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UTILIZING STRUCTURAL EQUATION MODELING TO EXAMINE FACTORS IMPACTING HEALTH-RELATED QUALITY OF LIFE FOR EMERGING ADULTS WITH CHRONIC PAIN AS THEY TRANSITION TO ADULTHOOD

by

Amy C. Lang

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ABSTRACT

UTILIZING STRUCTURAL EQUATION MODELING TO EXAMINE FACTORS IMPACTING HEALTH-RELATED QUALITY OF LIFE FOR EMERGING ADULTS WITH CHRONIC PAIN AS THEY TRANSITION TO ADULTHOOD

by

Amy C. Lang, M.S.

The University of Wisconsin-Milwaukee, 2022
Under the Supervision of Professor W. Hobart Davies, Ph.D.

Approximately 5% to 30% of adolescents and emerging adults are living with chronic pain as they navigate the transition from pediatric- to adult-focused health care. However, there is a paucity of research investigating the health care transition experience for emerging adults with chronic pain. The current study aimed to utilize structural equation modeling in a sample of community-recruited emerging adults with chronic pain to: 1) assess a hypothesized measurement model and validate pertinent measures in this understudied population; and 2) assess a hypothesized structural model based in the Individual and Family Self-Management Theory. Findings provide preliminary validation of measures of health literacy, psychological functioning, pain self-efficacy, and health-related quality of life that could be used to identify emerging adults with chronic pain who may be at risk for poorer health outcomes. Additionally, findings highlight the need for longitudinal research studies from preparation in adolescence through integration into adult health care, as well as development of reliable and valid self-management and transition readiness measures, in order to expand the current body of health care transition research and inform the development of tailored interventions to promote more successful health care transition.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Amos = Analysis of Moment Structures

BRIEF = Brief Health Literacy Screening Tool

CFA = confirmatory factor analysis

CFI = comparative fit index

CI = confidence interval

HRQoL = health-related quality of life

IFSMT = Individual and Family Self-Management Theory

PFSD Scale = Pain Frequency-Severity-Duration Scale

PROMIS = Patient-Reported Outcome Measurement Information System

PSEQ = Pain Self-Efficacy Questionnaire

RMSEA = root mean square error of approximation

SEM = structural equation modeling

SPSS = Statistical Product and Service Solutions

SRMR = standardized root mean square residual

STARx = Self-Management Transition to Adult Treatment

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Utilizing Structural Equation Modeling to Examine Factors Impacting Health-Related Quality of Life for Emerging Adults with Chronic Pain as They Transition to Adulthood

Technological advancements in diagnostic procedures and medical interventions have allowed more children and adolescents with chronic health conditions to survive into adulthood (Blum et al., 1993). The increased survival rate for pediatric-onset chronic health conditions has been an important catalyst for the field of health care transition research. Health care transition is a dynamic process (Reiss & Gibson, 2002), spanning from preparation in early adolescence to integration into adult health care in adulthood (Cooley & Sagerman, 2011; White & Cooley, 2018). Currently, healthcare transition research is limited due to a dearth of validated transition readiness measures, varying theories and definitions of successful health care transition (Betz et al., 2014; Schwartz et al., 2014), and lack of prospective longitudinal studies (Devine et al., 2018). Additionally, health care transition research has typically been disease-specific and focused on more severe chronic physical health conditions (e.g., diabetes and solid organ transplant; Davis et al., 2014). Approximately half of adolescents with chronic pain continue to experience pain into adulthood (Brown et al., 2021; Hassett et al., 2013); however, minimal research has focused on the health care transition process for chronic pain populations (Forgeron et al., 2017; Higginson et al., 2019). Chronic pain significantly negatively impacts functioning and health-related quality of life across the lifespan (e.g., Hadi et al., 2019; Salamon et al., 2014); thus, further research is warranted to understand the unique experiences of emerging adults with chronic pain to support a more successful healthcare transition.

Pediatric Chronic Pain

Approximately 11% to 38% of children and adolescents experience recurrent or persistent pain (King et al., 2011) lasting more than three months (i.e., beyond the standard recovery time; Merskey & Bogduk, 1994; Treede et al., 2015). Pediatric chronic pain prevalence rates vary widely due to complexities in identification and treatment, variable reporting methods, and differences in prevalence rates by type of chronic pain, with headaches (8% to 83%) and other/general (i.e., nonspecific) pain (5% to 88%) being the most frequently reported (King et al., 2011). Pediatric chronic pain has increased in prevalence over the last several decades (King et al., 2011) and is estimated to cost the United States health care system $19.5 billion annually (Groenewald et al., 2014).

