The character strength of Perseverance was associated with three SDL variables: SDL Control, SDL Self-efficacy, and SDL Composite.

SDL Control. Simple linear regression indicated that Perseverance (IV) had a statistically significant relationship with dependent variable SDL Control ($R^2 = .360$, $F[1, 269] = 151.007$, $p < .001$). Perseverance accounted for about 36% of the variance in SDL Control. The sequential multiple regression of SDL Control onto Age (block 1) and Perseverance (block 2) was also statistically significant ($R^2 = .372$, $F[2, 268] = 79.504$, $p < .001$), accounting for approximately 37% of total variance in SDL Control. After controlling for Age, Perseverance alone accounted for about 32% of additional variance ($\Delta R^2 = .318$, $F[1, 268] = 135.787$, $p < .001$). In the sequential multiple regression, both Perseverance ($b = .746$, $t[268] = 11.653$, $p < .001$) and Age ($b = .053$, $t[268] = 2.342$, $p = .020$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Perseverance by about 4%.

SDL Self-Efficacy. Simple linear regression indicated that Perseverance (IV) had a statistically significant relationship with dependent variable SDL Self-efficacy ($R^2 = .269$, $F[1, 269] = 98.931$, $p < .001$). Perseverance accounted for about 27% of the variance in SDL Self-

efficacy. The sequential multiple regression of SDL Self-efficacy onto Age (block 1) and Perseverance (block 2) was also statistically significant ($R^2 = .300$, $F[2, 268] = 57.367$, $p < .001$), accounting for approximately 30% of total variance in SDL Self-efficacy. After controlling for Age, Perseverance alone accounted for about 22% of additional variance ($\Delta R^2 = .223$, $F[1, 268] = 85.200$, $p < .001$). In the sequential multiple regression, both Perseverance ($b = .620$, $t[268] = 9.230$, $p < .001$) and Age ($b = .082$, $t[268] = 3.438$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Perseverance by about 4%.

SDL Composite. Simple linear regression indicated that Perseverance (IV) had a statistically significant relationship with dependent variable SDL Composite ($R^2 = .236$, $F[1, 269] = 83.302$, $p < .001$). Perseverance accounted for about 24% of the variance in SDL Composite. The sequential multiple regression of SDL Composite onto Age (block 1) and Perseverance (block 2) was also statistically significant ($R^2 = .298$, $F[2, 268] = 56.876$, $p < .001$), accounting for approximately 30% of total variance in SDL Composite. After controlling for Age, Perseverance alone accounted for about 18% of additional variance ($\Delta R^2 = .181$, $F[1, 268] = 69.109$, $p < .001$). In the sequential multiple regression, both Perseverance ($b = 1.836$, $t[268] = 8.313$, $p < .001$) and Age ($b = .381$, $t[268] = 4.846$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Perseverance by about 6%.

Self-Regulation. The character strength of Self-regulation was associated with three SDL variables: SDL Control, SDL Self-efficacy, and SDL Composite.

SDL Control. Simple linear regression indicated that Self-regulation (IV) had a statistically significant relationship with dependent variable SDL Control ($R^2 = .349$, $F[1, 269] = 144.267$, $p < .001$). Self-regulation accounted for about 35% of the variance in SDL Control.

The sequential multiple regression of SDL Control onto Age (block 1) and Self-regulation (block 2) was also statistically significant ($R^2 = .372$, $F[2, 268] = 79.534$, $p < .001$), accounting for approximately 37% of total variance in SDL Control. After controlling for Age, Self-regulation alone accounted for about 32% of additional variance ($\Delta R^2 = .318$, $F[1, 268] = 135.844$, $p < .001$). In the sequential multiple regression, both Self-regulation ($b = .725$, $t[268] = 11.655$, $p < .001$) and Age ($b = .071$, $t[268] = 3.160$, $p = .002$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Self-regulation by about 3%.

SDL Self-Efficacy. Simple linear regression indicated that Self-regulation (IV) had a statistically significant relationship with dependent variable SDL Self-efficacy ($R^2 = .271$, $F[1, 269] = 100.061$, $p < .001$). Self-regulation accounted for about 27% of the variance in SDL Self-efficacy. The sequential multiple regression of SDL Self-efficacy onto Age (block 1) and Self-regulation (block 2) was also statistically significant ($R^2 = .314$, $F[2, 268] = 61.413$, $p < .001$), accounting for approximately 31% of total variance in SDL Self-efficacy. After controlling for Age, Self-regulation alone accounted for about 24% of additional variance ($\Delta R^2 = .237$, $F[1, 268] = 92.667$, $p < .001$). In the sequential multiple regression, both Self-regulation ($b = .622$, $t[268] = 9.626$, $p < .001$) and Age ($b = .096$, $t[268] = 4.107$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Self-regulation by about 3%.

SDL Composite. Simple linear regression indicated that Self-regulation (IV) had a statistically significant relationship with dependent variable SDL Composite ($R^2 = .226$, $F[1, 269] = 78.510$, $p < .001$). Self-regulation accounted for about 23% of the variance in SDL Composite. The sequential multiple regression of SDL Composite onto Age (block 1) and Self-

regulation (block 2) was also statistically significant ($R^2 = .304$, $F[2, 268] = 58.443$, $p < .001$), accounting for approximately 30% of total variance in SDL Composite. After controlling for Age, Self-regulation alone accounted for about 19% of additional variance ($\Delta R^2 = .187$, $F[1, 268] = 71.876$, $p < .001$). In the sequential multiple regression, both Self-regulation ($b = 1.813$, $t[268] = 8.478$, $p < .001$) and Age ($b = .423$, $t[268] = 5.471$, $p < .001$) were statistically significant. The inclusion of Age in the model reduced the variance accounted for by Self-regulation by about 4%.

Findings

Correlations

Eleven of 24 character strengths, along with the demographic variable of Age, were found to be correlated with at least one of the SDL components/composite at $|.3|$ or higher, using Pearson product-moment correlation, Spearman rho correlation, or both. The remaining 13 character strengths, as well as demographic variables Gender and Stage of Doctoral Study, did not meet the $|.3|$ to be included in the multiple regressions. Four character strengths correlated with SDL Initiative, five with SDL Control and SDL Self-efficacy, two with SDL Motivation, and eight with SDL Composite. Age correlated with only SDL Motivation and SDL Composite.

For this sample, several character strengths correlated with other character strengths at a level of $|.5|$ or higher. There were 14 such correlated pairs. The third most highly correlated pair, Perseverance and Self-regulation, correlated with three SDL variables, SDL Control, SDL Self-efficacy, and SDL Composite. These three SDL variables were also the ones with the highest average item scores among the five SDL variables. Additionally, Perseverance and Self-

regulation were the only character strengths later found to be statistically significant for SDL Control and SDL Self-efficacy in the simultaneous multiple regressions for RQ1.

Multiple Regressions for RQ1

Simultaneous multiple regressions were implemented for RQ1 explorations. Each SDL component/composite was regressed on the character strengths identified in the correlation phase of the data analysis. Any character strengths which failed to show statistical significance were eliminated from the list of IVs and the multiple regression was revised.

