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Social Determinants and Academic Success for Online Undergraduates Mediated by Mental Health

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This is to certify that the doctoral dissertation by

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Walden University
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Abstract

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Mediated by Mental Health

by

Jamie Claus Getz

MA, Xavier University, 2004

BS, Ohio University, 1998

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Social determinants of health (SDH) are social and economic systems that directly contribute to health disparities and inequalities. This study examined SDH and their relation to education, also an SDH. The relationship between SDH and online undergraduate achievement, as measured by grade-point average (GPA), was studied. Cumulative inequality is the theoretical framework that guided the study; it underscores the complexity of interaction between personal, social, and environmental stressors in relation to a student's academic performance. The quantitative survey design allowed for potential relationships between variables to be observed and studied based on the survey responses per self-report from 212 online degree-seeking undergraduate participants. The dependent variable was GPA in an online undergraduate program of study. The predictor variables included household income, neighborhood safety, housing stability, and adverse childhood experiences. Mental health served as a potential mediator variable. Although there was a significant relationship between mental health status and GPA, mental health status did not mediate the relationship between the SDH and GPA. The conditions for mediation to occur were not met. There was no significant relationship between the SDH and GPA, nor a significant relationship between the SDH and mental health status. The data presented are valuable to post-secondary educators, academic advisors, stakeholders, and online students appropriate programming and advancement in academic resources. Increased achievement of undergraduates has a direct impact on positive social change.

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Chapter 1: Introduction to the Study

Introduction

The purpose of this study was to observe the strength of the relationship between social determinants of health (SDH) and online undergraduate achievement, as measured by grade-point average (GPA). Social determinants of health are social and economic systems that directly contribute to health disparities and inequalities (Telfair & Shelton, 2012). I studied the relationship between several SDH including household income, neighborhood safety, housing stability, mental health status, and adverse childhood experiences (ACEs) on achievement and academic outcomes measured by GPA. Also studied was the relationship between SDH and GPA as mediated by mental health status. The online undergraduate participants were surveyed to examine their status regarding SDH and their current level of academic achievement. Students who understand the influence of SDH and mental health status on their undergraduate experience and academic outcomes can make informed choices regarding their college studies and resources. This chapter provides an overview of the study, as well as the problem statement, purpose, research questions, and hypotheses. Also included will be the theoretical underpinnings, scope of the research, and significance of the study.

Background

The impact of SDH on educational achievement is seldom discussed, though education is itself a powerful determinant of health (CDC, 2014; Cohen & Syme, 2013). If education is an SDH impacted by other SDH, then the attainment of a college degree is both critical and challenging for populations impacted by SDH. While some students

thrive in an online environment, others have issues related to a deficient support structure, feelings of isolation, and technology challenges (Jaggars, 2011). It is thought that these issues negatively impact confidence and, in turn affect academic performance. Specific SDH-related factors also impact academic performance, student learning, and educational achievement. This is noted in emerging research. Cohen and Syme (2013) note that students in these populations tend to face both proximal and structural forms of SDH inequalities. For students impacted by racial, social, or ethnic marginalization, with lower socioeconomic status, few educational opportunities may be present. A study has not been conducted to survey online undergraduate learners to specifically address the relationship between SDH and GPA. The impact of SDH on educational achievement is seldom discussed, though students may be impacted by housing issues, economic challenges, socio-cultural struggles, family constellation, community safety, and limited access to needed health care, all of which are SDH and may greatly impact performance in college.

To observe SDH and academic outcomes, specific SDH were surveyed to determine relationships between SDH and GPA, along with mental health status. O'Connor et al. (2012) identified specific markers impacted by SDH and how each manifested in student performance. This study investigated whether there was a significant relationship between online undergraduate achievement and five determinants of health in regard to household income, neighborhood safety, housing stability, ACEs, and mental health as a potential mediator of SDH and GPA.

Problem Statement

As enrollments in online education (OE) increase (Ratnasingham, 2014), so do questions about variables that may negatively affect the academic success (AS) of non-traditional students attending remote online courses (Jaggers, 2011). Research is needed to study the efficacy of such degree-attainment programs for undergraduate learners (Lack, 2013). Among non-traditional students, SDH have been found to impact AS (Cohen & Syme, 2013).

Purpose of the Study

The purpose of this quantitative study was to observe the strength of the relationship, if existent, between SDH and achievement of undergraduate students who participate in an online 4-year degree program. Variables studied were household income, neighborhood safety, housing stability, mental health status, and ACE scores, along with GPA as a measure of academic achievement in an undergraduate online degree program and mental health status as a mediator.

Research Questions and Hypotheses

RQ1: Is there a relationship between annual household income and GPA as measured by survey questions answered by online undergraduate college students?

$H_0$1: Higher annual earned income is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a1: Higher annual earned income is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ2: Is there a relationship between neighborhood and community safety and GPA as measured by survey questions answered by online undergraduate college students?

$H_0 2$: Neighborhood/community safety is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

$H_a 2$: Neighborhood/community safety is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ3: Is there a relationship between housing stability and GPA as measured by survey questions answered by online undergraduate college students?

$H_0 3$: Stability in housing is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

$H_a 3$: Stability in housing is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ4: Is there a relationship between mental health status and GPA as measured by survey questions answered by online undergraduate college students?

$H_0$4: Mental health status is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a4: Mental health status is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ5: Is there a relationship between ACE scores and GPA as measured by survey questions answered by online undergraduate college students?

$H_0$5: ACEs are not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a5: ACEs are positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ6: Is there a relationship between SDH and GPA as measured by a survey and mediated by mental health?

$H_0$6: SDH are not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a6: SDH are positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

Theoretical Framework

The cumulative inequality (CI) model informed this study. The CI model underscores the complexity of interaction between personal, social, and environmental stressors in relation to a student's academic performance. CI theory can be characterized as a secondary theory closely related to SDH-related concepts. The theory's primary

purpose is to describe, detail, and analyze the cumulative impact that discrete variables have upon the lives and experience of individuals. CI analyses related to student educational attainment underscore that the dependent variable of student academic performance is typically framed by and complexly related to several key variables. This will be discussed in more detail in Chapter 2.

Nature of the Study

This study was conducted using a quantitative survey design to examine the hypotheses presented. This study is not one of cause and effect, so no causal relationships were examined. The design allowed for only potential relationships between variables to be observed and studied based on the survey responses as self-reported from participants. The dependent outcome variable is GPA in an online undergraduate program of study. The independent variables include household income, neighborhood safety, housing stability, mental health status, and ACEs.

The sampling for this study included undergraduate students enrolled in an online degree program. A random sampling method was appropriate for this study, and university students were reached through an online participant pool. Each participant answered questions on the survey, and completed surveys were collected from the online system. To meet the ideal sample for my research, I used a public survey pool to gain participation from more students.

To test the hypotheses, an analysis was conducted to first observe whether a relationship existed between SDH and GPA as well as determine if there was an indirect relationship between SDH and GPA as mediated by mental health status.

Definitions

Achievement: Achievement is defined by Merriam-Webster.com as "the quality and quantity of a student's work" and a "result gained by effort." Noted by York et al. (2015) regarding AS, the dominant measures of academic achievement are grades and GPA by course or assignment.

Adverse childhood experiences (ACEs): ACEs are experiences of childhood that negatively influence broader life issues as one grows and develops (Karatekin & Ahluwalia, 2016). ACEs have significant ongoing effects one's ability to cope with stressors and often lead to isolation, which has a negative impact on mental health.

Cumulative inequality theory (CI): CI describes how and why SDH impact individuals' lives. CI examines the macro systems that lead to SDH. Commonly measured in studies regarding CI are social systems as they impact individual development, opportunities, resources, and exposure to risk (Ferraro & Shippee, 2009). As CI is defined, social systems greatly shape one's disadvantaged place in society, which increases overtime due to accumulation of negative exposure to events and experiences (Ferraro & Shippee, 2009).

Grade-point average (GPA): GPA is the average obtained by dividing the total number of grade points earned by the total number of credits attempted.

Mental health status: Mental health status refers to status as measured by the SF-36. The questions pertaining to mental health are focused on anxiety, depression, and emotional health. In a study conducted by Cadena et al. (2003), mental health status was defined by one's well-being, autonomy, competence, perceived abilities, and self-

actualization of potential, both intellectually and emotionally, as defined by the Health Organization.

Online education (OE): OE consists of college coursework offered from an independent institution of higher learning offering off-campus online general studies leading to a bachelor's degree.

Social determinants of health (SDH): SDH are social and economic systems that directly contribute to health disparities and inequalities (Telfair & Shelton, 2012).

Undergraduate: An undergraduate is defined by Merriam-Webster.com as a student at a college or university who has not received a first and especially a bachelor's degree.

Assumptions

In this study, it was assumed that all participants would answer the survey questions honestly, but this could not be controlled. Participants were aware that their answers will remain anonymous and that there were no correct answers on the survey. The answers given were scored for purposes of this study and the data were not used in any way outside of this context. Questions were written to be least invasive, and participants were encouraged to answer honestly. The instrument used for this research included questions to measure the relationships between variables; all instrument questions were chosen from validated tools, assumed to accurately measure what they intended to measure.

Scope and Delimitations

Only undergraduate students who had completed 1 full year in an online degree-attainment program were surveyed for this study. Neither traditional students from brick-and-mortar settings nor first-year undergraduate students were sampled. To reduce the number of confounding variables, those enrolled dually in an on-campus and online program were not surveyed.

Limitations

Participants were randomly selected through the Mechanical Turk (MTurk) research pool. Amazon MTurk is a website often used for businesses to perform discrete, on-demand tasks that computers are unable to perform. It is owned by Amazon (2005). The population in this case included online undergraduate students enrolled in their second, third, fourth, or fifth year in undergraduate online programs. This choice was made to eliminate the effects of first-year stressors commonly experienced by college students and to give the time to have two semesters of calculated GPA data. A random sampling method allowed study results to be generalized for undergraduate students enrolled in an online program. A diverse group of participants were sampled since there were no recruitment procedures in place for a specific criteria-meeting group of students.

Surveys were completed online using an electronic survey application. Students with access to the internet were able to participate, as there was not a physical survey form distributed. In their report, Ryan and Lewis (2017) noted that the internet is accessible by nearly 75% of the United States population. Additionally, students enrolled

in online courses are accessing the internet to complete their coursework and should be able to access the survey instrument online.

The study is not longitudinal and is quantitative by design. The study design was not intended to yield causal relationships, and I was cognizant of potential implications regarding internal validity. There was not an experimental, quasi-experimental, or longitudinal study design used. I determined that no direct relationship between variables or an indirect relationship mediated by mental health status were indicated. Construct validity threats were limited in this study because the questions in the survey were selected from previously developed psychometric data-collection instruments. The instruments are discussed in greater detail in Chapter 3.

Significance

Current research has not explored the relationship between SDH and online undergraduate academic achievement, nor the relationship of SDH and GPA as mediated by mental health status. This study aimed to fill the gap in research and provide opportunities to improve the student experience in OE programs. This research was intended to add to the initiatives of colleges that offer online alternatives to those who are unable to study on a brick-and-mortar campus. This research has the potential to increase knowledge of the impact of ACEs on higher education and degree attainment, illustrating the importance of early intervention and ACE prevention.

Summary

SDH are known to impact quality of life for many, yet the impact of SDH on educational achievement is seldom discussed. Because students may be impacted by

income deficiencies, neighborhood safety, housing issues, mental health status, and childhood experiences, their academic outcomes may be jeopardized without additional information and awareness. This study was designed to examine the direct and indirect relationships between SDH and GPA in an online undergraduate program of study. Chapter 2 provides a literature overview of topics relevant to SDH, academic achievement, and mental status, as well as a discussion of the theoretical underpinnings of this study.

Chapter 2: Literature Review

Introduction

As OE increases (Ratnasingham, 2014), so does research to study the efficacy of such degree-attainment programs for undergraduate learners (Lack, 2013). Questions arise about variables that may negatively affect the AS of non-traditional students attending remote online courses (Jaggers, 2011). SDH, i.e., social and economic systems directly contributing to health disparities and inequalities, more common among non-traditional students, have been found to impact AS (Cohen & Syme, 2013). SDH of interest for this study included household income, neighborhood safety, housing stability, mental health status, and ACEs.

Mental health impacts AS also, although it has only been studied in brick-and-mortar campuses (Sontag-Padilla et al., 2016). Prevalence of mental health on campuses has been studied, though its role in academic outcomes is not clear, and it has not yet been examined within a study of SDH, although mental health problems are more prevalent in populations with worse SDH (Adler et al., 2016). It is possible, given the relationship of mental health with SDH, that one way that SDH impact AS is through mental health. In this study, mental health was examined as a potential mediator between SDH and AS. The literature review presented in this chapter justifies this set of variables and the relationships.

Search Strategy

The purpose of the literature search was to find scholarship in the area under investigation and identify gaps in the literature that may be filled by means of this study.

Specific keywords and search terms were identified using the research problems and questions developed for the study, and these were used in the search. Keywords and search terms used in the search included: online learning, online students, online education, academic success, mental health, social determinants of health, household income, housing stability, economic challenges, cumulative inequality, neighborhood safety, and adverse childhood experiences scores. Results were found in abstracts, titles, and subject headings.

Based on these keywords, multiple searches were conducted using online databases, including Google Scholar, JSTOR (Journal Storage Project), EBSCO database, and the Walden University library catalog. Only articles published in English were included. An initial list of relevant articles and publications was developed that covered the entirety of search terms and keywords. Over time, the initial list was reduced to a more manageable number of references containing significant amounts of information critical to address the research problem and questions developed for the study. Except for necessary seminal literature or articles deemed specifically relevant to the study for other reasons, the search focused on literature from the last 5 to 8 years. There was no predetermined number of references deemed desirable, if there were enough references related to each main point and variable discussed in the study to provide support for any eventual conclusions. The aim of the literature review was to provide a comprehensive review that meets the same standards as primary research.