Pediatric chronic pain can be difficult to diagnose and treat. While acute pain typically has a sudden onset, a shorter duration, and a clear genesis, chronic pain is typically characterized by an insidious onset, an extended duration, and lack of a clear physiological etiology (Merskey & Bogduk, 1994; Treede et al., 2015). Additionally, research suggests that there is a lack of consensus among physicians regarding optimal diagnostic approaches and interventions for pediatric chronic pain (Chambliss et al., 2002; King et al., 2011; Liossi & Howard, 2016; Rabin et al., 2017; Tait et al., 2009). Thus, pediatric chronic pain is often not appropriately diagnosed or treated until after it has resulted in significant interference in activities of daily living (Chambliss et al., 2002). It may take patients several months to years of experiencing chronic pain and continued unsuccessful pain management efforts to be referred to a pediatric chronic pain clinic (Cucchiaro et al., 2017). Typically, pediatric chronic pain is attributed to a complex relationship between physiological and psychosocial factors and requires a combination of pharmaceutical (e.g., over-the-counter and/or prescription analgesics), psychotherapeutic (e.g., cognitive-behavioral therapy and/or acceptance and commitment therapy), rehabilitative (e.g., physical and/or occupational therapies), and/or complementary and alternative medicine (e.g., acupuncture and/or biofeedback) approaches to effectively manage (Davey, 2016; Friedrichsdorf et al., 2016; Liossi & Howard, 2016; Rabin et al., 2017). Poorly managed chronic pain and subsequent extended perception of pain (i.e., nociception) increase activation of pain receptors (i.e., nociceptors), lower the activation threshold for nociceptors, and produce stronger and more sensitive responses to pain stimuli (Loizzo et al., 2009). Therefore, poorly controlled chronic pain places children and adolescents at heightened risk of developing chronic and disabling pain conditions later in life (Chambliss et al., 2002; King et al., 2011).

Research suggests that approximately half of children and adolescents will continue to experience chronic pain into adulthood: 19% continued to experience weekly headaches (Larsson et al., 2018), 35% continued to experience functional abdominal pain (Walker et al., 2010), and 60% continued to experience fibromyalgia (Kashikar-Zuck et al., 2010) in adulthood. Further, Hassett and colleagues (2013) found that 17% of adult pain patients had also experienced chronic pain in childhood or adolescence. Ultimately, an estimated 5% to 30% of emerging adults are living with chronic pain (Brown et al., 2021). Taken together, existing literature suggests that a significant portion of adolescents and emerging adults have chronic pain and likely require health care transition (Rosenbloom et al., 2017); however, minimal research has examined the unique challenges and changes experienced by individuals with chronic pain as they navigate the health care transition process (Forgeron et al., 2017; Higginson et al., 2019).

Health Care Transition

Health care transition is paramount to ensure high-quality, uninterrupted health care from adolescence into adulthood (Rosen et al., 2003), especially for individuals with chronic health conditions. Health care transfer, or the distinct shift from pediatric to adult health care (Rosen et al., 2003), is one of many components of the health care transition process; however, it is often used as an indicator of successful health care transition (Devine et al., 2018). Health care transfer typically occurs during “emerging adulthood,” which is the intermediary developmental stage between adolescence and adulthood (Arnett, 2000). Researchers have argued for differing age ranges to encompass emerging adulthood (e.g., Fry, 2017; Wood et al., 2018); however, the current study considered 18- to 25-year-olds to be emerging adults (Arnett, 2000). Emerging adults are required to navigate multiple co-occurring transformations, including increased independence in self-management, identity maturation, and development of aspirations for adulthood (Arnett, 2000, 2018). Many emerging adults establish “semiautonomy” (Goldscheider & DaVanzo, 1986) in which they demonstrate some aspects of adult independence (e.g., living outside of the family home, beginning a career, and/or pursuing higher education) while still relying on caregivers or others for certain assistance (e.g., health insurance, financial support, and/or medical advice; Arnett, 2018).

Non-categorical research approaches, which argue that the experience of living with chronic health conditions is more similar than different across conditions (Stein & Jessop, 1982, 1989), have found that adolescents and emerging adults with chronic physical and psychological health conditions face many additional barriers to establishing independence. Compared to healthy peers, emerging adults with chronic health conditions are at risk for: poorer physical and psychosocial functioning (Compas et al., 2012); lower educational and vocational (Maslow et al., 2011) achievement; and lower quality of life (Bai et al., 2017; Lang et al., 2020; Megari, 2013).