For SDL Initiative, the character strengths which were statistically significant in the regression equation were Bravery, Creativity, and Love of Learning. Love of Learning was most important, followed by Bravery then Creativity. For both SDL Control and SDL Self-efficacy, the character strengths which were statistically significant in the regression equation were Perseverance and Self-regulation. Perseverance was most important in SDL Control, while Self-regulation was most important in SDL Self-efficacy. For SDL Motivation, the character strengths which were statistically significant in the regression equation were Hope and Love of Learning. Love of Learning was more important in the regression equation. For SDL Composite, the character strengths which were statistically significant in the regression equation were Hope, Love of Learning, Perseverance, and Self-regulation. Love of Learning was most important in the regression equation, with Perseverance, Self-regulation, and Hope following in that order. Notably, Love of Learning was the most important character strength in three of the five SDL components/composite. Perseverance and Self-regulation were most important in the other two SDL components/composite. Self-regulation was a close second to Perseverance in

SDL Control, while Perseverance was an even closer second to Self-regulation in SDL Self-efficacy.

Multiple Regressions for RQ2

To determine whether age influenced the relationship between character strengths and self-directed learning, the researcher included age as an IV in sequential multiple regressions of SDL components/composite onto groups of character strengths, as well as individual character strengths, associated with them. Age as a single predictor of SDL components/composite accounted for 4-12% of variance in each of the SDL variables.

For SDL Initiative, Age was no longer statistically significant after the introduction of the group of character strength variables in block 2 of the regression. Age was also no longer significant in the sequential regression of SDL Initiative onto Age (block 1) and the individual character strength Bravery (block 2). Age remained significant in Model 2 of the two sequential regressions of SDL Initiative onto Age and Creativity, then Age and Love of Learning. Age reduced the variance accounted for by the character strengths by 2-4%. For both SDL Control and SDL Self-efficacy, Age remained statistically significant after the introduction of the group of character strength variables in block 2 of the regression. Age remained significant in Model 2 of the sequential regressions of both SDL Control and SDL Self-efficacy onto Age and Perseverance, then Age and Self-regulation. Age reduced the variance accounted for by the character strengths by 3-4% for both variables. For SDL Motivation, Age remained statistically significant after the introduction of the group of character strength variables in block 2 of the regression. Age remained significant in Model 2 of the sequential regression of SDL Motivation onto Age and Hope, then Age and Love of Learning. Age reduced the variance accounted for by

the character strengths by 4-5%. For SDL Composite, Age remained statistically significant after the introduction of the group of character strength variables in block 2 of the regression. Age remained significant in Model 2 of the sequential regression of SDL Composite onto Age and Hope, Age and Love of Learning, Age and Perseverance, and Age and Self-regulation. Age reduced the variance accounted for by the character strengths by 4-7%.

Examination of the data regarding the relationship between age and SDL Initiative showed an interesting result which can be examined in more detail. When the SDL components and SDL Composite were regressed on age (block 1) and the significant character strengths (block 2), age was still significant in Model 2 for SDL Composite and three of the SDL components. Age was not significant in Model 2 for SDL Initiative, however. Only Bravery, Creativity, and Love of Learning remained as significant in Model 2. Continuing into the next phase of the analysis, the relationship between single character strengths and SDL Composite and components was explored through sequential multiple regression. The researcher found that age was non-significant when SDL Initiative was regressed on Age then Bravery. Therefore, for both sequential multiple regressions which included regression of SDL Initiative onto Age then Bravery (alone or in combination with other character strengths), Age was non-significant in Model 2.

This chapter has provided information about the sample for this study, as well as descriptive statistics for all variables. Correlations between independent and dependent variables provided guidance for multiple regression. The multiple regression explored the relationships between character strengths and self-directed learning components and composite. Further regression explored how an age factor could influence relationships between character strengths

and self-directed learning components and composite. Finally, discussion of the results elaborated on the analyses. Chapter 5 will provide a study summary, discussion and implications of the study results, and future research possibilities.

Chapter 5

Conclusion

Chapter 1 provided an introduction to this dissertation study, including the research problem, purpose of the study, research questions, and theoretical models. Chapter 2 expanded the discussion of these topics with a literature review designed to give details about the areas of research related to this dissertation study. Chapter 3 detailed the methodology used in the current study. Chapter 4 provided information about the study sample, the descriptive statistics for all variables, correlations and multiple regressions that were performed, and conclusions drawn from the data analyses. This chapter will provide a study summary, discussion, and implications of the study results for practice in doctoral education. Future topics of research will also be addressed.

Summary of Study

This dissertation study focused on the relationships between character strengths from the field of positive psychology and self-directed learning from the field of adult education. This study was designed to examine the relationships between SDL and character strengths, as well as the relationships between SDL and demographic variables of gender, age, and stage of doctoral study. Also of interest was any interaction between the demographic variables and the character strengths in relation to SDL. The researcher explored two research questions:

RQ1: Which character strengths, if any, are associated with self-directed learning in doctoral students?

RQ2: To what extent are relationships between character strengths and self-directed learning influenced by doctoral students' personal characteristics, specifically gender, age, and stage of doctoral study?

The research was situated within the theoretical frameworks of Hiemstra and Brockett's Person Process Context (PPC) model of self-directed learning and Peterson and Seligman's VIA model of character strengths and virtues. Participants completed a survey consisting of the PRO-SDLS measuring self-directed learning, the VIA-IS-P measuring character strengths, and several demographic items. Data analysis was based on data obtained from 271 participants who were Ph.D. doctoral students at a large R1 university in the southeastern United States.

The researcher correlated SDL component and composite variables with character strength and demographic variables. Variables which correlated within set parameters would be included in multiple regressions later in the analysis. Neither gender nor stage in doctoral program variables were correlated with SDL variables, while the age correlation was sufficient to warrant inclusion of age in later multiple regressions. Eleven of the 24 character strengths met the criteria for inclusion in later multiple regressions. Multiple regressions of the five SDL variables on character strengths indicated that six of the 24 character strengths showed statistically significant relationships with one or more SDL variables. Further regressions indicated that for each character strength, the inclusion of age in the regression slightly reduced the variance explained by the character strength.

Discussion

Major Findings

While 11 character strengths correlated with SDL components or composite, only six ultimately indicated statistical significance in the multiple regression phase of the study:

Bravery, Creativity, Hope, Love of Learning, Perseverance, and Self-Regulation. Every statistically significant variable correlated with at least two SDL variables, except for Bravery and Creativity, which correlated with only SDL Initiative. When the SDL variables were regressed on Age (block 1), then the groups of statistically significant character strengths (block 2), Age was found to be significant in model 2 for every SDL variable except SDL Initiative. When SDL variables were regressed on Age (block 1) and each statistically significant variable individually (block 2), Age was found to be significant in Model 2 for each combination except for SDL Initiative regressed on Bravery.

Correlations

Observations of Interest. Not surprisingly, character strengths which were more highly correlated with each other often tended to correlate together in pairs with SDL variables, though some were eventually eliminated from models for lack of statistical significance. However, Love of Learning correlated with three SDL variables (SDL Initiative, SDL Motivation, and SDL Composite) but was not highly correlated with any other statistically significant character strength variables. Notably, Love of Learning was the only variable significantly related in the multiple regression to SDL Initiative which also was significantly related to other SDL variables. Perseverance and Self-Regulation were as a pair correlated with three SDL variables (SDL Control, SDL Self-Efficacy, and SDL Composite), with no independent significant correlations with the other two SDL variables. Overall, SDL Control, SDL Self-Efficacy, SDL Motivation, and SDL Composite seemed to have overlapping related variables of significance, while SDL Initiative seemed to be somewhat unique in its related character strengths, except for Love of Learning.