Online Education

The proposed study was conducted with students pursuing their degrees in an OE setting. Online instruction and learning—especially for students seeking a postsecondary education—continues to increase in popularity. Primary reasons for this interest in OE include flexibility and reduced commuting (Jaggars, 2011). OE is distance education in a web-based forum, contrasted with paper-based or face-to-face traditional methods and pedagogy (Emerson & Mckay, 2011). According to some sources, approximately one in three university students are enrolled in at least one online class, and the rate of increase among undergraduates taking online classes is expected to continue (Kearns, 2012). For this study, OE specifies enrollment in an online post-secondary degree program, engagement in an online academic experience where the undergraduates complete all coursework and learning (lectures, assignments, tests, etc.) online. In both face-to-face programs and OE programs, technology is used in innovative ways to share content and deliver instruction, and often the infrastructure for both on-campus and online environments is the same, with only variances in customization (Benzigar, 2014).

The increase in OE appears to be commensurate with the corresponding increase in technology, especially in software and social media applications. In addition, as explained by Ratnasingam (2014), changes in the workforce allow (and in some cases, encourage) employees to telecommute or videoconference from their homes, a pattern based on the ready availability of OE. Nontraditional or second career students, by taking advantage of online classes, can improve their education without the need to add travel time into their already hectic schedules. Jaggars (2011) also acknowledged that one of the

hopes for OE is that it will increase access to postsecondary education for students typically underserved—such as academic underachievers or low-income students, who are more likely to experience several SDH.

Jaggars (2011) observed that those enrolled in online education report issues that may relate to attrition before degree attainment. Students reported issues related to an absent support structure, a decreased sense of belonging, insufficient structure, and technology challenges. Research on OE is often inconclusive, identifying benefits as well as problem areas. Unfortunately, students with fewer skills or who are ill-prepared for postsecondary education may not be the prime candidates to benefit fromOE, despite its flexibility, as described by Coates et al. (2004), and later confirmed by Xu and Jaggars (2014).

Social Determinants of Health

SDH are generally defined as social and economic systems directly contributing to different health outcomes and inequalities among different groups (Telfair & Shelton, 2012). The World Health Organization (WHO) defines SDH as the external variables that impact the quality and nature of a person's life (Rine, 2016). Social determinants may be either structural or proximal (Viner et al., 2012). Structural determinants group people in society based on income, social status, or power. These include global and national economics, politics, welfare interventions, and educational systems. Proximal determinants influence one's daily condition, such as relationships, recreational activities, and access to education, as well as more basic needs, such as food security, housing stability, and so on. Though the determinants are defined separately, proximal

determinants are often a consequence of structural determinants. Proximal determinants can also come from one's culture, religion, and environment. In this study, the focus was on proximal determinants, specifically income, neighborhood safety, housing stability, mental health status, and ACEs.

Literature is sparse addressing the topic of SDH and educational achievement, although it is known that undergraduates may be negatively affected by SDH, especially those listed above (Cohen & Syme, 2013). All these factors create additional stressors for students, especially in their first year of postsecondary education (Cohen & Syme, 2013). Education, especially post-secondary education, is itself an SDH (Cohen & Syme, 2013; CDC, 2014), which highlights the vicious cycle individuals of low resources find themselves in as they attempt to reach their life goals. Below is a review of the SDH that were examined in the presented study as predictors of AS, measured through GPA.

Cumulative Inequality Theory

CI Theory describes how and why SDH impact individuals' lives. CI examines the macro systems that lead to SDH. Commonly measured in studies regarding CI are social systems as they impact individual development, opportunities, resources, and exposure to risk (Ferraro & Shippee, 2009). As CI is defined, social systems greatly shape one's disadvantaged place in society, which increases over time due to accumulation of negative exposure to events and experiences (Ferraro & Shippee, 2009). Much like CI, exposure to negative SDH also alters one's trajectory (Costa-Font & Hernandez-Quevedo, 2012), often contributing to systemic layering of disadvantage over time and even generationally.

Ferraro and Shippee (2009) discussed the meaning of CI theory, especially in the sense of generating systemic inequality. This process is insidious since it develops slowly but inexorably over time and ultimately shapes the future course of an individual's life. Ferraro and Shippee used a combination of longitudinal and cohort studies to identify specific factors that initiate the inequality process. The authors identified five axioms of CI theory that they hoped could help apply the theory to the life course:

Axiom 1: Social systems generate inequality, which is manifested over the life course through demographic and developmental processes.

Axiom 2: Disadvantage increases exposure to risk, but advantage increases exposure to opportunity.

Axiom 3: Life course trajectories are shaped by the accumulation of risk, available resources, and human agency.

Axiom 4: The perception of life trajectories influences subsequent trajectories.

Axiom 5: CI may lead to premature mortality; therefore, nonrandom selection may give the appearance of decreasing inequality in later life (cited in O'Rand, 2016, p. 373).

The first axiom of CI theory forms the foundation of the theory and explains how the social environment—if established on inequality—will shape an individual's entire life course. Without a doubt, inequality remains surprisingly consistent over time, ultimately resulting in an inability to escape from the cumulative effects of the process. The authors also observed that "social and environmental stressors often precipitate biologic processes that shape the survival and functioning of the organism. CI theory may

be helpful for identifying how these stressors accumulate, modify cohort inequality, and diffuse across life domains" (Ferraro & Shippee, 2009, p. 339). In brief, CI theory provides a broader framework for assessing how individuals, in terms of their personal and social development, are impacted by multiple external variables.

Benefits of Post-Secondary Education

Another broader area of analysis connected with SDH and student academic achievement relates to the specific benefits provided by secondary educations. Specifically, many of the debates in this context are useful in establishing if post-secondary educational opportunities elevate an individual beyond their specific environmental factors, or if this latter consideration serves to limit the impact of this type of attainment. Haskett et al. (2014) note that this is often a debatable point, particularly as in some cases post-secondary education does not have the type of impact normally associated with it. In some cases, students who are less prepared for university or college study may become overwhelmed or demoralized by the experience. Less prepared students may also find themselves unable to compete and more likely to be impacted negatively in terms of their confidence. However, many of these points remain controversial and speculative.

Income

Income Predicts Mental Health

Another SDH variable that will be used for this research is income—particularly lower socioeconomic status. Those living in poverty experience a variety of issues that may negatively impact their long-term mental health. According to Chung et al. (2016),

these include “child maltreatment, childcare and education, family financial support, physical environment, family social support, intimate partner violence, maternal depression and family mental illness, household substance abuse, firearm exposure, and parental health literacy” (p. 135). Continual exposure to adverse experiences increases the potential for what the authors called “toxic stress,” which often leads to a variety of emotional disorders.

Income Predicts Academic Success

Families with higher incomes have a greater capacity to invest financially in their children. This, in turn, establishes a foundation which allows children growing up in higher socioeconomic environments to benefit from opportunities unavailable to their peers who live in poverty. For example, children who are from higher-income families have other benefits, such as access to social circles with sophisticated dialogue, that have a positive impact on academic development (Corak, 2013). They will have a more sophisticated vocabulary, more life experiences, and access to opportunities that afford them non-monetary advantages. Such advantages could also decrease stressors in life, for example, hearing about others who have had struggles and how they overcame them. For many if not most children growing up in poverty, there are limited opportunities to have these experiences, which ultimately decreases their ability to develop skills to manage the stressors in their lives (Corak, 2013). Living in poverty is thus a SDH that perpetuates a vicious cycle that prevents students from developing their academic and emotional skills.

While the United States spends a much higher percentage of available income on each student in the education system, this does not compensate for the significant

inequities in parental resources between higher and lower income families (Corak, 2013). There is no scenario that levels the playing field for children from low-income families and provides equal opportunity for a quality education. For example, in countries that have high-performing education systems, the most qualified and experienced teachers work in disadvantaged areas. By contrast, the United States places its most qualified teachers with the students who are already most likely to perform well. Students from these backgrounds have additional factors that are not in their favor (OECD, 2012). Income thus impacts the ability of children to make educational progress.

Neighborhood Safety

Neighborhood Safety Predicts Mental Health

Neighborhood safety also is an SDH. A feeling of neighborhood insecurity is prevalent in all neighborhoods that experience significant instability and lack of safety. Some research reports that as many as nine million Americans live in "extreme poverty" areas, defined as neighborhoods consisting of at least 40% of the population classified as poor (Kneebone et al., 2011). Although much of the research conducted on this topic focuses on minority groups, there is research that simply focuses on individuals who live in unsafe neighborhoods (Assari & Caldwell, 2017). In such minority neighborhoods, negative mental and physical wellbeing are threatened not only from actual violence but also from the fear of potential violent acts (Assari & Caldwell, 2017). Those individuals who live in low-income areas are more likely to witness violent actions, including shootings and murder, especially compared to individuals living in middle or upper-class neighborhoods, irrespective of race.

Research over the past several decades consistently shows that residents of disadvantaged neighborhoods experience lower income, poorer health, lower levels of education, higher incidents of crime, and similar negative outcomes (Sampson, 2012). Based on these reports, indications are that unsafe neighborhoods are likely to have a significant negative effect on people's ability to make positive future life choices (Ludwig et al., 2013). Understanding these issues can assist policymakers identify the types of policies that will enable the poor to improve their situation.

A neighborhood deemed unsafe or socially disadvantaged may contribute to personal feelings of helplessness or the inability to improve one's circumstances, and thus be an SDH. At the same time, even if individuals have the opportunity to move from insecure neighborhoods to more economically viable areas, advantages may not necessarily increase due to the individual's inability to integrate into the new community, primarily related to an abrupt change in socioeconomic status without learning the associated social adaptations (Ludwig et al., 2013).

Life in a neighborhood perceived as unsafe creates an environment of stress and fear that contributes to negative health outcomes, even if a specific individual never directly experiences the violence personally (Assari & Caldwell, 2017). This is presented in findings from research conducted in neighborhoods considered disadvantaged—both economically and socially—where residents consistently experience a wide range of physical and mental health issues, including depression (Assari & Caldwell, 2017). A reality of the research is that minority groups are more likely to live in unsafe

neighborhoods. However, the research does show that it is the perception of safety within a neighborhood that is a SDH, even though race itself may be a contributing factor.

Neighborhood Safety Predicts Academic Success

Research on neighborhood safety often connects adolescent mental health to declining academics (Goldman-Mellor, Margerison-Zilko, Allen, & Cerdá, 2016), but undetermined is the impact of neighborhood safety on online academic performance of undergraduates.

Ludwig and associates (2013) examined the long-term effects on poor families moving out of unsafe neighborhoods into areas offering more opportunities using data from the U.S. Department of Housing and Urban Development's Moving to Opportunity (MTO) demonstration. MTO provided housing vouchers to families with children living in high-poverty public housing projects, enabling them to move to a neighborhood they would otherwise not have access to. Over the course of time, studying the results of these movements provides data related to health and wellbeing outcomes for families in both neighborhood types. The study (Ludwig et al., 2013), which examined data from as many as 15 years of such moves, found improved results in mental health as well as physical health in several areas.

It is no simple matter to identify causal effects related to behavior or well-being based on the environment of a specific neighborhood. This is largely due to the reality of personal choice which allows, at least to a certain degree, where people choose to live. As revealed by Ludwig et al. (2013), the overall impact of a neighborhood is often difficult to separate from the combined impacts created by families living in that neighborhood.

Nevertheless, the collection of evidence about "neighborhood effects" is important largely because of the increasing role that low incomes have on the creation of neighborhoods (Reardon & Bischoff, 2011).

Even with the added advantages of neighborhood movement a correlation between adult economic self-sufficiency and children's educational achievement outcomes was unidentifiable. In conclusion, Ludwig et al (2013) stated: "Despite the mixed MTO impacts on the standard outcomes that have dominated the neighborhood-effects literature, MTO moves generate a large gain in subjective well-being (SWB) for adults" (Ludwig et al. 2013, p. 2).

Housing Stability

Housing Stability (HS) Predicts Mental Health (MH)

Housing stability or instability, a well-recognized SDH, plays a critical role in individuals' mental health, and problems with mental health, in turn, case problems with learning. An analysis of data from the 2011 Washington State Behavioral Risk Factor Surveillance System (BRFSS), a random-digit–dialed telephone survey conducted annually in all 50 states, DC, and US territories, reported a well-defined difference between individuals feeling secure in their housing and those feeling insecure, with the latter group more likely to report poor mental health (Stahre, VanEenwyk, Siegel, & Njai, 2015). While previous studies found similar correlation between housing insecurity and diminished mental health, Stahre et al. (2015) were the first to identify such trends after controlling for several socioeconomic and demographic measures.

Housing Stability Predicts Academic Success.

Poor quality housing experienced at a young age was a predictor of a negative sense of wellbeing into later life. Living in low-quality housing resulted in significant differences in behavior and emotional stability when compared to those living in higher-quality housing (Coley et al., 2013). The study reported a clear connection between the level of housing stability and quality and emotional wellbeing. In addition to poor emotional well-being, poor quality housing and the concomitant levels of emotional distress was also caused poor academic performance.

Thus, the literature also clearly demonstrates that housing instability has a negative impact on academic success. Children growing up in adequate housing tend to experience an improved ability to learn because stable housing creates a sense of emotional security and provides beneficial physical amenities (Lareau & Goyette, 2014). Housing stability also provides adequate places for students to study and decreases extraneous stressors that could negative impact academic performance. Housing instability typically results in students moving multiple times between neighborhoods, schools, and school districts (Lareau, & Goyette, 2014). This chronic mobility destabilizes children and decreases their likelihood for academic success. For example, children who change school districts often lose the support of a teacher network that understands their academic performance and issues. These students may have to start over completely with dealing with any academic issues.