Within the past few decades, researchers have established the importance of examining the consequences of living with chronic physical and psychological health conditions for adolescents and emerging adults in order to support optimal functioning during the health care transition process (Betz et al., 2014; Devine et al., 2018; Rosen et al., 2003). White and colleagues (2020) from Got Transition® have developed the Six Core Elements of Health Care

Transition^{TM} 3.0, which serve as a guide for health care providers to support emerging adults in all three phases of the health care transition process: preparation, transfer, and integration into adult health care. The Six Core Elements of Health Care Transition^{TM} 3.0 (White et al., 2020) aligns with the most recent clinical report on health care transition from the American Academy of Pediatrics, American Academy of Family Physicians, and American College of Physicians (White & Cooley, 2018). According to the Six Core Elements of Health Care Transition^{TM} 3.0 (White et al., 2020), discussions among health care providers, patients, and caregivers regarding transition policies and processes should begin between the ages of 12 and 14 years (Core Element #1). Between the ages of 14 and 18 years, it is recommended that health care providers track adolescents' progress (Core Element #2), assess transition readiness (i.e., transition-related ability, knowledge, motivation, and resources; Sawicki et. al., 2011) of adolescents, caregivers, and medical teams (Core Element #3), and develop a health care transfer plan (Core Element #4). White and colleagues (2018, 2020) recommend that the discrete transfer to adult health care and integration into adult-centered care occur between the ages of 18 and 21 years (Core Element #5). Core Element #6 is confirmation of transfer of care and ongoing adult-centered care, which is recommended to be achieved by the age of 26 years.

The Six Core Elements of Health Care Transition^{TM} 3.0 (White et al., 2020) were designed to be tailored to different models of transition care, different health care settings, and different patient needs. Teamwork is vital for successful health care transition and requires collaboration, communication, and coordination among patients, families, health care providers, and other stakeholders (e.g., clinic administrators and insurers). Additionally, the involvement of care coordination support in both the pediatric and adult health care settings has been shown to increase the likelihood of successful health care transfer; however, transitional health care coordination support is not a widely available resource at this time, particularly in adult health care settings (Cooley & Sagerman, 2011; Okumura et al., 2010; White & Cooley, 2018).

Research suggests that transitional support programs are associated with improved medical adherence, healthier perceived health status, higher quality of life, and better self-management skills (Crowley et al., 2011; Gabriel et al., 2017). At this time, there is insufficient longitudinal research on health care transition outcomes for emerging adults (Devine et al., 2018); however, there is a growing body of literature examining health care transition preparedness for adolescents (i.e., 12- to 17-year-olds) with special health care needs (i.e., behavioral, developmental, psychological, and/or physical conditions that require more than the standard health care of a healthy peer; McPherson et al., 1998). Unfortunately, only 17% (Lebrun-Harris et al., 2018) to 41% (Lotstein, 2009) of adolescents with special health care needs are considered to be adequately prepared for the health care transition process (i.e., providers informed them about the health care transition process and the need to establish care with an adult provider, encouraged them to take primary responsibility for own care, discussed adult health care needs and potential health insurance changes, and worked with them to gain self-management skills). Further, only 14% of adolescents without special health care needs are considered adequately prepared for the health care transition process (Lebrun-Harris et al., 2018).

Currently, there are many barriers to successful health care transition, including limited availability and training of adult providers well-versed in health care transition (Okumura et al., 2010), lack of validated measures of transition readiness (Schwartz et al., 2014), insurance or other financial concerns, and transition-related anxiety expressed by adolescents, emerging adults, families, and pediatric providers (Gray et al., 2018). Unsuccessful health care transition for emerging adults with chronic health conditions may be characterized by disruptions in health care (Bohun et al., 2016), poor adherence and, subsequently, exacerbated symptoms (Pai & Ostendorf, 2011), and diminished quality of life (Maslow et al., 2013). For individuals with life-limiting conditions, unsuccessful health care transition could even result in death (Annunziato et al., 2007). Thus, it is vital for researchers to continue focusing on the identification of risk and protective factors for health care transition outcomes among adolescents and emerging adults with chronic health conditions.