Interpretation. In relation to the PPC model of self-directed learning by Hiemstra and Brockett, the character strengths are a part of the Person component of the model. The Person element of the model consists of all of the personal characteristics of the learner which can affect self-directed learning (Hiemstra & Brockett, 2012, p. 158). The character strengths of Love of Learning, Perseverance, and Self-regulation seem to have wider consequence than other character strengths in the field of self-directed learning. Love of Learning and Self-regulation seem to intuitively relate to the practice of self-directed learning, as its exercise hinges on learners who “plan, carry out, and evaluate their own learning” (Merriam et al., 2007, p. 107). The planning phase is facilitated by Love of Learning, as a learner who is interested in learning will effectively plan for the learning experience, expending time and effort to make it a positive experience. Perseverance is necessary to execute the learning plan and carry it through to completion. Finally, self-regulation enables the learner to engage in evaluation of the learning and to make necessary adjustments, if needed.

The character strengths Bravery, Creativity, and Hope seem to have more limited consequence across SDL component and composite variables. Intuitively, Bravery and Creativity would seem to be helpful character strengths in initiating learning projects. In addition, Hope would facilitate a learner’s SDL Motivation, as a positive outlook on outcomes makes it easier to remain motivated. This motivation then is subsumed in the SDL composite variable, as well.

Multiple Regressions

Observations of Interest. While 11 character strengths were correlated with the SDL variable(s) within the set parameters for the study, only six character strengths were ultimately

found to have statistically significant relationships with SDL variables. Curiosity, Fairness, Gratitude, Honesty, and Zest were eliminated from all multiple regression analyses due to non-significance across all SDL variables, while Bravery, Creativity, Hope, Love of Learning, Perseverance, and Self-regulation were retained. All SDL variables had at least one variable removed from the multiple regressions, except for SDL Motivation, which had only two variables in its initial regression. Three of the five removed character strengths (Curiosity, Gratitude, and Zest) were correlated at $|.5|$ or higher with other character strength variables which were retained. The character strengths which were ultimately retained in the five multiple regressions were, not surprisingly, the character strengths which were originally most highly correlated with each of the five SDL dependent variables.

Age accounted for less variance than character strengths in SDL variables when the sequential regressions were conducted and included Age as a variable. However, age was statistically significant in all sequential regressions except for the two regressions of SDL Initiative which contained the Bravery character strength variable.

Interpretation. The retention of only 11 of 24 character strengths after the correlation phase of the data analysis indicated that SDL in doctoral students is associated with a limited number of strengths, even when accounting for the possibility that the sample might not be representative of all doctoral students. These results confirmed intuitive speculation that many character strengths, like humor or humility, might have no relevance in SDL. Regression of the SDL variables was necessary to possibly pare down the character strengths further, allowing for more detail about the relationships between the SDL variables and the character strengths. The reduction to six character strengths suggested that character strengths were likely correlated

(which was the case for three of them). The remaining two (Fairness and Honesty), like the first 11 character strengths to be removed, intuitively would have little relevance to self-directed learning.

The element of age, throughout the sequential multiple regression data analysis, presented similar findings except when placed in a regression with bravery. For five of six character strength variables, after controlling for age, the variance accounted for by the character strength was decreased from its previous value, a reduction of 2-7% of total variance. These data suggest that, within the field of self-directed learning, character strengths have a relationship that is influenced by maturation.

Context of the Literature

As discussed previously, some studies have explored the relationship between self-directed learning and positive psychology topics such as wellness (Teal et al., 2015; Owen, 1996), resilience (Beeler, 2018; Robinson, 2003), creativity (Cox, 2002), gratitude (Vess, 2015), hope (Dieffenderfer, 2014), and grit (Ruttencutter, 2018). However, this researcher has located little literature which addresses self-directed learning in the context of an entire framework of character strengths, rather than just a single one. Kirwan et al. (2010) examined the Big Five and other narrow personality traits in relation to SDL, but the Big Five personality traits fall within the area of personality theory, not positive psychology. The researcher for the current study adds to the body of research in positive psychology by exploring connections between self-directed learning and a comprehensive body of character strengths within the well-known framework of the VIA model.

Specific studies of character strengths within the field of positive psychology tend to focus largely on well-being (Ruch et al., 2020, p. 4). Recent studies specific to college students using the VIA model have focused on academic performance (Villacís et al., 2021; Karris Bachik et al., 2021), academic satisfaction (Owens et al., 2021), and academic persistence (Browning et al., 2018), finding many positive associations between character strengths and these specific outcomes. However, no studies appeared to examine how character strengths related to a specific type of learning, particularly self-directed learning. This study explores relationships between character strengths and self-directed learning, specifically. In doing so, this study advocates a new avenue of inquiry for character strength literature, wherein character strengths are examined for their relationships with specific types of teaching and learning models, rather than their outcomes.

This study also contributes to the literature by examining the relationship between self-directed learning and demographic variables of age and gender. While the research regarding the relationship between SDL and age has been mixed, this study found that the relationship between age and self-directed learning was significant for the SDL Composite and three of the SDL components. There was no significant relationship between age and SDL Initiative, however. Consistent with other research, this study's results showed no significant relationship between gender and self-directed learning.

Implications for Practice

The findings of this study present several implications for practice in the area of doctoral education. Researchers in the field have asserted the important role of self-directed learning (Lew et al., 2020; Porter et al., 2020; Lake et al., 2018; Kasworm & Bowles, 2010). Because

learning to function as an independent scholar who can engage effectively in research is so important in a Ph.D. doctoral program, self-directed learning can be a great asset to doctoral students (Mendoza & Gardner, 2010, p. 19; Kasworm & Bowles, 2010, p. 238). As graduate schools seek to limit doctoral attrition, they could benefit from knowing which applicants already have those skills and/or have the character strengths associated with SDL. With this information, institutions can not only admit candidates who have SDL skills, but those who are likely to develop them easily. For candidates who lack the skills or character strengths associated with SDL, the institutions can be prepared to offer these students extra supports and opportunities for development. Based on the findings in this study, character strengths of doctoral students should be leveraged to contribute to self-directed learning. Several approaches could contribute to this goal.