Extreme mobility negatively affects children—especially their ability to learn—to a much greater degree than is widely accepted (Lareau & Goyette, 2014). Certainly,

families move to different neighborhood at times as a means of improving the family's educational and socioeconomic options, but this is rarely the case with lower-income families. Instead, poor families often are forced to relocate due to circumstances out of their control, many times resulting in turmoil or emotional distress. Thus, this emotional distress, coupled with the lack of support from teachers means that children are at a significant academic disadvantage as compared to students who have more stability.

Certain characteristics, generally associated with stable housing, are also beneficial to academic success. For example, a private bedroom provides a secluded area which is much more conducive to completing homework or other school assignments (Lareau & Goyette, 2014). A lack of privacy often inhibits the quiet time necessary for individual learning. Other issues related to poor housing conditions—such as concerns over health or safety—can contribute to lower academic success more indirectly. For example, poor health results in missed days of school as well as diminished ability to concentrate on schoolwork (Lareau, & Goyette, 2014). Finally, housing that is overcrowded or populated by a wide range of age groups, has a negative impact on academic performance because of the stressors related to having multiple people living in quarters that are too small. Stress related to a lack of private space or problem behaviors exhibited in the living space negatively impact academic performance (Lareau & Goyette, 2014).

Adverse Childhood Experiences

Adverse Childhood Experiences (ACEs) Predict Mental Health (MH)

Adverse childhood experiences (ACEs) are experiences of childhood that negatively influence broader life issues as one grows and develops (Karatekin, & Ahluwalia, 2016). Although measuring the existence of ACEs now, it is important to note that these occurred in the past, rather than now. However, ACEs have significant ongoing effects one individual's ability to cope with stressors, and often lead to isolation, which has a negative impact on mental health. Further, when looking at issues related to OE, is important to look at previous factors that could have an effect on how adult learners perform, even though their current SDH are more positive than they were in the past. The negative impact of ACEs is often in areas of occupation, education, economics, physical well-being, and mental health. A decrease in economic, occupational and education success correlates with the increase of adverse experiences in childhood (2016). The ACEs concept was developed over a period of three years based on investigations that included thousands of participants. The ACEs scores are designed to represent an overview of each participant's exposure to negative experiences during childhood (Felitti et al., 1998). Higher scores on the ACEs questionnaire are closely related to an individual's risk for "developing at-risk behaviors, including substance abuse, multiple sexual partners, smoking, and early initiation of sexual activity and pregnancy."

This study will include scores calculated utilizing the ACE Scale, based on a landmark study presented by Felitti, Anda, Nordenberg, et al. (1998). That study, and the scale resulting from it, represented a landmark in medical research, associating experiences from childhood such as abuse, alcoholism, and general household

dysfunction with future health outcomes. (CDC, 2014). Other research indicates that as the number of ACEs increases, physical and mental health issues increase while age of mortality decreases. (Cronholm et al., 2015). The ACE Scale has shown beneficial for many agencies in an effort to impact health outcomes, as well as economy and educational outcomes.

Following the development of the ACE Scale, numerous studies proceeded to apply it as a method of more fully understanding childhood adversity and its relationship to diminished health outcomes in later years, including early onset of disease, social problems and even early death. Some states include ACE Scale modules into Behavioral Risk Factor Surveillance System (BRFSS), which are telephone surveys designed to collect information on health-related questions. The use of BRFSS reports confirm that higher scores on the ACE Scale typically result in poor health outcomes (O'Connor, Finkbiner, & Watson, 2012). To date, most studies or policies incorporating ACE Scale data have included predominantly white, highly educated participants. Similarly, BRFSS reports consist largely of that same demographic (CDC, 2014). Cronholm et al. (2015) suggested that ACE Scale should likewise be utilized to study the health outcomes for minority groups as well. More specific types of adversity more common to minority groups, such as experiencing racism, neighborhood violence, bullying, or similar experiences, could be collected to increase the application of the ACE Scale to a broader population (Wade, Jr., Shea, Rubin, & Wood, 2014; Pachter, Bahora, Witherspoon, Davis, Smith-Brown, & Bernstein, 2014).

While Cronholm et al. (2015) described the benefits derived from the ongoing research related to a longitudinal Adverse Childhood Experiences Study of adults, they acknowledged a lack of knowledge regarding the epidemiology of adverse childhood experiences among American children. One noted exception is Bethell, Newacheck and Halfon's (2014) investigation based on the 2011-12 National Survey of Children's Health which reported on the relationship between negative childhood experiences and lifelong health and wellbeing. Specifically, the study found a higher incidence of chronic disease among individuals who experienced adversity in childhood. Of note, the researchers suggested that the ability to become resilient (or maintain a sense of control) contributed to an aptitude for negating damaging childhood experiences.

Adverse Childhood Experiences Predict Academic Success

ACEs affect the overall quality of life for adults. Studies designed to measure the impact of ACEs on academic performance in college noted that both GPA and adaptation to university life are impacted negatively by a self-reported history of emotional abuse (Welsh, Peterson, & Jameson, 2017). Results demonstrated poor academic outcomes for all who scored higher on questions related to child maltreatment. In contrast to poor educational outcomes as manifestation of high ACEs, one of the protective factors that can assist students in resiliency and recovery are academic engagement and a positive school environment (Haskett, Nears, Ward, & McPherson, 2014). Students with higher rates of resiliency engaged more fully in their education and this was highly dependent on support from their family unit and their ability to support the learner (Bethell et al., 2014)

Mental Health Status

In the various sections above, I described how SDH impact mental health. Below I explain how mental health may impact a student's ability has to perform academically. Mental health challenges are often expressed as helplessness, varying mood states, exhaustion, anger, or loneliness. Depression and anxiety, which are often exacerbated or initiated after traumatic and difficult life events (Shenoy, Lee, & Sang Leng Trieu, 2016), lead to negative mood states and negative perception of stressors, with decreased productivity. For those students who have a history of exposure to traumatic events, ACEs, or social inequality, it is likely that stressors may be more debilitating and attitudes to challenges more negative (Gress-Smith et al., 2013). OE may create an additional level of stress since many students enrolled in online courses are inexperienced with the type of self-regulation necessary to take charge of their own learning, which is required in OE environments (Devlin, 2013).

Undergraduates experience stress and other related psychological issues at an increasingly elevated degree, brought on or exacerbated by a variety of influences. Byrd and McKinney (2012) conducted a survey of students to determine their perception of how such issues impacted their mental wellbeing. For nearly half of the respondents, the combination of institutional and individual factors was reported as the primary sources of negative mental health experiences. The types of factors reported in Byrd and McKinney's (2012) survey results included coping skills, suicidal ideations, ability to communicate, spirituality, and heterosexual orientation as the most often cited. Students who reported limited coping skills and who experienced stress related to racial identity

were most likely to suffer from negative mental health issues. Byrd and McKinney (2012) thus recommended that postsecondary institutions address these factors to support undergraduates.

While some research, as noted above, reported that enrollment in postsecondary education may be a cause for mental distress in students, other research claims that higher education is a determinant of mental health outcomes. For example, Telfair and Shelton (2012) reported a positive link between postsecondary education and positive mental health. The study acknowledged that those who attain a higher education are more likely to have a positive outlook on life and thus experience fewer mental health issues. However, the study likewise noted that not all people are able to perform academically at a level that allows them to attain postsecondary success, which, in turn, can result in negative mental health outcomes. In addition, Telfair and Shelton (2012) confirmed what for many is common knowledge—that the creation of lifelong beliefs about what can be accomplished in the future is largely dependent on an individual's social and economic status. Lack of personal belief that a postsecondary education is truly attainable results in additional stress and negativity that can inhibit the ability to make academic progress.

To fill the gap in research investigating the prevalence of depression and other mental health issues among undergraduates, Luna and MacMillan (2016) examined a broad demographic group of students hoping to draw conclusions based on prevalence of symptoms based on ethnicity, age, and gender. The research included well over 1100 students on three separate campuses who completed a detailed questionnaire. While the study failed to find serious levels of depression or other mental health issues, it did

identify what was termed mild levels of these issues, as well as a perceived connection between age and race (Luna, & MacMillan, 2016). Findings related to gender revealed no statistically significant differences in depressive symptoms between males and females, which may seem to contradict what is typically believed about the prevalence of depression. The researchers noted, however, that previous studies found minimal differentiation between males and females regarding depression, with one reporting that "gender only accounted for 2% of the variation in psychological symptoms and different types of symptoms may be reported by men and women" (Lovell, Nash, Sharman, & Lane, 2015, p. 134). This result may indicate either that gender does not play a role in experiencing depression or that the way depression is measured requires adjustment. Clear statistical evidence was found to support variations in level of depressive symptoms and quality of life based on ethnicity (Luna &MacMillan, 2016). The highest levels on impaired quality of life were reported by Latinos, while Caribbean/West Indians were identified as having the lowest levels of impairment. Caucasians and African Americans had levels in between these highs and lows on the scale (Luna & MacMillan, 2016). The research results indicated that depression is a common problem across all ethnic and racial boundaries, which is consistent with previous studies conducted by Brittian et al. (2013; 2015). At the same time, the results also suggest that other factors beyond mere ethnic identity may play a role in depressive symptoms, such as acculturation. Cumulative stressors seem to play an important role in the mental wellbeing of students enrolled in postsecondary education. The research is clear and points to a correlation between environment and perception—which will, in turn, determine coping ability

(GressSmith, Roubinov, Andreotti, Compas, & Lueken, 2013). The little research that exists on the topic clearly indicates a higher risk for depression and other mental health issues among students at postsecondary institutions. GressSmith et al. performed two studies and the first researched depressive symptoms and insomnia as co-morbid issues in 18-23-year-old students from a University in the Southwest. Results indicated that 19% of the 1338 students revealed mild depressive symptoms and 14.5% reported moderate to severe symptoms (2013, p. 63). Both elevated incidents of depression and insomnia are reported in this study and others that included undergraduate students. These incidents are multiplied when the cumulative effects of many years of negative environmental factors are included and accounted for. The study concluded that a lower socioeconomic environment typically results in an arrested level of socio emotional ability (Coley et al., 2013).

Chapter 3: Research Method

Introduction

This study was conducted for the purpose of determining which SDH, if any, are associated with achievement of undergraduate students who participate in an online 4-year degree program. For this study, the social determinants of interest include stability in household income, neighborhood safety, housing stability, mental health status, and ACEs. Since this study employed a quantitative survey instrument, a descriptive research design was created to accurately analyze and present findings concerning how, and to what extent, SDH are associated with OE achievement.

Chapter 3 contains an explanation of the chosen research design, as well as the methodology, population sampling, instruments, and data analysis procedures. Also included in the chapter are considerations related to ethics and general precautions.

Research Design and Rationale

In this study, a quantitative, correlational, cross sectional survey study design was employed. Descriptive research may be either qualitative or quantitative. With a quantitative research design, I was able to examine whether there was a significant relationship between predictors—SDH (stability in housing, earned annual income, neighborhood/community safety, ACEs and mental health)—and an outcome variable-undergraduate achievement in a 4-year online degree program. By employing a survey instrument, I was able to conclude that there was no significant relationship between each SDH on undergraduate achievement in an online program.

Methodology

Sample Size

The intended size of the sample included in this descriptive quantitative study was approximately 150 undergraduate students currently enrolled in an online undergraduate program that offers a 4-year degree program a wide range of subjects. According to G*Power 3.0.10 calculations, with an effect size of .3 and a 0.95 error probability, the total sample size suggested was approximately 110 participants.

Preliminary approval was sought and received to use a participant pool and an online survey distribution site. I considered and rejected the use of a university participant pool, which is a virtual bulletin board that connects researchers to participants. This option allows access to a very diverse community, while simultaneously allowing participants to learn about research, but was rejected due to the rapid change in course formats all over the world because of a global pandemic. With changes to university protocols and procedures, nearly all undergraduates became online learners. I adjusted to this external factor by distributing the survey by means of a public sector distribution owned and operated by Amazon. Amazon Mechanical Turk (MTurk) was developed for use by businesses in 2005 and allows researchers to post surveys for task-driven data collection.

An application was not necessary to access the features of Amazon Turk, though the study was registered and published on the site. The letter of invitation and a letter of informed consent were attached to the survey and consent had to be granted by each participant for inclusion in the study. The university institutional review board (IRB)

required an application and approval to conduct research on human subjects and to use the survey instrument itself. Using the online participant pool for this study ensured complete anonymity with no negative repercussions for refusing to participate or choosing to withdraw at any time.

The descriptive quantitative study tested 10 hypotheses that directly reflected how each SDH influenced achievement among the undergraduate students surveyed. The purpose of including a large sample size in this descriptive quantitative study was to reduce the probability that Type I and Type II errors will occur. When a hypothesis is true, but rejected, a Type I error occurs. The probability of a Type I error in this study is 5%, a 0.95 error probability (a = 0.05). When the null hypothesis is false, but is not rejected, a Type II error occurs. Thus, a large sample size of 212 study participants increased the accuracy of survey results.

The inclusion criteria of this study are students that are (a) enrolled in an online undergraduate program, (b) projected to complete a 4-year degree in a strictly online format, and (c) an age of at least 18 years.

Instrumentation

Instrumentation included a survey that assesses declared major, academic year (e.g., first, second, third, fourth, and beyond), race/ethnicity, gender, and age. The survey also assessed the social determinants of annual earned income, neighborhood safety, housing stability, and number of ACEs. Mental health status was collected through the RAND 36-Item Health Survey (Version 1.0). In 1990, the self-report measure of functional health and well-being (The Short Form 36) was standardized. The (SF-36v2),

version 2.0, was published in 1996 with privileges belonging to the Medical Outcomes Trust, Health Assessment Lab, and Quality Metric Incorporated (Ware & Sherbourne, 1992). This survey includes eight health concepts, but only the questions related to role limitations due to personal or emotional problems and emotional well-being were used. Within the 36 questions, three measure role limitations due to personal or emotional problems and five measure emotional well-being. The ACEs score was calculated from the results of the ACE Quiz. The 10 questions measure different types of abuse, neglect, and household dysfunction (Felitti et al., 1998).