Individual and Family Self-Management Theory (IFSMT)

The Individual and Family Self-Management Theory (IFSMT; Ryan & Sawin, 2009) is an important theory for conceptualizing health outcomes during adolescence and emerging adulthood. IFSMT emphasizes the vital role of self-management, which is the management and monitoring of chronic health condition symptoms and treatments (Holroyd & Creer, 1986) and requires individuals and families to incorporate health-related behaviors into their daily routines (Ryan & Sawin, 2009). Family self-management refers to the shared responsibility between children, adolescents, and emerging adults with chronic health conditions and their families to use their knowledge, beliefs, self-regulation abilities, and social facilitation to achieve control of their health and overall well-being. By beginning the transition from family self-management to individual self-management (i.e., the individual taking full responsibility for their own health) in early adolescence at a developmentally appropriate pace, caregivers can support a gradual increase in their child's self-management abilities and health competence as they begin to seek greater independence from their caregivers during late adolescence and emerging adulthood (Ryan & Sawin, 2009; Sawin et al., 2009).

IFSMT proposes that individual and family self-management abilities can be conceptualized within three broad, interrelated dimensions: context, process, and outcomes (Ryan & Sawin, 2009; see Figure 1). The context dimension encompasses risk and protective factors for the development and implementation of self-management behaviors. Specifically, the context dimension includes individual (e.g., developmental stage), family (e.g., family functioning), condition-specific (e.g., perception of condition), and physical and social environment (e.g., health care access and cultural influences) factors that may impact self-management abilities. The process dimension includes factors important for supporting self-management behaviors, such as knowledge and beliefs (e.g., self-efficacy and outcomes expectancies), self-regulation skills (e.g., self-monitoring), and social facilitation (e.g., social support and collaboration). The outcomes dimension comprises proximal outcomes, such as engagement in self-management abilities and cost of health care services, and distal outcomes, such as health status, quality of life, and overall cost of health (i.e., the economic, physical, psychological, and/or social cost to self and community). According to IFSMT, the process domain partially mediates the relationship between the context and outcomes domains (Ryan & Sawin, 2009).

Interventions based in IFSMT focus on reducing risk factors, fostering protective factors, and/or enhancing knowledge, abilities, and social supports in order to promote self-management abilities and health outcomes (Ryan & Sawin, 2009; Sawin et al., 2009). These interventions are family- or patient-centered, dependent upon the developmental level of the individual, and typically focus on modifiable factors in the context and/or process dimensions. Interventions based in IFSMT ultimately impact both proximal (i.e., self-management behaviors) and distal (i.e., health status and quality of life) outcomes directly and indirectly and have the potential to support a more successful health care transition for adolescents and emerging adults with chronic health conditions.

Application of IFSMT to Chronic Pain Transition

To the author's knowledge, no research has been conducted applying IFSMT to emerging adults with chronic pain. However, research has been conducted on the role of select IFSMT factors or domains among children, adolescents, and adults with chronic pain without conceptualizing them within IFSMT structure (e.g., Hadi et al., 2019; King et al., 2011; Tomlinson et al., 2017). The following literature review summarizes research on the impact of pertinent context factors (i.e., demographics, psychological functioning, pain experience, and health literacy) and process factors (i.e., pain self-efficacy) among individuals with chronic pain. Additionally, proximal (i.e., self-management) and distal (i.e., health-related quality of life) outcome factors are discussed as they relate to the health care transition experience for emerging adults with chronic pain.

Context Dimension of Chronic Pain Transition

Many protective and risk factors for health outcomes among pediatric chronic pain populations have been identified, which fall within the context dimension of chronic pain self-management, according to IFSMT (Ryan & Sawin, 2009). This section summarizes existing literature on pertinent individual (i.e., gender, age, and health literacy) and condition-specific (i.e., characteristics of the pain condition and comorbid physical and/or psychological health conditions) risk and protective factors for children, adolescents, and adults with chronic pain.

Among pediatric (e.g., King et al., 2011), as well as adult (e.g., Fillingim et al., 2009), populations, the prevalence of chronic pain is higher among females than males. Further, adult research has shown that physicians are more likely to view female pain complaints as less credible (Hoffmann & Tarzian, 2001) due to gender stereotypes (i.e., females being perceived as overly emotional or sensitive; Newton et al., 2013). A recent study among pediatric populations (Earp et al., 2019) found that adults tended to perceive male children as experiencing more intense pain than female children, despite identical video/audio presentations. Additionally, adolescent females with chronic pain are also more likely than adolescent males with chronic pain to experience pain dismissal (Defenderfer et al., 2018). Thus, female chronic pain patients are at heightened risk of others underestimating their pain (Tait et al., 2009) and receiving insufficient treatment of their chronic pain (Hoffmann & Tarzian, 2001), which may further exacerbate the negative behavioral, emotional, and physiological consequences of their chronic pain (Brown et al., 2021; King et al., 2011).