Development of Self-Directed Learning

Before discussing how character strengths can be leveraged to develop self-directed learning in doctoral students, this researcher will describe ways in which self-directed learning skills can be established and/or strengthened. Early advocate Malcolm Knowles (1975) provided guidelines for self-directed learning, describing learner-initiated processes in which the learner may or may not be assisted by others (p. 18). Learners engage in “diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes” (Knowles, 1975, p. 18). Knowles (1975) asserted that, despite the emphasis on the individual in the term self-directed learning, the learner typically works in conjunction with others, whether experts or peers (p. 18). Indeed, he suggested that learners be provided the opportunity to choose

whether to work on learning activities either alone or in teams (Knowles, 1975, p. 41). Throughout the process, the concept of learner choice is integral (Brockett, 2006, p. 27; Curran et al., 2019, p. 81). Kraznow and Highland (2016) found that intentional inclusion of self-directed learning instruction in a graduate course increased learner readiness to engage in self-directed learning (p. 1, 11). Not only can faculty introduce self-directed learning concepts into the curriculum, but they can lead students to increasingly engage in self-directed learning in their coursework (Francom, 2010, p. 34). Knowles (1975) provided examples of learning contracts which can guide learners to design their own comprehensive learning plans, following the guidelines he developed (p. 18, 62-63). While neither these tools nor the approach to self-directed learning are new to the field of adult education, their continuing utility has been demonstrated in the literature (Porter et al., 2020, p. 12). This researcher submitted similar learning contracts for some of her own doctoral coursework, which enabled her to participate actively in planning, documenting, and evaluating her own educational experience. (See Appendix F for Brockett's (n.d.) learning contract example.)

Character Strengths Associated with SDL

Doctoral students should be encouraged to use and further develop their existing self-directed learning skills, while using their character strengths to accomplish those objectives. This researcher acknowledges that some of the character strengths associated with self-directed learning, like bravery or hope, may have fewer obvious applications in this effort. Others, however, more than compensate with high relevance in this approach. For example, a doctoral student who exhibits self-regulation as a character strength can reflect on how self-regulation is relevant to self-directed learning. The student can then develop a plan to use self-regulation in

some self-directed learning activities. Likewise, curiosity could help a student to develop self-directed learning skills. The student could critically examine current knowledge of self-directed learning then discover more about other self-directed learning skills that may not be familiar. The student's curiosity would bolster interest in the topic of study and likely result in further exploration than might have occurred in a student who was not strong in the curiosity character strength. By using existing character strengths, the student can further develop as a self-directed learner.

Character Strengths Not Associated with SDL

To complement the approach above, doctoral students can also leverage character strengths which are not associated with self-directed learning. An interesting example of this type of character strength is teamwork. Upon initial consideration, it would seem that this character strength would be the antithesis of anything related to self. However, teamwork could be an effective tool in developing self-directed learning skills in doctoral students. For example, since the transition to independent scholarship is a goal for doctoral students, teams of students can work together to develop skills integral to this transition. Working together as a team, students can break down research goals into more manageable objectives. They can analyze which skills they have and which ones they want to develop. Students with strong skills in an area can facilitate others' learning, while those who are not strong in the skill can take the lead in other areas.

Team-based techniques for building self-directed learning can not only help doctoral students in the primary goal of developing SDL competencies but can also reap the added benefits of developing skills in communication, collaboration, cooperation, and competence as a

team member. Within the context of a team, additional character strengths can be leveraged to work with other team members efficiently and effectively. Character strengths which can directly facilitate teamwork include perspective, judgment, prudence, and leadership.

Furthermore, personal interactions between team members can be enhanced by character strengths including social intelligence, gratitude, zest, humility, honesty, and even humor. Team function is augmented when the team composition is thoughtfully considered. When deciding which doctoral students to include on a team, it is important to contemplate the students' skills sets, personality traits, personal characteristics, and potential contributions to the group. Using a team approach, each student takes on the role of teacher and the role of learner. This approach leads very naturally to the next implication.

Communities of Practice

Doctoral students should become involved in communities of practice. These groups may begin as formal organizations created within an institution, which gradually start to function as communities of practice (Merriam & Bierema, 2014, p. 122). However, they more often develop organically and informally as students gather to study and work together (Merriam & Bierema, 2014, p. 121). As students form these groups, more knowledgeable experts constitute the central core and provide more direction in the group (Merriam & Bierema, 2014, p. 121). However, as other individuals gain competence, they begin to transition from the periphery of the group toward a more central role (Merriam & Bierema, 2014, p. 121). Individuals commonly belong to several communities of practice and may function as core members in some groups and peripheral members in others (Merriam & Bierema, 2014, p. 120-121). Institutions can play

an important role in connecting students to others with whom they can learn, creating spaces and opportunities for engagement (Merriam & Bierema, 2014, p. 122).

To facilitate communities of practice, an institution might set aside times and spaces in which there are no scheduled classes or requirements to allow students to form interest groups about various subtopics of their field. Additionally, the institution might enlist alumni volunteers who have earned doctoral degrees to share tips and suggestions with students just beginning the doctoral program or the dissertation writing process. This institutional facilitation can be particularly important for students who would not normally seek out connections with other students due to their own personality traits, constraints on their time due to personal responsibilities, or simply a lack of knowledge about how to effectively connect with other students. Institutions should also encourage faculty to engage with students within these communities of practice. While faculty interactions within the classroom are critically important to doctoral students' scholarly development, informal interactions can be beneficial, as well. When faculty choose to go beyond their job requirements to engage with students, they may build stronger rapport with students, establish informal mentoring relationships, and strengthen students' sense of belonging within the institution and the larger academic community. The communities of practice may foster connections based on mutual research interests, ultimately leading doctoral students to form productive research partnerships or even supportive personal friendships with fellow doctoral students and/or faculty members. In practice, efforts to establish communities of practice nudge students to make commitments to other students who may be more or less knowledgeable than themselves. Based on their levels of expertise, doctoral

students can then function in the roles of both novice and expert in various communities of practice.

Reflection

Whether doctoral students develop self-directed learning skills through individual work, team exercises, or communities of practice mentioned above or any other methods, reflection can play a key role in optimizing development and effective use of these skills. Reflection on self-directed learning involves not only recognizing and describing events that have occurred, but also critical thinking and analysis related to those events. Kraznow and Hyland's (2016) study highlighted the need for both reflection and critical thinking when developing self-directed learning skills (p. 9, 10). For example, a doctoral student may reflect on their most prevalent character strengths which are related to self-directed learning and whether they are currently optimizing use of those strengths to further their self-directed learning behaviors, as well as how they can do so more comprehensively. In addition, they may reflect on how to further develop self-directed learning using character strengths which are not directly associated with self-directed learning, such as using their strong character strength of teamwork. Indeed, reflection functions as part of the evaluative piece of self-directed learning itself, as the learner must evaluate the learning which has occurred and whether the learning goals and objectives have been accomplished. While the reflection may begin with objective description of events, it must delve deeper into the meaning of these events for the individual learner, which is certainly a more subjective area of inquiry. For a doctoral student who is developing as an independent scholar, comprehensive reflection may determine that the learning experience has been incomplete, even if the goals and objectives originally set by the learner were accomplished.

The doctoral student may determine that additional work is needed toward a new or clarified goal or objective, because the student's understanding has now been expanded to include new avenues of inquiry which must be explored to more fully comprehend a topic. The process of reflection itself may further cause the student to perceive nuances of the learning experience which had not previously been apparent, leading the learner to discern fresh insights.

Recommendations for Future Research

As the researcher worked on the current study, she considered many topics which were outside the main focus of this study, yet tangentially related to the study's interests. Even within the topics addressed in the current study, she found many areas worthy of additional scrutiny. Thus, her recommendations for future research are largely based on the limitations of the current study.