Data Collection and Analysis Procedures

Analyzing the survey questionnaire results involved a process of investigating with multiple linear regression and structural equation modeling. Six research questions and related hypotheses were generated for investigation.

All variables were imported into SPSS as string variables. String variables were assigned numeric values as appropriate by using the automatic recode feature in SPSS. On two items, participants were given instructions to select all that apply. Their responses were recorded in one column and one cell for each participant even if the participant selected more than one choice for these two items. These responses were manually disaggregated by creating a column for each possible response. Each possible response was assigned a numeric value of one. Variables of interest were recoded or computed as warranted. The reliability of the items for mental health status for the sample was tested with Cronbach's alpha. The first five research questions were tested simultaneously with univariate statistics, and the assumptions of multiple regression were also tested.

To establish that the mediator completely or partially mediated the relationship between the causal variable and the outcome variable, Research question six was investigated with structural equation modeling. Using the Barron and Kenny approach to establish mediation, there are four steps required (Kenny, 2018) and mediation was unfounded.

In this research context, multiple linear regression and structural equation modeling were used to determine whether there was a significant correlation between each social determinant of health and achievement among the sample of 212 undergraduate students enrolled in a 4-year degree program. The relationship between each of the five independent variables—e.g., household income, neighborhood safety, housing stability, mental health status, and ACEs and the dependent variable of achievement in a 4-year online degree program was measured, estimated, and reported. The working hypotheses were:

RQ1: Is there a relationship between annual household income and GPA as measured by survey questions answered by online undergraduate college students?

$H_0$1: Higher annual earned income is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a1: Higher annual earned income is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ2: Is there a relationship between neighborhood and community safety and GPA as measured by survey questions answered by online undergraduate college students?

$H_0$2: Neighborhood/community safety is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a2: Neighborhood/community safety is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ3: Is there a relationship between housing stability and GPA as measured by survey questions answered by online undergraduate college students?

$H_0$3: Stability in housing is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a3: Stability in housing is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ4: Is there a relationship between mental health status and GPA as measured by survey questions answered by online undergraduate college students?

$H_0$4: Mental health status is not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a4: Mental health status is positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ5: Is there a relationship between ACE scores and GPA as measured by survey questions answered by online undergraduate college students?

H_05: ACEs are not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a5: ACEs are positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

RQ6: Is there a relationship between SDH and GPA as measured by a survey and mediated by mental health?

H_06: SDH are not correlated with the achievement of undergraduate students enrolled in a 4-year online degree program as measured with GPA.

H_a6: SDH are positively correlated with the achievement of undergraduate students enrolled in a 4-year online degree program, as measured with GPA.

Ethical Procedures

Since this study involved research on human participants, the IRB reviewed all ethical considerations to provide support. The IRB reviewed whether this study involved an intervention designed to benefit participants. Secondly, the IRB determined whether participants who were least 16 years of age but who are also under 18 years of age comprehend the meaning of voluntarily participating in a research study.

I aimed to recruit participants who were at least 18 years of age, eliminating the need to gain permission from a parent or legal guardian.

Each of the participants received a letter of invitation that described the intended purpose of this study. The letter of invitation described the nature of the study and how much time was necessary to complete the survey questionnaire. The survey questionnaire took less than 30 minutes to complete. The participants did not receive any monetary compensation for answering the survey questionnaire. All participants received a letter of informed consent indicating the anonymous and voluntary nature of this study. No personally identifiable information such as names, addresses, and phone numbers were included in the final study results. Without consent, participants were not included in the research.

Each participant had the option of choosing or not choosing to participate in this study. Not choosing to participate in this study had no legal, professional, or personal repercussions. By choosing to participate, however, everyone who completed the survey questionnaire did provide a valuable research contribution. It was noted that study results will be published to the web on a professional social media site.

Summary

This chapter described the research design and its rationale. This study is descriptive and quantitative in nature based on the construction of a survey instrument intended for use by each of the 150 intended participants, with over 200 included in the results. The quantitative descriptive research design allowed the me to provide an objective narrative about the relationship between SDH fand GPA for undergraduate

students enrolled in a 4-year online degree program. The study employed a survey that included questions on demographics and SDH. The descriptive and quantitative nature of this study entailed that the data collection and analysis procedures involve random selection and structured instrumentation methods aligned with predetermined categories. This study also employed a random sampling method to ensure that the margin of error contained in the survey results was minimal and to achieve a 95% confidence interval.

Additionally, this study employed multiple linear regression and structural equation modeling to estimate the possible significant relationships between of each of the SDH on achievement for undergraduate students enrolled in a 4-year online degree program. The ethical considerations were included in this chapter to help ensure participants that all responses to items included in the survey questionnaire would remain confidential. The results of this study provide an objective view of how the SDH influence achievement, as measured by GPA, in a 4-year online degree program. Ideally, the results of this study will apply to more general populations.

Chapter 4: Results

Introduction

The purpose of this quantitative, correlational study was to determine if and to what extent a relationship existed between SDH and achievement of undergraduate students who participated in an online 4-year degree program. Among the variables studied were household income, neighborhood safety, housing stability, mental health status, and ACE scores, along with GPA as a measure of academic achievement in an undergraduate online degree program and mental health status as a potential mediator.

The research questions and associated hypotheses were as follows:

RQ1: Is there a relationship between annual household income and grade-point-average as measured by survey questions answered by online undergraduate college students?

H_{01}: Higher annual earned income is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.

H_1: Higher annual earned income is positively correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program, as measured with GPA.

RQ2: Is there a relationship between neighborhood and community safety and grade-point-average as measured by survey questions answered by online undergraduate college students?

H_{02}: Neighborhood/community safety is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.

H_2: Neighborhood/community safety is positively correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program, as measured with GPA.

RQ3: Is there a relationship between housing stability and grade-point-average as measured by survey questions answered by online undergraduate college students?

H_{03}: Stability in housing is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.

H_3: Stability in housing is positively correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program, as measured with GPA.

RQ4: Is there a relationship between mental health status and grade-point-average as measured by survey questions answered by online undergraduate college students?

H_{04}: Mental health status is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.

H_4: Mental health status is positively correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program, as measured with GPA.

RQ5: Is there a relationship between ACE scores and grade-point average as measured by survey questions answered by online undergraduate college students?

H_{05}: Adverse childhood experiences are not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.

H_5: Adverse childhood experiences are positively correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program, as measured with GPA.

RQ6: If there is a relationship between social determinants of health and GPA, is the relationship mediated by mental health?

H_{06}: If there is a relationship between social determinants of health and GPA, the relationship is not mediated by mental health.

H_6: If there is a relationship between social determinants of health and GPA, the relationship is mediated by mental health.

Chapter 4 is organized by an introduction, a discussion of the data preparation, sample demographics, reliability analysis, descriptive statistics, research question/hypotheses testing, and a summary of the results. Data were analyzed with SPSS 23 for Windows and AMOS 23 for Windows. The following provides a discussion of the preparation of the data.

Preparation of Data

The data were collected through Google Forms. After data collection, the data were exported to Microsoft Excel. The Excel file was then imported into SPSS for data cleaning and analysis. Data were gathered on 415 participants. Participants were deleted from the dataset if they were not enrolled in online courses, did not provide their GPA, or

if the GPA they provided did not confirm to the 4-point scale. This left a total sample size of 212 participants.

All variables were imported into SPSS as string variables. String variables were assigned numeric values as appropriate by using the automatic recode feature in SPSS. On two items, participants were given instructions to select all that apply. Their responses were recorded in one column and one cell for each participant even if the participant selected more than one choice for these two items. These responses were manually disaggregated by creating a column for each possible response. Each possible response was assigned a numeric value of one.

Variables of interest were recoded or computed as warranted. The variable of interest in research question one was household income (item #7). Household income was an ordinal variable but was dichotomized for use in multiple linear regression. The variable of interest in research question two was lack of perceived neighborhood safety (item #10). The variable was recoded so that the higher the score, the higher the perceived lack of safety. The variable of interest in research question three was household stability (item #11). The variables were recoded so that the higher the score, the greater the household stability. The variable of interest in research question four was mental health status (items #15, 16). These items were recoded so that the higher the score, the greater the emotional problems such as feeling depressed or anxious. This was the mediator variable. After the items were recoded, they were summed to produce a composite score for mental health. The variable of interest in research question five was ACEs (item #13). Participants were asked to select all that applied for this item. There

were nine possible choices. The ACEs score was computed by summing the number of items selected.

Demographic Profile of Sample

The demographic data will be presented in the order in which it was presented on the survey. Participants were asked, "Are you enrolled in an online undergraduate college program?" If they selected yes, they were prompted to select which year of study. Seven percent (n = 15) were freshmen, and 17.5% (n = 37) were sophomores. The largest group of participants were seniors (40.1%, n = 85), whereas 17.5% (n = 37) were in their fifth year or more of study. Student classification is presented in Table 1.

Table 1

Student Classification

Student classification	*n*	*%*	Cumulative *%*
Yes, and I am a 1st year/freshman	15	7.1	7.1
Yes, and I am a 2nd year/sophomore	37	17.5	24.5
Yes, and I am a 3rd year/junior	38	17.9	42.5
Yes, and I am a 4th year/senior	85	40.1	82.5
Yes, and I am in my 5th year or more of study	37	17.5	100.0
Total	212	100.0	

Participants were asked, "What is your current GPA?" This was an open-ended question. Participant GPAs ranged from 0.72 to 4.00 (M = 3.30, SD = 0.67) with a median GPA of 3.45. Regarding race/ethnicity, 11.8% (n = 25) were African American/Black, 1.9% (n = 4) were White, and 12.7% (n = 27) were Latino-Americans. Race/ethnicity is presented in Table 2.

Table 2

Race/Ethnicity

Race/ethnicity	*N*	*%*
African American/Black	25	11.8
East Asian (e.g., Japanese, Chinese, Korean, Mongolian, Taiwanese)	8	3.8
Eastern European	18	8.5
Indigenous American/Native American/First Nations	15	7.1
Latino-American/Hispanic/Central and South American	27	12.7
Middle Eastern (e.g., Turkish, Egyptian, Saudi, Persian, Iraqi)	1	0.5
Mixed	11	5.2
North American	59	27.8
South Asian (e.g., e.g., Indian/Hindu, Afghani, Pakistani, Bangladeshi, Sri Lankan, Nepalese)	22	10.4
Southeast Asian (e.g., Thai, Laotian, Cambodian, Burmese, Vietnamese)	7	3.3
Western European	15	7.1
White	4	1.9
Total	212	100.0

Participant ages ranged from 18 to 61 ($M = 28.77$, $SD = 8.41$) with a median age of 27.00. Participants were asked, "How is your income generated?" Most participants (60.8%, $n = 129$) had a hybrid source of income in that they earned some of their own income and their families also provided some of their incomes. However, 26.4% ($n = 56$) earned their own incomes, whereas 2.8% ($n = 6$) accrued all of their income from their families. Source of income is presented in Table 3.

Table 3

Source of Income

Source of income	*n*	*%*
I accrue all of my income from my family	6	2.8
I accrue my income from a trust account	21	9.9
I earn my own income	56	26.4
I earn some of my own income and my family contributes some of my income	129	60.8
Total	212	100.0

Participants were asked, "What is your income?" About half (48.6%, *n* = 103) earned between $400 - $2,399 per month and half (51.4%, *n* = 109) earned $2,400 or more per month. See Table 4.

Table 4

Income

Income	*n*	*%*	Cumulative *%*
$400-899 per month (48.00-9600.00 per year)	31	14.6	14.6
$900-1399 per month	27	12.7	27.4
$1400-1899 per month	30	14.2	41.5
$1900-2399 per month	15	7.1	48.6
$2400-2899 per month	31	14.6	63.2
$2900-3399 per month	18	8.5	71.7
$3400-3899 per month	16	7.5	79.2
$3900-4399 per month	9	4.2	83.5
$4400-4899 per month	7	3.3	86.8
$4900-5399 per month	6	2.8	89.6

$5400-5899 per month	7	3.3	92.9
$5900 or more per month (70,000 or more per year)	15	7.1	100.0
Total	212	100.0	

Participants were asked, "How is your college tuition (for current program) paid?" One respondent (0.5%) did not know how his or her tuition was paid. Approximately, 45% (n = 95) paid their own tuition with their own incomes, and 3.3% (n = 7) paid their tuition with funds from a trust account. Source of college tuition for current program is presented in Table 5.

Table 5

Source of College Tuition for Current Program

Source of college tuition	*n*	*%*
I do not know how my tuition is paid	1	0.5
I pay my own tuition as an independent borrower of loans or with financial aid	50	23.6
I pay my own tuition with my own income	95	44.8
My tuition is paid from another source (G.I Bill, scholarship funds)	9	4.2
My tuition is paid through loans (with me as a dependent borrower) or with financial aid (granted with me as a dependent)	50	23.6
My tuition is paid with funds from a trust account	7	3.3
Total	212	100.0

Nearly two-thirds of responds (67.9%, n = 144) opined that their income was sufficient to meet their needs, whereas 27.8% (n = 59) did not think their income was adequate, and 4.2% (n = 9) were not sure. Participants were asked, "How safe do you feel in the neighborhood/community where you live?" Nearly 58% (n = 122) felt mostly safe

or very safe, whereas 42% (*n* = 90) did not feel safe at all or felt somewhat safe. Perception of safety is presented in Table 6.