Research has found higher rates of chronic pain among older adolescents, compared to children and younger adolescents (King et al., 2011). However, potential differences in health outcomes for adolescents and emerging adults with chronic pain across the health care transition process require further investigation (Forgeron et al., 2017). It is likely that, due to significant developmental changes that occur over the course of adolescence and emerging adulthood (e.g., enhanced knowledge, skills, and maturity related to their own self-management), the relationships among IFSMT variables and overall health outcomes vary by age, which typically coincides with developmental level (Ryan & Sawin, 2009). Further, the level of transitional support from caregivers and health care providers likely varies by age and across the transition process, with the highest level of transitional support likely occurring in late adolescence and early emerging adulthood when health care transfer typically is initiated (White & Cooley, 2018). Post-health care transfer, emerging adults may experience a reduction in transitional supports (e.g., Devine et al., 2018), which could negatively impact health outcomes, such as quality of life and condition prognosis (Megari, 2013), particularly if their individual self-management abilities and competence have not been adequately cultivated (Ryan & Sawin, 2009).

Pain experiences are subjective and, thus, unique to the individual (Koyama et al., 2005); however, physicians and others often assess pain severity based on objective and observable pain behaviors (e.g., grimacing; Twigg & Byrne, 2014), which are typically not demonstrated by chronic pain patients (Chambliss et al., 2002). Discordance between objective and subjective perceptions of pain may lead chronic pain patients to experience pain-related stigma, or the experience of judgment from others due to chronic pain diagnoses, symptoms, and/or treatments, which can negatively impact one's psychosocial functioning (Wakefield et al., 2018). Further, adolescents and emerging adults with chronic pain may be at heightened risk for pain-related stigma, as others may perceive their youth to indicate they are inherently healthy and, thus, unlikely to be experiencing chronic pain (Ojala et al., 2015). Additionally, condition-specific characteristics have been shown to be correlated with activity limitations and quality of life, such that adolescents with greater pain frequency, severity, and duration demonstrated more activity limitations and lower quality of life (Salamon et al., 2014). Ultimately, pediatric chronic pain patients are at greater risk for long-term physical, cognitive, and/or psychological limitations due to their chronic pain, which is referred to as functional disability (Stahlschmidt et al., 2018).

Individual and family health literacy is an important predictor of health outcomes in adult populations; however, minimal research has examined the impact of health literacy in adolescent and emerging adult populations (Sansom-Daly et al., 2016). Health literacy is defined as one's ability to obtain, read, understand, and use health-related information and is vital for making informed health decisions and appropriately following treatment recommendations (Nutbeam, 2008). Chronic pain research has found that individuals with lower health literacy experience greater pain intensity and poorer pain management than individuals with higher health literacy (Koppen et al., 2018). According to the Six Core Elements of Health Care Transition^{TM} 3.0 (White et al., 2020), discussions and trainings regarding transition processes are considered Core Element #1 and are recommended to begin occurring prior to 12 years of age; however, adolescents with limited health literacy may have difficulties fully understanding and utilizing transition-related information (Sansom-Daly et al., 2016). Research suggests that health literacy is associated with self-efficacy (Farley, 2020) and likely an important foundation for development of the skills necessary for a successful transition to adulthood (Crowley et al., 2011; Gabriel et al., 2017).

For some individuals, chronic pain is their primary health complaint and may be considered a distinct chronic health condition, such as chronic widespread pain, complex regional pain syndrome, or chronic headache pain (Treede et al., 2019). For others, chronic pain may occur secondary to an underlying health concern, most commonly cancer, a neurological condition, or postoperative recovery (Treede et al., 2019). Pediatric chronic pain alone is associated with academic challenges, increased school absences, and poorer psychosocial functioning (e.g., Brown et al., 2021; Miller et al., 2018). However, many children, adolescents, and emerging adults with chronic pain also experience comorbid physiological (e.g., sleep disturbances, fatigue, and neurocognitive changes) and psychological (e.g., mood changes, stress, and low motivation) health concerns, which may appear pre- or post-onset of pain and exacerbate the negative consequences of pediatric chronic pain (Brown et al., 2021; Friedrichsdorf et al., 2016; King et al., 2011). Research suggests that adolescents with chronic pain are twice as likely to develop anxiety and/or mood disorders than their healthy peers (Noel et al., 2016). Thus, it is vital to consider the role of psychological functioning on health outcomes within chronic pain populations.