Recommendation 1

One limitation of this study was that its sample included only current doctoral Ph.D. students who were surveyed at one short interval of time. This study should be replicated with participants who are doctoral Ph.D. students and who also participate in follow-up surveys at regular intervals. The first survey could be given in the first year of doctoral study, with follow-up surveys at regular intervals thereafter. This longitudinal approach would allow researchers to explore the stability of character traits over time, as well as development of SDL behaviors during the doctoral Ph.D. program. An additional survey about the development of independent scholarship and research activity would also be helpful. This would allow researchers to explore whether changes in SDL over time are associated with changes in independent scholarship and research activity. If a participant left the doctoral program, researchers would follow up to

determine the cause(s) of attrition. As the research problem for this study was doctoral program attrition, this follow-up would enable the researcher(s) to explore whether there are differences between Ph.D. completers and non-completers.

Recommendation 2

Another limitation of this study was that it was conducted at a single large R1 university in the southeastern United States. This limitation suggests that the study should be replicated at diverse institutions with doctoral Ph.D. programs. Participants should be recruited from multiple institutions, with consideration of geographical, racial/ethnic, and SES diversity. The longitudinal study approach described in the first recommendation would be prudent in this study, as well. Additionally, researchers should also include HBCUs and Hispanic-serving institutions, as this would allow analyses to explore whether students at these institutions have the same opportunities and patterns for development of SDL skills, independent scholarship, and research activity as students at PWIs. Furthermore, inclusion of doctoral Ph.D. students from online programs would allow researchers to determine whether these students differ from those enrolled in traditional doctoral Ph.D. programs in SDL and character strengths, either upon entry to their programs or over time.

Recommendation 3

Further study is needed to examine the relationship between SDL and the development of independent scholarship and research activity. An experimental study should compare the development of independent scholarship and research activity between two groups of Ph.D. doctoral students, a control group which is enrolled in a typical professional development course and an experimental group which is enrolled in an SDL professional development course. The

SDL course would be delivered using SDL principles of instruction and activities and would also provide explicit instruction about SDL. At the beginning and end of the semester, participants should complete the PRO-SDLS and a survey about independent scholarship and research activities. Both instruments should be completed again one year and two years after the professional development course completion. Researchers can then analyze the data to determine whether there are differences between students who completed the standard professional development course and students who completed the SDL professional development course.

Recommendation 4

The current study explored possible associations between self-directed learning and certain demographic variables, specifically gender, age, and stage of doctoral study. While this study's results found only age to be associated with self-directed learning, it is possible that these findings were due to the limitations of the sample. This researcher would recommend that an additional study be conducted with a larger sample from diverse institutions. This study should examine the relationships between self-directed learning and a wider variety of demographic variables. The study should examine the three demographic variables included in the current study, but also other variables like the college of enrollment within the institution (ex. agriculture, engineering, education, etc.), enrollment in predominantly online versus predominantly face-to-face programs, previous undergraduate research experience, race/ethnicity, and international versus domestic student status. The study should explore whether these attributes are associated with self-directed learning in doctoral students. Future

researchers may also wish to employ multi-level modeling techniques to more effectively explore both institutional and personal characteristics related to self-directed learning.

Recommendation 5

The current study did not differentiate between participants based on the type of Ph.D. program in which they were enrolled. The information provided on the website of the large R1 university where this study was conducted indicates that few online Ph.D. programs are currently provided. As a result, the vast majority of sample participants were likely enrolled in face-to-face programs, though some coursework may have been taken in an online format. This researcher asserts that there may be differences between self-directed learning in doctoral students who are enrolled in online programs and those enrolled in face-to-face programs within the same institution/college/department/program. While a research study would ideally compare online and face-to-face students in the same programs at the same institutions, this would likely result in very low sample sizes. Studies would need to enroll participants across programs within the same institution, within the same program(s) across institutions, or both. Any of these approaches would introduce confounding variables, so researchers would need to carefully consider those implications. Another study approach would be to examine self-directed learning in doctoral students enrolled in fully online institutions versus fully face-to-face institutions, though the confounding variable issue would still be relevant. A qualitative study might also explore the curriculum and student support structures of programs at fully online institutions versus programs at fully face-to-face institutions to determine how self-directed learning development is incorporated.

Recommendation 6

This researcher also recommends that future researchers examine faculty and student perceptions of self-directed learning within the context of doctoral education. Areas of interest include perceptions of (a) the importance of self-directed learning for doctoral students, (b) the extent to which faculty should include self-directed learning development in the curriculum, (c) the prevalence of self-directed learning activities included in coursework, (d) the value of self-directed learning in doctoral coursework, and (e) the importance of self-directed learning in the research and dissertation phases of the doctoral program. Faculty and/or students may have very different perceptions of self-directed learning in doctoral programs. Such distinctions between the perceptions of faculty and doctoral students could also promote further discussions about needed improvements within programs.

Personal Reflection About This Dissertation

As this researcher considers her personal journey through the Ph.D. program and dissertation process, the paramount importance of self-directed learning throughout her experience is evident. Her own odyssey of transition from student to independent scholar is marked by development and improvement of self-directed learning skills throughout her program of study. Many of her professors and fellow students modeled self-directed learning and encouraged her in its practice. This researcher recognizes that her own character strengths of love of learning, perseverance, and self-regulation enabled her to develop proficiency in self-directed learning. She is hopeful that other doctoral students will build on their own character strengths to effectively engage in self-directed learning. In many ways, this dissertation is her attempt to bring attention to the connection between self-directed learning and character

strengths, which she believes can be instrumental in positively transforming the doctoral journey for other learners as they too make the transition from students to independent scholars.

In conclusion, this final chapter of the dissertation has provided a summary of the study, as well as a discussion of the results obtained through the data analysis. Further, implications for practice in the field of doctoral education and recommendations for future research were provided. As researchers move forward on a research agenda for the relationships between character strengths and self-directed learning, this researcher hopes that they find her small contribution to the literature to be informative and meaningful. As this work progresses, this researcher hopes that further insights into character strengths, self-directed learning, and other topics related to doctoral attrition can move those who work with doctoral students toward a comprehensive group of strategies to dramatically increase retention and completion among doctoral students.

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Appendices

Appendix A

Descriptions of Character Strengths – VIA Model – Peterson and Seligman (2004)

Virtue	Character Strength	Description	Peterson & Seligman, 2004
Wisdom and Knowledge	Creativity	Creativity, as a character strength, is exhibited by the production of ideas and/or behaviors which are both original and adaptive, contributing to the individual's or others' lives in a positive manner.	p. 110
	Originality	Creative individuals tend to be independent, above average in intelligence, and flexible in both behavioral and cognitive realms.	p. 117
	Ingenuity	Creativity is nurtured in an environment which is open, accepting, and supportive.	p. 119
		Furthermore, field-specific creativity is often dependent on expertise in the domain which requires years of development.	p. 119