Table 6

Safety Perception

Safety perception	*n*	*%*	Cumulative *%*
Very safe	49	23.1	23.1
Mostly safe	73	34.4	57.5
Somewhat safe	84	39.6	97.2
Not safe at all	6	2.8	100.0
Total	212	100.0	

Participants were asked, "How long have you lived in your current neighborhood/community?" Twenty-five percent of respondents (*n* = 52) lived in their current neighborhoods or communities between 2 and 5 years, 23% (*n* = 48) lived in their communities between 1and 2 years, and 19% (*n* = 40) lived in their communities between 6 months and 1 year. See Table 7.

Table 7

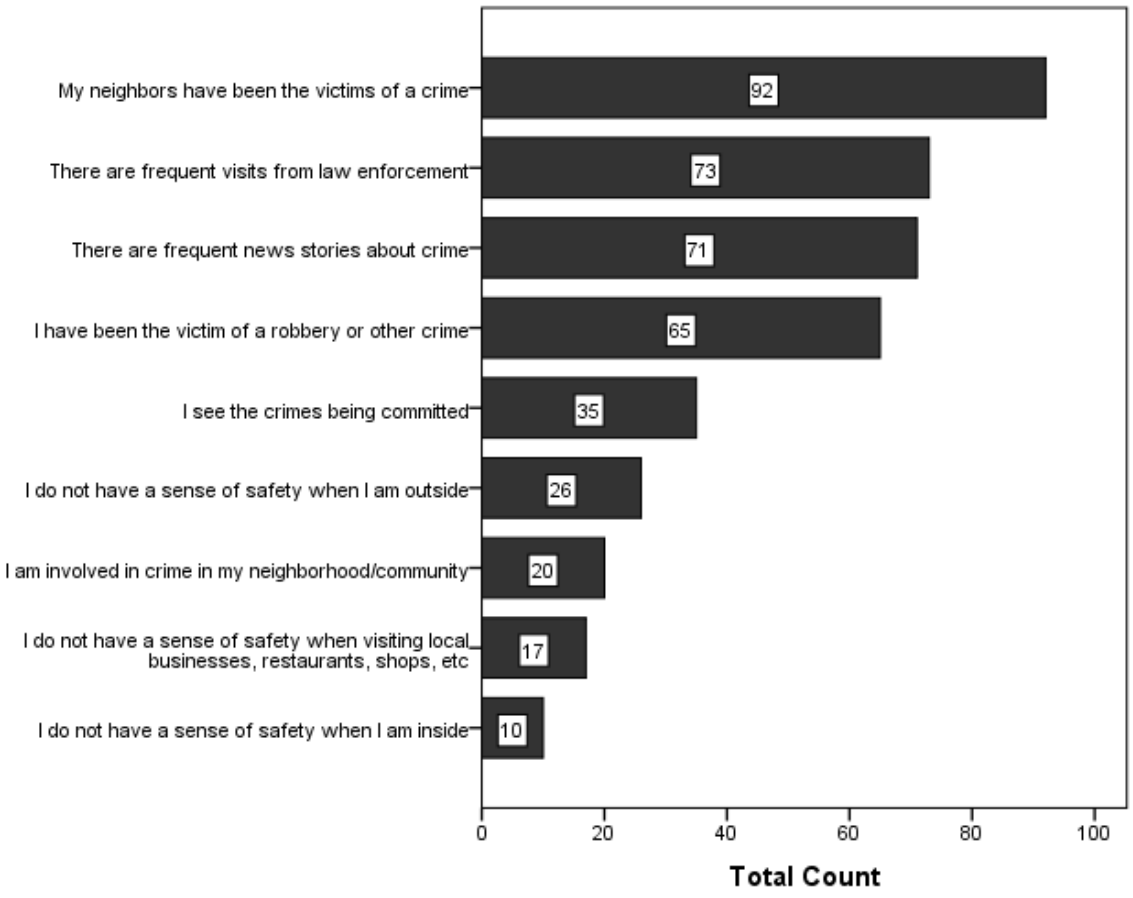
Length of Time Living in Neighborhood/Community

Length of time lived in community	*n*	%	Cumulative %
6 months or less	16	7.5	7.5
Between 6 months and 1 year	40	18.9	26.4
Between 1 year and 2 years	48	22.6	49.1
Between 2 and 5 years	52	24.5	73.6
Between 5 and 10 years	23	10.8	84.4
More than 10 years	33	15.6	100.0
Total	212	100.0	

Participants were asked, "If you live in an unsafe or somewhat safe neighborhood, what leads you to believe so? (please choose all that apply):" The most frequently endorsed reasons were having neighbors who have been the victim of a crime (n = 92), frequent visits from law enforcement (n = 73), and frequent news stories about crimes (n = 71). Less frequent reasons included not having a sense of safety when inside (n = 10), not having a sense of safety when visiting local businesses, restaurants, shops, etc. (n = 17), and being involved in crime in their neighborhood/community (n = 20). Factors attributed to feelings of unsafety are presented in Figure 1.

Figure 1

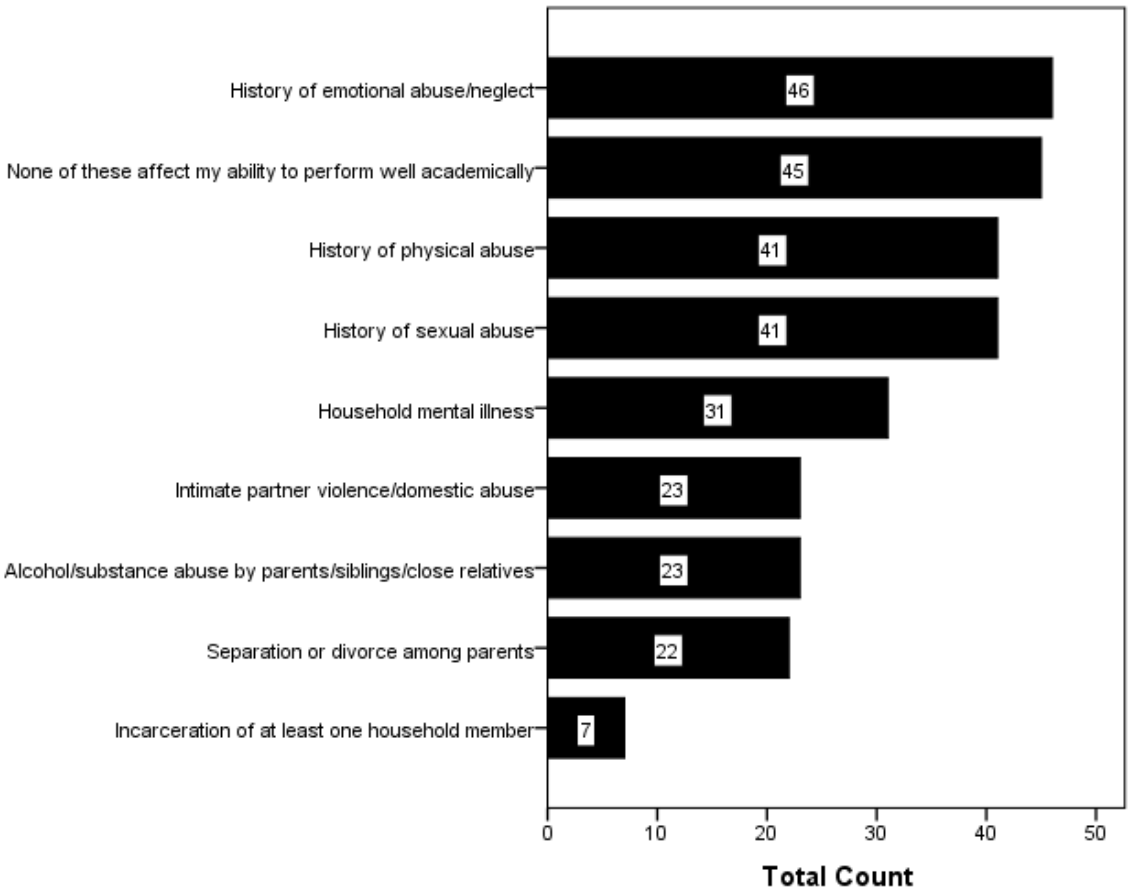
Factors Attributed to Feelings of Unsafety



Participants were asked, "What types of adverse childhood experiences do you believe have affected your ability to perform well academically?" The most frequently cited experiences included having a history of emotional abuse/neglect (n = 46), history of physical abuse (n = 41), and history of sexual abuse (n = 41). However, some participants (n = 45) indicated that none of the adverse childhood experiences affected their ability to perform well academically. Less frequent reasons cited included

incarceration of at least one household member (*n* = 7), separation or divorce among parents (*n* = 22), and responses were equally distributed among participants who experienced alcohol/substance abuse by parents/siblings/close relatives (*n* = 23) and intimate partner violence/domestic abuse *(n* = 23). ACEs are presented in Figure 2.

Figure 2 *Adverse Childhood Experiences*



Participants were prompted, "Choose the answer that best describes your situation." The answer choices were associated with renting or owning their homes. For instance, 28.3% (*n* = 60) rented their homes and moved less than once per year, whereas

26.9% (*n* = 57) owned a house and moved less than once per year. However, 14.2% (*n* = 30) owned a house and moved more than four times per year. Description of living situation is presented in Table 8.

Table 8 *Description of Living Situation*

Living Situation	*n*	*%*
I live in a house owned by family members	1	0.5
I live in a house owned by partner's family - don't pay rent. Move less than once per year	1	0.5
I live in my parents' house.	1	0.5
I live with parents	1	0.5
I own a house and I move between one and two times per year	27	12.7
I own a house and I move between two and four times per year	16	7.5
I own a house and I move less than once per year	57	26.9
I own a house and I move more than four times per year	30	14.2
I rent and I move between one and two times per year	12	5.7
I rent and I move between two and four times per year	4	1.9
I rent and I move less than once per year	60	28.3
I rent and I move more than four times per year	1	0.5
live in my parents' house	1	0.5
Total	212	100.0

Participants were asked, "During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?" Approximately 60% (*n* = 127) indicated that their emotional problems cut down on the amount of time they spent on work or other activities, whereas 40% (*n* = 85) responded no or unsure. Sixty-two

percent of respondents (*n* = 131) disclosed that their emotional problems caused them to accomplish less than they would have liked, whereas 38% (*n* = 81) selected no or unsure. Due to their emotional problems, 48% (*n* = 101) did not do work or other activities as carefully as usual, whereas 52% (*n* = 111) were unsure or either this did not apply to them. See Table 9.

Table 9 *Problems Due to Emotional Problems*

	No or Unsure		Yes	
	n	%	*n*	%
Cut down on the amount of time you spent on work or other activities	85	40.1%	127	59.9%
Accomplished less than you would like	81	38.2%	131	61.8%
Didn't do work or other activities as carefully as usual	111	52.4%	101	47.6%

Instrument Reliability for Sample

The reliability of the items for mental health status for the sample was tested with Cronbach's alpha. The reliability was questionable (α = .615) for the seven items. This is based on generally accepted criteria (DeVellis, 2012). Moreover, when α = .90 or above, it is considered to be excellent, .80-.89 is good, .70-.79 is acceptable, .60-.69 is questionable, .50-.59 is poor, and below .50 is unacceptable.

Descriptive Statistics

Continuous variables of interest were computed as aforementioned. Scores for lack of perceived neighborhood safety ranged from 2.00 to 8.00 (M = 4.15, SD = 1.40). Scores for mental health status ranged from 4.00 to 26.00 (M = 15.70, SD = 4.29). ACE

scores ranged from 1.00 to 7.00 (M = 1.32, SD = 0.90). Descriptive statistics for the continuous variables of interest are presented in Table 10.

Table 10 *Descriptive Statistics for Continuous Variables of Interest*

Variable	*Minimum*	*Maximum*	*M*	*SD*
Lack of Perceived Neighborhood Safety	2.00	8.00	4.15	1.40
Mental Health Status	4.00	26.00	15.70	4.29
Adverse Childhood Experiences	1.00	7.00	1.32	0.90
Current GPA	0.72	4.00	3.30	0.67

Research Questions/Hypothesis Testing

The first five research questions were tested simultaneously with multiple linear regression. Specifically, each research question was tested with the univariate statistics. The assumptions of multiple regression were also tested.

Assumption #1: No Influential Cases Biasing Model

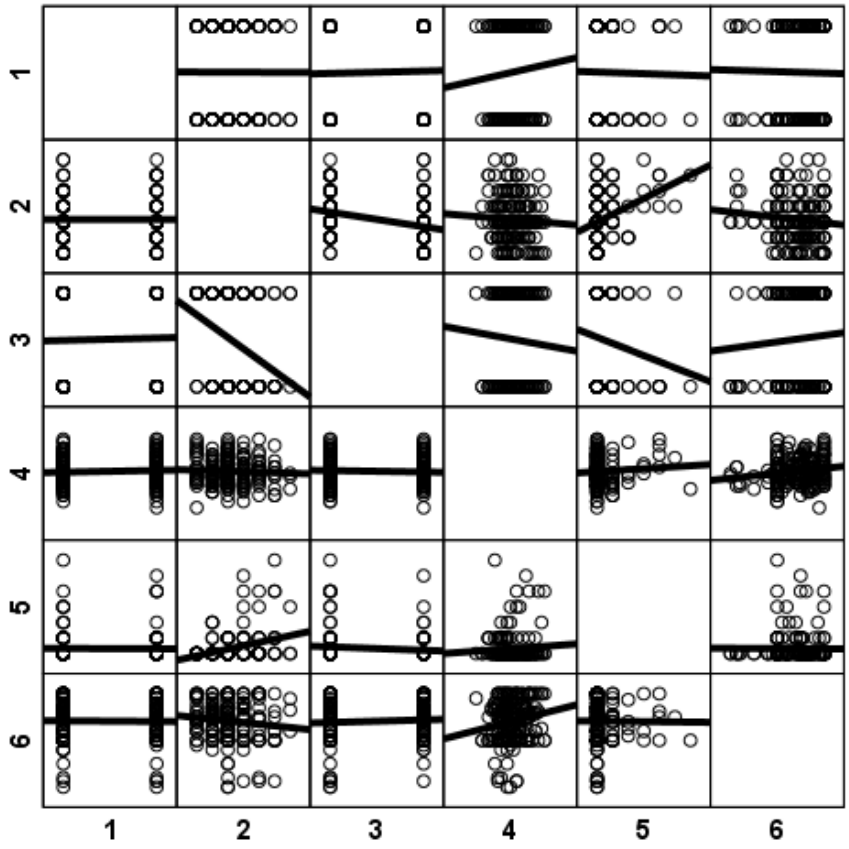
Multiple regression assumes that there are no influential cases biasing the model. This assumption was tested by analyzing the residuals. A residual is the difference between the observed and the model predicted values of the dependent variable. Standardized residuals that exceeded ±3 were candidates for exclusion. Initially, standardized residuals ranged from -3.76 to 1.22. Eleven multivariate outliers were excluded, which left 201 cases. The residuals were analyzed again. On the second iteration, the residuals ranged from -3.10 to 1.58.