Wisdom and Knowledge	Curiosity	The character strength of curiosity is the individual's inclination to experience and learn when confronted with life events, characterized by recognition of and response to those opportunities.	p. 125
	Interest		
	Novelty-Seeking	While curiosity itself is universal, its manifestation as a character strength is dependent upon "frequency, intensity, and duration of exploration."	p. 126
	Openness to Experience	When curiosity spurs an individual toward such experiences of exploration, any favorable experiences serve as positive reinforcement, so "curiosity begets further curiosity."	p. 130
		Curiosity and its associated traits have some nuances which should be considered.	p. 126-127
		Curiosity, interest, and novelty-seeking are interpreted as action-oriented, whether considered in cognitive, emotional, or especially behavioral terms.	p. 126
		Openness, however, is considered a tendency determined by one's personality.	p. 127

Wisdom and Knowledge	Open-mindedness	Open-mindedness entails an individual's earnest effort to challenge one's beliefs with contrary evidence and evaluate the result, which can be characterized as a thinking style.	p. 144, 151
	Judgment		
	Critical Thinking	Because of this emphasis on thinking style, Peterson and Seligman situate open-mindedness more within the cognitive, rather than personality, branch of psychological study.	p. 151
		Open-mindedness produces active critical thinking patterns which are useful in fairly assessing the validity of ideas, regardless of the individual's existing stance or opinion.	p. 144, 153
		Open-minded individuals are concerned about their reflective journeys to knowledge and truth through both argumentation and development of judgment and convictions.	p. 151-152

Wisdom and Knowledge	Love of Learning	Peterson and Seligman identify love of learning as a distinct character strength, though its characteristics have often been studied more as concepts in their own right (motivation, task value, interest, achievement), rather than dimensions of this character strength. Love of learning can manifest as a prevailing propensity to actively engage in myriad learning experiences or as a preference to similarly engage with distinctive, limited content. This love of learning persists with little disruption, even in the face of obstacles, challenges, or setbacks. The individual conceptualizes the learning endeavor as a positive experience. The love of a particular content area which is limited in scope is evident in many people, whereas the generalized love of learning is almost certainly less prevalent. The evidence of love of learning, at least to some degree, in many people may be one reason that this character strength has been studied less as an overall concept and more in terms of its individual dimensions.	p. 163-164, 166, 168 p. 163 p. 163, 170 p. 170 p. 171 p. 170-171
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Wisdom and Knowledge	Perspective	Perspective as a character strength is primarily exhibited as wisdom, the ability of an individual to assess life's events, challenges, and even purpose for self and others.	p. 182
	Wisdom	Peterson and Seligman note that this perspective should not be equated to intelligence, though the individual utilizes knowledge, combined with thoughtful judgment, to guide the behaviors or conduct in life.	p. 182
		Wisdom relies on both logic and emotion, as well as balanced convictions and uncertainties of life's meaning consistent with one's own ideology.	p. 182, 183, 185
		While wisdom is often associated with aging and life experience, an individual's actual responses to life events and challenges are extremely important in the formation of perspective and wisdom.	p. 189, 192
Courage	Bravery	The character strength of bravery is exhibited by an individual who chooses through free will to engage in actions which are understood to likely risk negative consequences, in order to hopefully achieve some good outcome.	p. 214
	Valor	Bravery is exhibited through clear reasoning in pursuits of morality or purpose, frequently as acts of conscience for the good of humanity.	p. 214, 215
		Notably, bravery allows an individual to judge that action is prudent even in the face of potential peril, requiring "the mastery of fear rather than fearlessness."	p. 214
		While consideration of bravery is usually situated within the context of physical risk, bravery can also be social, psychological, or moral in nature.	p. 215-216

Courage	Persistence	The character strength of persistence is embodied by an individual who voluntarily and actively pursues existing goals, despite adversity and/or regression in the process or frustration and/or perplexity in one's feelings about how the process is unfolding.	p. 229
	Perseverance	The connecting concept of perseverance captures the struggle of challenges involved in such an undertaking.	p. 230
	Industriousness	Persistence is typically associated with expectation that continued effort will result in a desired outcome, combined with confidence in one's own abilities, one's self-efficacy to accomplish the objective, and an internal locus of control.	p. 231
		Optimism, self-control, and intrinsic motivation bolster an individual's tendency toward persistence.	p. 232, 234, 236
		Likewise, self-esteem is positively linked to persistence and can be particularly helpful in making appropriate decisions about whether or not to persist in a course of action which is not currently yielding desired results.	p. 232, 240
		The exercise of persistence tends to produce, in turn, more persistence, as well as enhanced ingenuity and increased success in future endeavors.	p. 238, 240

Courage	Integrity Authenticity Honesty	The character strength of integrity, also associated with authenticity and honesty, is characterized by an individual's representation of self in a way that accurately captures the true self, both internal feelings and external behaviors. These linked strengths are concentrated in specific domains: integrity in the moral domain, authenticity in the emotional domain, and honesty in the interpersonal domain. A person of integrity publicly espouses moral convictions (even without support), acts on those convictions consistently, and exhibits care for others and their needs. Integrity enables benefits in both personal and social realms, fostering progressive personal growth.	p. 249 p. 250 p. 250 p. 253, 263
Courage	Vitality Zest Enthusiasm Vigor Energy	Vitality as a character strength is demonstrated in both physical well-being and interpersonal/ intrapersonal psychological well-being. This vitality goes beyond the concept of the fully functional individual to one who is dynamically alive, embracing life with energetic enthusiasm and vigor. Vitality is a construct of great complexity, which can be influenced by lifestyle, physical and psychological health, and social interactions.	p. 274 p. 274 p. 285-286

Humanity	Love	The character strength of love consists of not only an emotional component, but also cognitive and behavioral components, as well.	p. 304
		Peterson and Seligman assert that love, furthermore, manifests in three prototypical forms: parent to child, child to parent, and partner to partner.	p. 304
		The parent shows love for the child as the parent provides for the needs and well-being of the child (safety, comfort, support, affection, etc.), prioritizing the child's needs before his/her own personal needs.	p. 304
		The child loves the parent because the parent reliably accomplishes the care necessary for the child's well-being and prioritizes the nurturance of the child.	p. 304
		Romantic love between partners encompasses reciprocal emotional attachment, physical closeness, and sexual intimacy.	p. 304
		Human relationships develop and shift over time, so a mate relationship, for example, might manifest all three forms of love at different points in the relationship.	p. 304
		Human nature enables individuals to form loving relationships, ensuring the continuation of the species and the attachments necessary for individual well-being and quality relationships.	p. 305, 307, 314

Humanity	Kindness Generosity Nurturance Care Compassion Altruistic Love “Niceness”	Kindness and its associated traits are all reflective of an individual’s orientation toward another person or group, rather than oneself. A kind person who respects the common bonds of humanity holds others in esteem because of their innate worth, not for any benefit which can be obtained from them. This altruistic regard for others is evident in numerous disparate traditions of moral virtue, spirituality, and religion. A kind, altruistic individual is typically characterized by empathy, which motivates one to assist others; morality, which focuses one’s attention on another’s needs; and personal ethics, which impose a responsibility to act in the presence of a societal need.	p. 326 p. 326 p. 326 p. 330-331
Humanity	Social Intelligence Emotional Intelligence Personal Intelligence	Social, emotional, and personal intelligences are described as noncognitive hot intelligences because of their vital importance in maintaining one’s well-being and ensuring one’s survival. These intelligences are used in concert to abstractly reason when addressing complex situations, processing information, and solving problems. Social intelligence includes all interpersonal relationships, from associations between individuals to affiliations between groups. Emotional intelligence helps an individual to perceive and use information about the emotions of both self and others. Personal intelligence enables one to effectively evaluate how one’s own feelings and intentions may affect interactions and behaviors.	p. 338, 340 p. 338 p. 339 p. 339 p. 339

Justice	Citizenship	Citizenship, as a character strength, causes an individual to identify with and pursue the good of the community or society, rather than just personal aims.	p. 370
	Social Responsibility	This action stems from the loyalty and commitment that the individual feels in relationship with the larger societal group.	p. 372
	Loyalty	The individual may exhibit this duty in commitment to social, political, or even environmental issues, with interest in improving life for both current citizens and generations to come.	p. 370
	Teamwork	Someone with this character strength applies both knowledge and reasoning to develop plans of action in response to societal issues, working collaboratively with others to produce lasting positive change.	p. 371

Justice	Fairness	For Peterson and Seligman, moral reasoning produces moral judgement, which in turn is exhibited as fairness in behavior and attitudes toward others.	p. 392
		Moral reasoning, for most people, involves a personal fusion of justice reasoning (concentrated on the responsibility to determine and do what is deemed right in a situation) and care reasoning (concentrated on meeting the needs of those involved).	p. 393-394
		One who uses moral reasoning in the pursuit of fairness has a deep personal moral identity and strong commitment to behaviors which are consistent with that identity.	p. 402-403
		This orientation is further augmented by a personal obligation to reflect deeply in any situation about one's own position, the others' perspectives, and relationships which may also be crucial to fairly assessing appropriate outcomes.	p. 403-404

Justice	Leadership	The character strength of leadership can be conceptualized as both a personal quality, but also as a practice.	p. 414
		Integral to the quality of leadership are “intelligence, morality, and a predisposition toward action.”	p. 415
		As a personal quality, leadership consists of cognitive abilities and dispositional traits which incline an individual to pursue opportunities to guide others into action.	p. 414
		The practice of leadership occurs when one inspires others to participate in mutual action, galvanizing them to work together to accomplish shared goals.	p. 414
		In practice, leadership is invariably a social enterprise, affected by attributes of the leader, the follower(s), and the context of the undertaking.	p. 414

Temperance	Forgiveness and Mercy	The character strength of mercy is conceptualized as a generalized tendency to extend compassion to someone who is distressed, who is under one's authority, or who has committed an offense.	p. 446
		The latter category involving commission of a wrong is the specialized form of mercy termed forgiveness, in which mercy is granted to a particular person for a specific offense.	p. 446
		Forgiveness and mercy are associated with moral reasoning, perspective, and empathy.	p. 449, 455
		While this character strength is evident in many religious traditions, its manifestation is not restricted to religious adherents, but can occur without religious affiliation.	p. 447
		Forgiveness does not inherently require the offender to take responsibility, nor does it mandate the restoration of any broken relationship which occurred because of the transgression, which is distinguished as reconciliation.	p. 447

Temperance	Humility and Modesty	Peterson & Seligman deferred to Tangney's (2000, p. 72; 2002, p. 413) characteristics of humility when describing this character trait, wherein an individual accurately assesses one's own abilities and shortcomings, while also acknowledging and welcoming others' wisdom and contributions. Humble people are teachable and open to all feedback, whether positive or negative, in the interest of improving their self-perception to be as genuine as possible. Modesty, however, is primarily evidenced in the behavioral context, as an individual is careful about discussing one's own merits, often extending to minimizing or downplaying one's own performance. Therefore, humility is typically seen as a private interpretation of one's abilities, whereas modesty is typically evidenced in a social setting.	p. 462 p. 464, 470 p. 463 p. 463
Temperance	Prudence	As a character strength, prudence is the propensity to utilize cognitive reasoning and personal management skills to pursue and achieve one's goals, including the discipline to delay short-term gratification in favor of long-term achievements.). Prudent people exhibit moderation, flexibility, and balance in their thoughts and actions in both their personal lives and their interactions with others. Prudence does not carry the negative connotations of self-deprivation, but is instead a practical, responsible, measured approach to life.	p. 478, 484 p. 478 p. 478, 480

Temperance	Self-Regulation Self-Control	As a character strength, self-regulation manifests in an individual's ability to make choices and instigate actions which are consistent with one's chosen goals and principles. Self-regulation includes, but is not limited to, self-control and self-discipline. Self-regulation is necessary for responding appropriately to external influences but is also essential when contending with emotions and one's own thoughts. As a result, individuals who excel in self-regulation tend to thrive in personal achievement and adjustment, but they also are successful in forming personal and social relationships.	p. 500 p. 500 p. 500-501 p. 506-507
Transcendence	Appreciation of Beauty and Excellence Awe Wonder Elevation	This character strength, often referred to more naturally as appreciation, enables an individual to identify goodness in the world and respond with awe and physical/emotional pleasure to physical stimuli, social experiences, extraordinary traits in fellow humans, and moral virtue. In their daily lives, appreciative individuals often experience joy in what others might overlook or find mundane, create meaning in different ways, and establish profound relationships with others. Appreciation is frequently linked to discussions of transcendence in the field of religion, as well as peak experiences and elevated perception in the field of psychology.	p. 537-538 p. 538 p. 542, 543, 546

Transcendence	Gratitude	Gratitude manifests as joyful appreciation for an unearned gift, benefit, or experience perceived to be benevolently provided to the recipient by another person, a deity, or the universe. Gratitude is linked, on a personal level, to emotional and physical well-being. Furthermore, gratitude influences positive behaviors toward others, which generates positive societal outcomes.	p. 554-555 p. 558, 563 p. 557
Transcendence	Hope Optimism Future-Mindedness Future Orientation	The character strength of hope, when combined with its affiliated traits, “represent[s] a cognitive, emotional, and motivational stance toward the future.” An individual’s thoughts, expectations, and behaviors are oriented toward attaining positive outcomes based on one’s goals. Hope is predicated on the proposition that the desired outcomes can reasonably and realistically be expected to occur and that, furthermore, actions by the individual can positively contribute to those results. Hopeful individuals make and execute plans, leading to successful accomplishments across life domains.	p. 570 p. 570 p. 571-572 p. 576-577

Transcendence	Humor Playfulness	The character strength of humor is associated with a playful view of life’s anomalies, a measured and good-natured view of life’s adversities, and the ability to bring cheer to others. Humorous individuals exhibit wisdom about the life’s imperfections, coupled with the resilience to endure and flourish when faced with challenges. Their humor enables them to effectively cope with adversity.	p. 584 p. 595 p. 585
Transcendence	Spirituality Religiousness Faith Purpose	The character strength of spirituality indicates that an individual believes in a “transcendent (nonphysical) dimension of life.” These beliefs affect how individuals interpret life events, create meaning, and interact with fellow human beings. Peterson and Seligman assert that all cultures conceptualize some version of the divine, and all religions purport to help their adherents discover the meaning of life.	p. 600 p. 600 p. 601

Appendix B

Researcher Agreement from VIA in Order to Use the VIA-IS-P Survey

Research Terms & Conditions

To provide you with access to any of the VIA Assessments, scoring keys and your research data set, you must agree to the following terms & conditions:

- I agree to keep the information strictly confidential and will not distribute it unless I'm given written permission from VIA. I will not publish or share the VIA Survey questions or scoring key (including in research dissertations).
- I agree to use the information for non-commercial research purposes only.
- I agree to complete the analyses within three years of the date this agreement is submitted.
- I agree to allow inclusion of my data, in a non-identifiable form, in the VIA databases.
- I agree that my data may be used for future archival studies at the discretion of the VIA Institute and that some of this research may be for purposes of developing products relevant to the concept of character.
- I understand that the VIA assessments are provided free of charge, thus I will not charge my research subjects for taking any of the VIA assessments.
- I agree to share my research findings and outcomes with the VIA Institute using the following email addresses: research@viacharacter.org and ryan@viacharacter.org.
- I agree to adhere to regulations for the conduct of ethical research in the geographic region where I am located.
- I agree to use the VIA Surveys in their entirety (unless use of individual subsets is approved) and not alter in any way, with the exception of the Signature Strengths Survey and the Global Assessment of Character Strengths. *SSS and GACS assessments may be altered and modified without permission.
- I agree that the approval given herein is only applicable to the current study.
- I understand that data once delivered to the VIA Institute on Character will be incorporated into a database with other records and cannot be withdrawn at a later date.
- I agree to cite the VIA assessment properly.

☐ I understand and agree to adhere to ALL of the statements above.

Appendix C

Demographic Items

With which gender identity do you most identify?

Man

Woman

Other/Prefer not to answer

What is your age? _____

Are you enrolled full-time or part-time at the university?

Full-time

Part-time

Are you an international student?

Yes

No

Which category best represents your race?

Hispanic

Native American or Alaska Native

Asian or Pacific Islander

Black or African American

White

Two or more races

Prefer not to answer

In which college are you enrolled for doctoral study?

Agriculture

Architecture and Design

Arts and Sciences

Business

Communication and Information

Education, Health, and Human Sciences

Engineering

Intercollegiate

Nursing

Social Work

Prefer not to answer

Which best describes your stage in your doctoral work?

First half of doctoral coursework

Last half of doctoral coursework

Taking comprehensive exams

Writing proposal for dissertation

Collecting data and/or writing last part of dissertation

Dissertation finished – defense pending or completed

Appendix D

Email Sent to Potential Participants

Greetings, fellow PhD student!

I am Cindy Perry, a PhD candidate in the University of Tennessee, Knoxville, College of Education, Health, and Human Services – Department of Educational Leadership and Policy Studies. I am in the dissertation phase of my program, Educational Psychology and Research – Adult Learning.

I would like to ask for your assistance in completing a survey for my doctoral research study. The survey will be completely anonymous and will ask questions about self-directed learning, character strengths, and a few demographic characteristics. I hope to learn more about how these variables are related in doctoral students. The survey should take less than 30 minutes.

Please click on the link below to enter the survey and provide your consent to participate in the study.

[insert link to consent form and Qualtrics survey here]

Thank you so much for your help!

Cindy Perry

Appendix E

Informed Consent

Consent for Research Participation

Research Study Title:

Relationships between SDL and Character Strengths in Doctoral Students

Researcher(s):

Cynthia Noblin Perry, University of Tennessee, Knoxville

Gary Skolits, University of Tennessee, Knoxville

We are asking you to be in this research study because you are a Ph.D. student at the University of Tennessee – Knoxville. You must be age 18 or older to participate in the study. The information in this consent form is to help you decide if you want to be in this research study. Please take your time reading this form and contact the researcher(s) to ask questions if there is anything you do not understand.

Why is the research being done?

The purpose of the research study is to identify character strengths that are associated with self-directed learning in doctoral students.

What will I do in this study?

If you agree to be in this study, you will complete an online survey. The survey includes questions about your feelings and behaviors in your education and other parts of your life and should take you about 30 minutes to complete. You can skip questions that you do not want to answer.

Can I say “No”?

Being in this study is up to you. You can stop up until you submit the survey. After you submit the survey, we cannot remove your responses because we will not know which responses came from you.

Either way, your decision won't affect your grades, your relationship with your instructors, or standing with the University of Tennessee – Knoxville.

Are there any risks to me?

We don't know of any risks to you from being in the study that are greater than the risks you encounter in everyday life.

Are there any benefits to me?

We do not expect you to benefit from being in this study. Your participation may help us to learn more about the relationship between self-directed learning and character strengths in doctoral students. We hope the knowledge gained from this study will benefit others in the future.

What will happen with the information collected for this study?

The survey is anonymous, and no one will be able to link your responses back to you. Your responses to the survey will not be linked to your computer, email address or other electronic identifiers. Please do not include your name or other information that could be used to identify you in your survey responses. Information provided in this survey can only be kept as secure as any other online communication.

Information collected for this study will be published and possibly presented at scientific meetings.

Who can answer my questions about this research study?

If you have questions or concerns about this study, or have experienced a research related problem or injury, contact the researchers.

Cynthia Noblin Perry
Email: cperry26@vols.utk.edu
Phone: 423-354-5112

Gary Skolits
Email: gskolits@utk.edu
Phone: 865-974-6139 (Educational Leadership and Policy Studies)

For questions or concerns about your rights or to speak with someone other than the research team about the study, please contact:

Institutional Review Board
The University of Tennessee, Knoxville
1534 White Avenue
Blount Hall, Room 408
Knoxville, TN 37996-1529
Phone: 865-974-7697
Email: utkirb@utk.edu

Statement of Consent

I have read this form, been given the chance to ask questions and have my questions answered. If I have more questions, I have been told who to contact. By selecting "I Agree" below, I am providing my signature by electronic means and agree to be in this study. I can print or save a copy of this consent information for future reference. If I do not want to be in this study, I can select "I Do Not Agree" to exit out of the survey.

- ☐ I agree to participate
- ☐ I do not agree to participate

Appendix F

Learning Contract Example

Learning Contract

Name _____ Course _____ Semester _____

Purpose (Objective)	Process (Resources and Strategies)	Product (Evidence)	Target Date for Completion

Adapted from Knowles (1975) and Hiemstra and Sisco (1990)

Note. Learning Contract obtained through email communication with R. G. Brockett, July 30, 2023.

Vita

Cynthia Noblin Perry was born in Michigan, but grew up in Huntsville, Alabama. She attended Auburn University and graduated with a Bachelor of Science in Secondary Mathematics Education with a concentration in Computer Science. After teaching in the Florida public school system, she returned to Auburn University and earned a Master of Education degree in instructional development. She taught mathematics as an adjunct instructor at Northeast State Community College in Blountville, Tennessee, before joining the full-time staff at the college. She earned a Master of Science degree in Applied Educational Psychology at The University of Tennessee and went on to pursue the Doctor of Philosophy in Educational Psychology and Research with a concentration in Adult Learning. She also earned a Graduate Certificate in Online Teaching and Learning. Her research interests include self-directed learning, positive psychology in education, and learning in older adults. After graduation, she will continue in her roles at Northeast State Community College as the coordinator for The Learning Center, which provides tutoring services, and as the QEP Professional Development Lead. As she completes the doctoral journey, she is thankful for the support of her family, her committee, and her colleagues.