Assumption #2: Linearity of Relationships

Multiple regression assumes that the relationship between the independent and dependent variables is linear. A scatterplot of the relationship between each of the

independent variables and the dependent variables was generated. The relationships can be modeled by a straight line. Therefore, the assumption of linearity was met. This is illustrated in Figure 3.

Figure 3 *Scatterplot Matrix*



1=Income, 2=Lack of Perceived Neighborhood Safety, 3=Housing Stability, 4=Mental Health Status, 5=Adverse Childhood Experiences, 6=Current GPA

Assumption #3: No Multicollinearity

Multiple linear regression assumes that the predictors are not highly correlated with one another. This assumption was tested with the variance inflation factor (VIF). VIF values that are greater than 10 indicate a serious concern. VIF values ranged from

1.01 to 1.26. Therefore, the assumption of no multicollinearity was met. VIF values are presented in Table 11.

Table 11 *Variance Inflation Factors*

Variable	VIF
Income	1.01
Lack of Perceived Neighborhood Safety	1.26
Housing Stability	1.14
Mental Health Status	1.02
Adverse Childhood Experiences	1.13

Note. Income: 0=$400 - $2,399 per month, 1= $2,400 or more per month, Housing Stability: 0=Less than 6 months to 2 years, 1=2 years or more.

Assumption #4: Independence of Residuals

Multiple regression also assumes that the residuals are uncorrelated or independent. This assumption was tested with the Durbin-Watson statistic. Values below 1 and above 3 are cause for concern. The value should be close to 2. The Durbin-Watson statistic = 1.63. Therefore, the independence of residuals assumption was met as indicated in Table 12.

Table 12 *Model Summary*

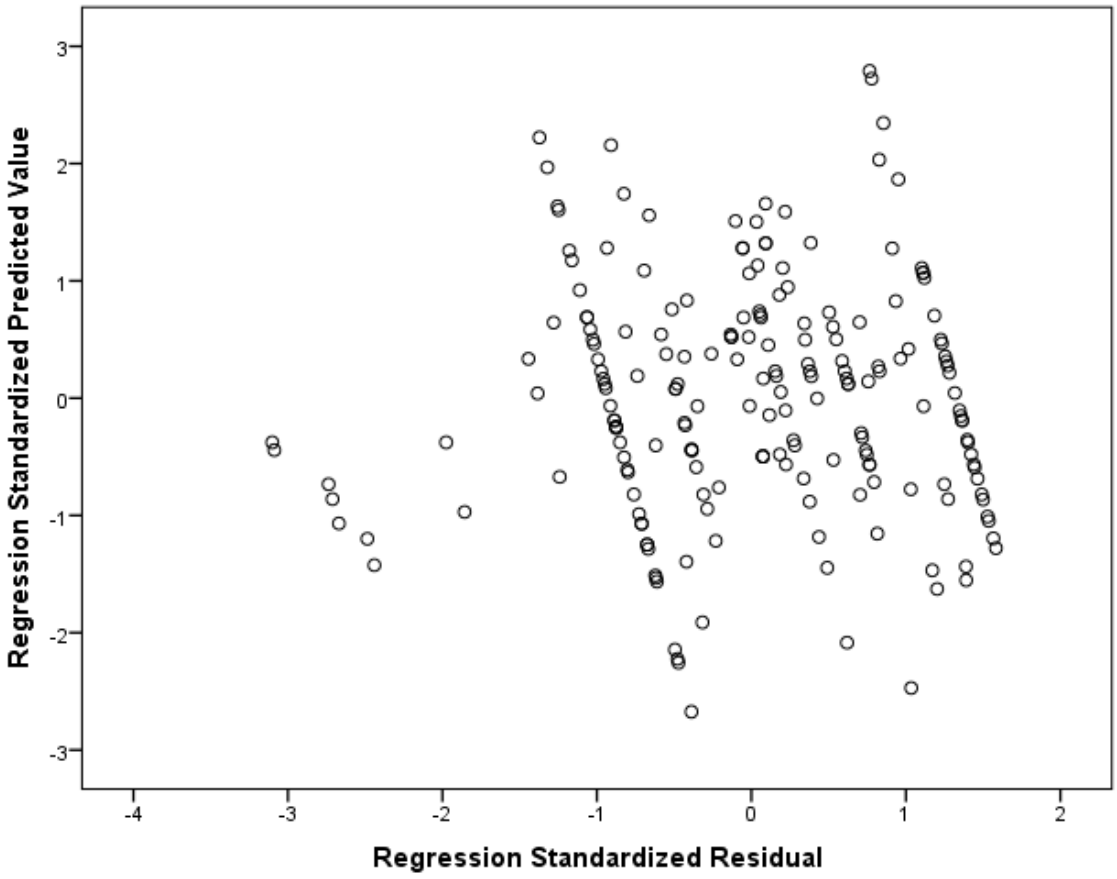
Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	.199	.040	.015	0.44	1.63

Note. Predictors: (Constant), Adverse Childhood Experiences, Income, Mental Health Status, Housing Stability, Lack of Perceived Neighborhood Safety;
Dependent Variable: Current GPA. Income: 0=$400 - $2,399 per month, 1= $2,400 or more per month, Housing Stability: 0=Less than 6 months to 2 years, 1=2 years or more.

Assumption #5: Homoscedasticity

Multiple regression assumes that the variance of the residuals is constant across all levels of the independent variables. This is known as the assumption of homoscedasticity. The variation of residuals should be approximately similar and random. This is illustrated in Figure 4.

Figure 4 *Scatterplot of Standardized Residuals by Standardized Predicted Values for GPA*

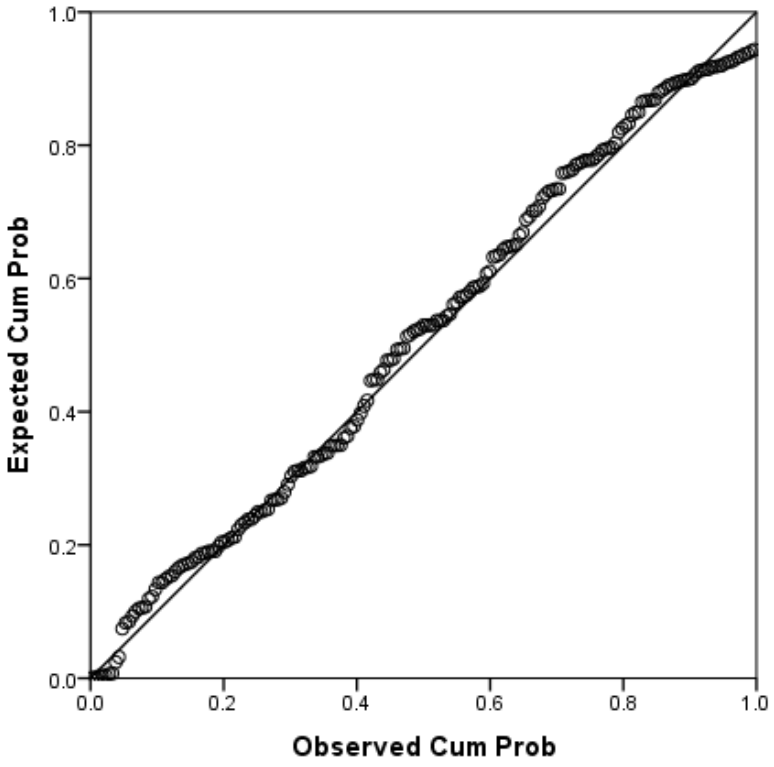


Note. Dependent Variable = Current GPA

Assumption #6: Normality of Residuals

Multiple regression assumes that the residuals are normally distributed. This assumption was assessed by generating and visually inspecting a Normal P-P Plot for the model. The closer the dots are to the 45-degree line, the closer to normality the closer to normal the residuals are distributed. Several points are touching the 45-degree line, which suggests that the residuals are approximately normally distributed. This is illustrated in Figure 5.

Figure 5 *Norma P-P Plot of Standardized Residuals*



Note. Dependent Variable = Current GPA

The overall model was not statistically significant, $F(5, 195) = 1.62$, $p = .158$, Adjusted $R^2 = .015$. The ANOVA Summary Table for model is presented in Table 13.

Table 13 *ANOVA Summary Table for Regression Model*

Model	Sum of Squares	*df*	Mean Square	*F*	*p*
Regression	1.59	5	0.32	1.62	.158
Residual	38.47	195	0.20		
Total	40.06	200			

Note. Dependent Variable: Current GPA
Predictors: Adverse Childhood Experiences, Income, Mental Health Status, Housing Stability, Lack of Perceived Neighborhood Safety. Income: 0=$400 - $2,399 per month, 1= $2,400 or more per month, Housing Stability: 0=Less than 6 months to 2 years, 1=2 years or more.

The regression coefficients for the regression model are presented in Table 14.

Variable	*B*	SE *B*	β	*t*	*p*
(Constant)	3.25	0.17		18.68	.000
Income	-0.02	0.06	-0.03	-0.36	.718
Lack of Perceived Neighborhood Safety	-0.03	0.03	-0.09	-1.18	.238
Housing Stability	0.04	0.07	0.04	0.56	.577
Mental Health Status*	0.02	0.01	0.16	2.29	.023
Adverse Childhood Experiences	0.01	0.04	0.02	0.23	.815

Note. Dependent Variable: Current GPA
Predictors: Adverse Childhood Experiences, Income, Mental Health Status, Housing Stability, Lack of Perceived Neighborhood Safety. Income: 0=$400 - $2,399 per month, 1= $2,400 or more per month, Housing Stability: 0=Less than 6 months to 2 years, 1=2 years or more. *$p < .05$.

Research Question 1

Is there a relationship between annual household income and grade-point-average as measured by survey questions answered by online undergraduate college students? There was no significant relationship between annual household income and grade-point-average as measured by survey questions answered by online undergraduate college students (β = -0.03, t = -0.36, p = .718). Therefore, the null hypothesis was not rejected.

Research Question 2

Is there a relationship between neighborhood and community safety and grade-point-average as measured by survey questions answered by online undergraduate college students? There was no significant relationship between neighborhood and community safety and grade-point-average as measured by survey questions answered by online undergraduate college students (β = -0.09, t = -1.18, p = .238). Therefore, the null hypothesis was not rejected.

Research Question 3

Is there a relationship between housing stability and grade-point-average as measured by survey questions answered by online undergraduate college students? There was no significant relationship between housing stability and grade-point-average as measured by survey questions answered by online undergraduate college students (β = 0.04, t = 0.56, p = .577). Therefore, the null hypothesis was not rejected.

Research Question 4

Is there a relationship between mental health status and grade-point-average as measured by survey questions answered by online undergraduate college students? There

was a significant, positive relationship between mental health status and grade-point-average as measured by survey questions answered by online undergraduate college students ($\beta = 0.16$, $t = 2.29$, $p = .023$). Therefore, the null hypothesis was rejected. When mental health status goes up by one standard deviation, current GPA goes up by 0.16 standard deviations.

Research Question 5

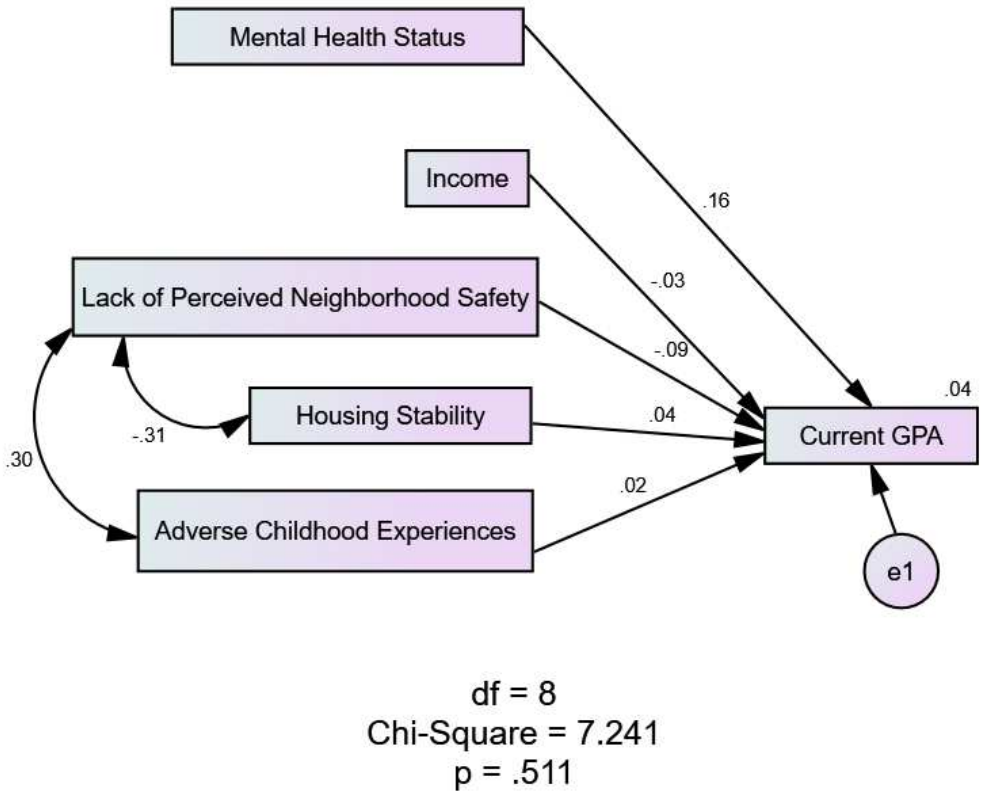
Is there a relationship between ACEs scores and grade-point average as measured by survey questions answered by online undergraduate college students? There was no significant relationship between ACEs scores and grade-point average as measured by survey questions answered by online undergraduate college students ($\beta = 0.02$, $t = 0.23$, $p = .815$).

The regression model was illustrated with a path diagram in Figure 6 through structural equation modeling to set the stage for the last research question. Figure 6 shows the independent (exogenous) variables of mental health status, income, community/neighborhood safety, housing stability, and ACEs being regressed onto the dependent (endogenous) variable of current GPA. The standardized regression weights are displayed on the lines linking the exogenous and endogenous variables. The R-squared (.04) value is also displayed above current GPA.

Several model fit indices are provided in AMOS. Model fit indices provide objective measures on how well the model fit the data. One such index is the chi-square. When the associated p-value of the chi-square statistics is greater than .05, then the model is a good fit for the data because there is no significant difference between the illustrated

model and the underlying data. The chi-square for the model (X^2, $N = 201$) = 7.24, p = .511. Therefore, the model is a good fit for the data.

Figure 6 *Path Diagram of Regression Model*



Research Question 6

If there is a relationship between SDH and GPA, is the relationship mediated by mental health? Research question six was investigated with structural equation modeling. Using the Barron and Kenny approach to establish mediation, there are four steps

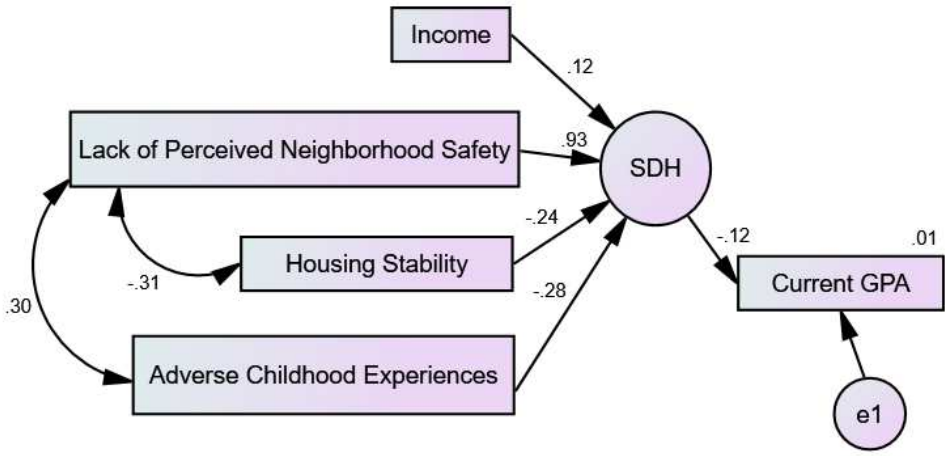
required (Kenny, 2018). The first step is to show that the causal variable (social determinants of health) is related to the outcome variable (GPA). The SDH included income, neighborhood safety, household stability, and ACEs. There was no significant relationship between social determinants of health and GPA, $p = .837$. Regression weights are presented in Table 15.

Table 15 *Regression Weights for Social Determinants of Health and GPA*

			Estimate	S.E.	C.R.	*P*
SDH	<---	Income	1.00			
SDH	<---	Safety	2.75	13.50	.204	.838
SDH	<---	Housing Stability	-1.98	10.89	-.182	.856
SDH	<---	ACE	-1.24	6.64	-.187	.852
Current GPA	<---	SDH	-.013	.063	-.206	.837

The path diagram for the social determinants of health and GPA are presented in Figure 7.

Figure 7 *Path Diagram for Social Determinants of Health and GPA*



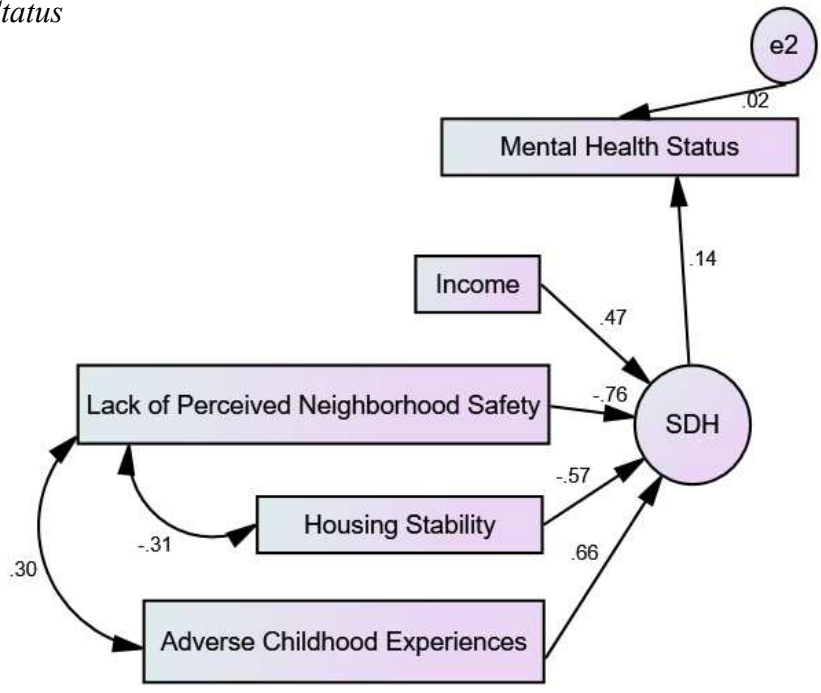
The second step is to show that the causal variable (SDH) is correlated with the mediator (mental health status). The causal variable (SDH) was not significantly related to the mediator (mental health status), $p = .334$. Regression weights are presented in Table 16.

Table 16 *Regression Weights for Social Determinants of Health and Mediator*

			Estimate	S.E.	C.R.	*P*
SDH	<---	Income	1.00			
SDH	<---	Safety	-.585	.734	-.798	.425
SDH	<---	Housing Stability	-1.20	1.65	-.725	.468
SDH	<---	ACE	.766	.991	.773	.440
MHS	<---	SDH	.581	.601	.967	.334

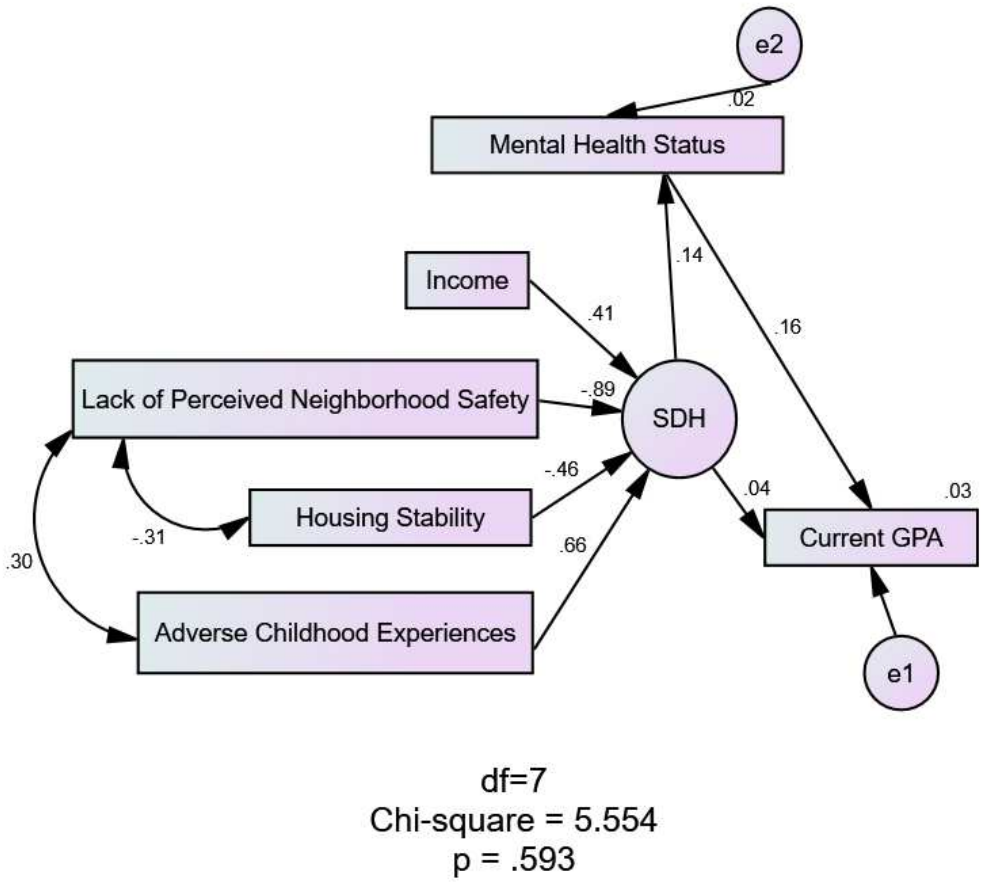
The path diagram for the social determinants of health and the mediator is presented in Figure 8.

Figure 8 *Path Diagram for Social Determinants of Health and Mediator Mental Health Status*



The third step is to show that the mediator is related to the outcome variable. This was previously established in the fifth research question. The fourth step is to establish that the mediator completely or partially mediates the relationship between the causal variable and the outcome variable. In this instance, the conditions for mediation have not been met because there was no significant relationship between the causal variable and the mediator, and there was no significant relationship between the causal variable and the outcome variable. Therefore, the null hypothesis was not rejected. However, the final path diagram is presented in Figure 9.

Figure 9



Regression weights for the causal variable, mediator and outcome variable are presented in Table 17.

Table 17 *Regression Weights for Causal Variable, Mediator, and Outcome Variable*

			Estimate	S.E.	C.R.	*p*
SDH	<---	Income	1.00			
SDH	<---	Safety	-.792	1.05	-.754	.451
SDH	<---	Housing Stability	-1.15	1.85	-.622	.534
SDH	<---	ACE	.890	1.26	.709	.478
MHS	<---	SDH	.492	.585	.840	.401
Current GPA	<---	SDH	.013	.029	.452	.651
Current GPA	<---	MHS	.017	.007	2.26	.024

The hypotheses and outcomes are summarized in Table 18.

Table 18 *Hypothesis Summary and Outcomes*

Hypothesis	Significance	Outcome
H_{01}: Higher annual earned income is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA	p = .718	Null Not Rejected.
H_{02}: Neighborhood/community safety is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.	p = .238	Null Not Rejected.
H_{03}: Stability in housing is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.	p = .577	Null Not Rejected.
H_{04}: Mental health status is not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.	p = .023	Null Rejected.

H_{05}: Adverse childhood experiences are not correlated with the achievement of undergraduate students enrolled in a 4-year4-year online degree program as measured with GPA.	p = .815	Null Not Rejected
H_{06}: If there is a relationship between social determinants of health and GPA, the relationship is not mediated by mental health.	p = .837	Null Not Rejected.

Summary

Six research questions and related hypotheses were generated for investigation. They were investigated with multiple linear regression and structural equation modeling. It was determined that there was one significant relationship, whereas all the other relationships examined were not statistically significant. Specifically, it was determined that there was a significant, positive relationship between mental health status and current GPA.

However, there was no significant relationship between annual household income and GPA amongst online undergraduate college students. There was no significant relationship between neighborhood and community safety and GPA. There was no significant relationship between housing stability and GPA. There was no significant relationship between ACE scores and GPA amongst online undergraduate college students. Although there was a significant relationship between mental health status and GPA, mental health status did not mediate the relationship between the SDH and GPA. The conditions for mediation to occur were not met. There was no significant relationship

between the SDH and GPA. There was no significant relationship between the SDH and mental health status. Recommendations and implications will be discussed in Chapter 5.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this quantitative correlational study was to determine the relationships between SDH and online undergraduate education, and to determine whether mental health status was a mediator for SDH and online academic achievement. It was the goal to determine if and to what extent a relationship existed between housing stability, income, neighborhood safety, ACEs, and online undergraduate achievement as measured by GPA.

Data from 212 participants who completed a survey were analyzed using multiple linear regression and structural equation modeling. Descriptive statistics and a reliability analysis showed there was no significant relationship between SDH and GPA However, the results of this study showed that mental health status impacted the academic achievement of online undergraduates.

SDH are known social and economic systems which directly impact health disparities (Cohen & Syme, 2013), and while studies have revealed higher education as a social determinant, few have researched the impact of other SDH on the achievement on those seeking an undergraduate degree, and fewer still for online students. Adler et al. (2016) presented data to link social and economic systems and achievement, but those findings were not drawn from this research. Cohen and Syme (2013) directly mention the impact of SDH on non-traditional students' AS and this study included those enrolled in an online undergraduate degree. The student participants were of diverse background and a broad age range. The population included non-traditional students, yet the data

supported the null hypothesis of no significant relationship between the SDH and the performance, measured by GPA, of the online undergraduate participants.

The CI used as a theoretical framework for the study describes the impact of variables on individual's lives and experiences. The CI model underscores the importance of the outcome variable of academic achievement as it relates to the predictor variables. The CI model explains that proximal, environmental determinants impact educational outcomes, yet this study suggests that proximal determinants of SDH, though likely influencers of the online undergraduate experience, do not significantly impact one's GPA. Only the variable of mental health status had a significant relationship to online undergraduate achievement.

The findings regarding mental health status and online academic performance are consistent with the findings of Byrd and McKinney (2012). Byrd and McKinney conducted a survey to determine their perception of how such issues impacted their mental wellbeing and for nearly half of the students, the combination of factors, including individual and institutional factors, was reported as the primary sources of negative mental health experiences.

The findings indicate that neighborhood safety is not a predictor of achievement for online undergraduate learners, nor was housing stability or income. There was no significant relationship between the number of ACEs of an undergraduate and their online academic achievement. Mental health status is a predictor of academic performance as measured by GPA but is not a mediator of SDH and GPA; there was no

significant relationship found between neighborhood safety, income, housing stability, ACEs, and GPA.

This chapter includes a discussion of the major findings as related to literature, as well as a discussion on the relevant connections between SDH, GPA, and CI The chapter concludes with a discussion of the study limitations, areas of future research and a brief summary.

Interpretation of Findings

Hypothesis 1: Household Income

In hypothesis 1, I examined whether there was a significant relationship between household income and achievement in an online undergraduate program, as measured by GPA. The results showed no significant relationship between the social determinant of income and GPA. Research shows that academic development is impacted by the socioeconomic environments in which children are raised (Corak, 2013). The research points to increased life experiences, access to opportunities, and exposure to heightened vocabulary, all of which contribute to AS.

Research also states that students from low socioeconomic backgrounds endure additional non-monetary factors and determinants that impact educational progress in school (OECD, 2012). Research with undergraduates is not as prevalent, and less prevalent are studies for undergraduates in exclusive online programs of study.
SDH are often defined in terms of economic systems that impact health outcomes and equality (Telfair & Shelton, 2012). Structural determinants that group people by income, as well as social status or power, are found in global systems including those related to

welfare services, education, economy, and politics. For purposes of this study, proximal determinants were the focus. Proximal determinants, as defined by OECD, include determinants in one's culture, religion, or living environment. In the presented study, participants were asked, "What is your income?" About half (48.6%, *n* = 103) earned between $400 - $2,399 per month and half (51.4%, *n* = 109) earned $2,400 or more per month. See Table 4. This indicates that at least half of the online students surveyed were financially stable and few were self-reported as financially insecure or impoverished. For those surveyed, tuition payments and monetary stressors were not an area of reported distress for the participants. It is noted that most online undergraduate students sampled do not have distress regarding the negative SDH of household income. Possibly, due to the availability of household income and the presence of undergraduate financial aid programs and support, no significant relationship was found. One's household income, according to the data collected in this study, does not have a significant influence on online undergraduate academics when measured by GPA.

Hypothesis 2: Neighborhood and Community Safety

In hypothesis 2, I examined whether there was a significant relationship between community safety and achievement in an online undergraduate program, as measured by GPA. The results showed no significant relationship between the social determinant of neighborhood safety and GPA, though when asked, "How safe do you feel in the neighborhood/community where you live?", nearly 42% reported that they did not feel safe at all or felt somewhat safe. Though neighborhood safety is a proximal determinant

of health, it is not evidenced by this study to have an impact on the achievement of online undergraduate students enrolled in a 4-year program.

Online educational opportunities are sought by students who seek schedule flexibility and a decreased commute to and from campus (Jaggars, 2011). Jaggars (2011) studied the success of online learning for low-income students primarily, and as emphasized in the discussion of household income, most participants were not financially insecure or noted to be low-income in status. For those impacted by negative social determinants, often exposure to risk is increased and access to opportunities is decreased (Ferraro & Shippee, 2009). Notably, Ferraro and Shippee (2009) studied CI and aging, and the median age of the study participants presented in this study was 27, with ages reported between 18 and 61. In terms of lifespan development and CI that increases with age, the social systems of the participants may not have yet generated great inequality in their lives. Neighborhood safety was included in the research to observe the possible relationship between the perceived safety in students' off-campus learning environment and academic outcomes. The findings contrast with research conducted by Sampson in 2012 that indicates that individuals who reside in low-income settings are exposed to frequent criminal acts such as violent murders, robberies, and shootings, which in turn leads to experiences of poorer health, lower income, and lower levels of education. It is notable, however, that it is the perception of neighborhood safety that is the SDH, not actual crime statistics (Assari & Caldwell, 2017). Assari and Caldwell (2017) studied the impact of neighborhood safety on Black youth, ages 13-17. Findings indicated that stress during adolescence as related to social factors leads to major depressive disorders and

difficulty with developmental transitions. Because the youth studied by Assari and Caldwell were significantly younger than those surveyed in this study, the absence of a relationship between neighborhood safety and academic outcomes is understandable. This study measured perceived neighborhood safety in undergraduates aged 18-61, and the data analyzed indicated no relationship between one's perceived safety in their community and their online academic outcomes, as measured by GPA.

Hypothesis 3: Housing Stability

In hypothesis 3, the relationship between housing stability and achievement in an online undergraduate program was studied. To measure housing stability, participants were asked about the duration of time spent in their current residence, as well as the frequency of moves.

Many have studied the impact of housing instability on learning, noting that while many families relocate to increase opportunities and accrue more living space in better conditions, that is not true of most who move frequently. It is suggested that extreme mobility puts children at risk as it relates to their ability to learn (Lareau & Goyette, 2014). Coley et al. (2013) reported a clear connection between housing stability and emotional well-being which caused poor academic performance.

As noted in the literature, SDH are factors that create stress for students (Cohen & Syme, 2013). Cohen and Syme (2013) go on to report that theses stressors are exceptionally influential on first-year college students. In this study, just over 7% of the sample participants were in their first year of online undergraduate schooling. Most of the sample reported being in their fourth year of undergraduate coursework, while second,

third, and fifth-year students collectively made up less than 60% of respondents. Of the sample, over 50% of students reported that they either own or rent a home and move less than once per year. Cohen and Syme's sample included students who were from lower levels of college than those presented in this study. It is reasonable to interpret that the students who were most impacted by housing instability or frequent relocations had already left the college setting and that those surveyed here had already established housing stability. The results showed no significant relationship between the social determinant of housing stability and GPA.

It is clearly noted in literature that housing stability may impact learning because the instability has negative effects on mental well-being. A study by the Washington State Behavioral Risk Factor Surveillance System was conducted in 2011 in all 50 states to conclude that those with housing insecurity also reported poor mental health. With mental health as a known factor to influence academic outcomes, the research by Stahre et al. (2015) was the first to correlate housing insecurity and mental health while controlling for socioeconomic and demographic measures.

Hypothesis 4: Mental Health

In hypothesis 4, I examined whether there was a significant relationship between mental health and achievement in an online undergraduate program, as measured by GPA. The results showed a significant relationship between mental health and GPA. For purposes of this study, mental health status was measured by the SF-36 questions focused on anxiety, depression, and emotional health. Cadena et al. (2003) defined mental health status as one's well-being, autonomy, competence, perceived abilities, and self-

actualization of potential, both intellectually and emotionally. The survey was a self-report instrument and students answered questions regarding their mental health status. This study aimed to research the relationship between SDH and GPA, as well as any possible mediation by the variable of mental health. No significant relationship was found between SDH and GPA, and as such mental health did not qualify as a mediator. Mental health was found to significantly relate to students' academic achievement as measured by GPA.

Much literature is available regarding mental health status and academic performances in college, though it has only been studied in brick-and-mortar settings (Sontag-Padilla, et al., 2016) rather than online learning communities. Mental health problems are notably higher in populations with negative SDH (Adler et al., 2016). This study indicated that participants were experiencing negative SDH, but not at high levels, and less than half of the participants reported negative SDH in terms of ACE that affected their ability to perform well academically in their online undergraduate program. While lesser academic achievement for those with mental health issues is supported by the theory of CI, which states that social and environmental stressors cause changes in biological processes (Ferraro & Shippee, 2009), this study did not indicate a connection between ACEs and online academic achievement (GPA). Those with higher ACEs reportedly also have significant impact on coping and lead to isolation, which in turn negatively effects mental health. In the case of online learning, perhaps the isolation creates a focused and distraction-free study space for online learners. The data collected

for analysis and presented here indicate that mental health impacts online academic achievement as measured by undergraduate GPA.

Hypothesis 5: Adverse Childhood Experiences

In hypothesis 5, the relationship between ACEs and achievement in an online undergraduate program was studied. To measure the impact of ACEs scores on GPA each participant was asked questions directly from the ACEs scale regarding the number of adverse experiences they had as a child.

Karatekin and Ahluwalia (2016) report that ACEs are experiences of childhood that negatively impact the growth and development of the individual throughout their lifespan. The impact of ACEs is studied regarding negative effects on physical well-being, occupation, mental health, economics, and education. It is known that ACEs impact overall quality of life in a variety of ways, and research has determined the impact of emotional abuse on academic college performance illustrates lower grade point averages and difficult adaptation to university life. For those who reported child maltreatment, poor academic outcomes were noted (Welsh et al., 2017).

Participants reported high rates of emotional abuse/ neglect histories on the survey, and responses were equally distributed for reports of alcohol/substance abuse by parents/siblings/close relatives and intimate partner violence/domestic abuse. Most indicated that none of their adverse experience did not impact their ability to perform well academically, though the data did show a significant relationship between mental health and academic achievement. Research has shown strong correlates and even direct

effects of ACEs. An increase in ACEs projects an increase in physical and mental health issues and a decrease in mortality (CDC, 2014).

In contrast to studies that report a negative effect on academic outcomes for those with high ACEs scores, others have reported that a positive school environment and academic engagement can serve as protective factors and lead to resiliency and recovery (Haskett et al., 2014).

Limitations of the Study

Six research questions were generated for investigation in this study, all relevant to the hypotheses. Mental health was chosen as a mediator rather than a fifth social determinant of health. Because mental health was presented as a potential mediator and the conditions of mediation were not met, the strength of relationship between mental health and online academic achievement is not clear. Questions related to mental health were asked with a self-report measure of depression and anxiety, and questions regarding ACEs were asked as well. Though students reported poor mental health, they did not report any negative impacts of ACEs on their achievement. Direct questions about mental health may have led participants to report salient symptoms of emotional issues, but it is possible that participants were unaware of the non-salient impact of their ACEs (i.e., poor mental health) on learning and achievement.

In addition, the instrument reliability for mental health status was tested using Cronbach's Alpha. This revealed questionable reliability ($\alpha = .615$) for all seven items. Acceptable reliability is .70 - .79. The questions were posed as emotional problems and answers were self-reported based on personal perception of mental health status. Mental

health status was collected through the RAND 36-Item Health Survey (Version 1.0) that is a standardized self-report measure of functional health and well-being (Ware and Sherbourne, 1992). It is notable that the survey was administered during a global pandemic. Known to the mental health and public health communities, the impact of the pandemic has caused a significant increase in emotional distress exhibited by symptoms of insomnia, fear, confusion, depression, irritability, and anger, as well as social isolation 9Pfefferbaum & North, 2020). Additionally, many who are in therapy or under medication management and psychiatric care had appointment disruptions, transitions to telehealth, and decreased continuity of care due to understaffing and increases in demand for services in most communities. Because the survey questions were not phrased in a way to delineate between recent distress and ongoing mental health issues, this study may not be generalizable in times that follow the pandemic.

Further, regarding generalizability, this study yielded data from various college programs and learning institutions and the results may not be generalizable to all online undergraduate programs. Various programs and support services are offered at universities and colleges, and many online exclusive programs offer student support that is individualized for the needs of online learners. Research supports that various individual and institutional factors are reported to determine students' perception of mental well-being (Byrd & McKinney, 2012).

Implications for Social Change and Recommendations

This study revealed numerous implications for potential society change. First, the awareness of the impact of mental health on academic outcomes for undergraduate

institutions, specifically the online learning communities has the potential to drive policies and impact not only grade point average, but also retention and degree attainment. Mental health has been studied in brick-and-mortar settings (Sontag-Padilla et al., 2016) but not with relation to other SDH and without known effects on academic outcomes. With additional studies to address mental health status, resiliency, and self-efficacy, program developers and educators will have additional information to guide students to higher GPAs. It has been observed that online students report issues, such as poor mental health, that may relate to high rates of attrition and low rates of degree-attainment (Jaggars, 2011). Also noted by Jaggar is that online courses are reportedly less structured and lead to lower student participation, procrastination, and lower completion rates, when compared to participation in brick-and-mortar courses.

Second, information pertaining to mental health status and academic achievement has the potential to lead to innovative scheduling and program design for undergraduates. Peer support cohorts with the inclusion of advisor and counselor check-ins, as well as continuous skills courses for ongoing student development would potentially decrease isolation and add support and resource sharing to increase mental wellness for students. The findings can provide researchers with data and information relevant to future studies regarding mental health, program performance, online learning communities, and student experiences in online classes. In addition, further research regarding additional SDH, efficacy, attendance, support systems, and retention of content when impacted by SDH.

Additional research regarding adversity and issues faced by disadvantaged students in undergraduate online settings may increase the understanding on the

educational impact of ACEs. It has been noted that the ACE Scale has been used much more widely with predominately white respondents who are highly educated (CDC, 2014) and it has been suggested in the literature that the ACE Scale be utilized in the broader population to study health outcomes for minority groups (Cronholm et al., 2015). Using the ACE Scale on groups who are economically disadvantaged, experiencing racism, exposed to neighborhood violence, and so on, would allow for increased understanding of the experiences, in and out of classrooms, of all students enrolled in online programs.

Research highlights that online academic achievement is impacted by the SDH of mental health issues, but that education itself is a positive social determinant of health and long-term success. CI describes the impact of SDH on individuals' lives and frequently measures the macro systems that lead to SDH (Ferraro & Shippee, 2009). Social systems, according to CI shape one's place in society and educational systems can have a positive effect on advantages over time and generationally.

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