Process Dimension of Chronic Pain Transition

The process dimension of IFSMT contains important factors influencing self-management of chronic pain during the transition to adulthood, such as knowledge and beliefs, self-regulation skills and abilities, and social facilitation (Ryan & Sawin, 2009). The process dimension of IFSMT aligns with the Health Belief Model (Rosenstock, 1974), which posits that individuals are more likely to adhere to recommended behavior changes if: 1) they fully comprehend the complexities of their condition and the benefits of adherence; 2) the behavior changes are consistent with their health beliefs; and 3) they are surrounded by a social network that supports the behavior changes. The current study focused on the importance of pain self-efficacy for self-management and health care transition among chronic pain populations.

Pain self-efficacy refers to one's confidence that their life activities can continue, despite the pain (Nicholas, 2007). Adult pain research has demonstrated that pain self-efficacy can effectively interrupt the fear-avoidance cycle by reducing avoidance associated with fear of pain (Carpino et al., 2014; Woby et al., 2007). Further, greater pain self-efficacy is associated with decreased emotional challenges and increased use of active coping skills (Nicholas, 2007). Among children and adolescents with chronic pain, greater pain self-efficacy has been shown to be associated with improved school functioning, higher self-esteem, fewer symptoms of anxiety and depression, and lower functional disability (Bursch et al., 2006; Kalapurakkel et al., 2015; Tomlinson et al., 2017). Additionally, research on sickle cell disease populations has demonstrated positive correlations between self-efficacy, transition readiness, and independent self-management (Molter & Abrahamson, 2015; Treadwell et al., 2015). Thus, pain self-efficacy is an important protective factor to consider in order to support more successful health care transition for emerging adults with chronic pain.

Outcomes Dimension of Chronic Pain Transition

The outcomes dimension of IFSMT (Ryan & Sawin, 2009) comprises proximal outcomes, such as individual and family self-management, as well as distal outcomes, such as health status and quality of life. Additionally, the outcomes dimension of IFSMT includes financial outcomes, such as cost of health care services and overall economic, physical, psychological, and social cost of health to individuals and their communities.

Self-management requires collaboration among individuals with chronic health conditions and their families in order to effectively manage their conditions and overall health and well-being (Ryan & Sawin, 2009). According to IFSMT, during adolescence and emerging adulthood there is a significant shift from family self-management to individual self-management of one's conditions, which requires caregivers to adjust their behaviors, responsibilities, and roles to support their child's growing independence (Sawin et al., 2009). The complexity of self-management for adolescents and emerging adults with chronic pain may vary depending upon pain severity, level of functional disability, and presence of comorbid physical and/or psychological conditions (Friedrichsdorf et al., 2016; Treede et al., 2019). Chronic pain, like many chronic conditions, often requires day-to-day self-management. For adolescents and emerging adults with chronic pain, the specific self-management behaviors necessary may include medical interventions (e.g., using medication appropriately, building partnerships with health care providers), cognitive and behavioral strategies, modifying social and professional roles with their changing identities, and maintaining normalcy in all aspects of their lives (Davey, 2016; Friedrichsdorf et al., 2016; Liossi & Howard, 2016; Rabin et al., 2017).

Through the development and promotion of their pain self-efficacy and individual self-management abilities, adolescents and emerging adults with chronic pain can gain the skills necessary for a more successful health care transition and improved quality of life in adulthood (Sawin et al., 2009).

Health-related quality of life (HRQoL) is a concept encompassing the perceived impact of one's health status on their physical, psychological, and social functioning (Karimi & Brazer, 2016). HRQoL predicts multiple important health outcomes, including more satisfaction with life (e.g., Novianti et al., 2020), decreased health care resource utilization (e.g., Rendas-Baum et al., 2019), and better prognosis (e.g., Megari, 2013) for individuals with a wide range of chronic health conditions. Pediatric research has shown that having a chronic health condition negatively impacts psychosocial well-being and HRQoL (Ingerski et al., 2010), especially for children and adolescents who perceive their condition as more severe or who have multiple diagnosed chronic health conditions (Bai et al., 2017). Among chronic pain populations, these results have been mostly replicated (e.g., Hoffman et al., 2007). Recent research has found an even greater negative impact on HRQoL for individuals living with chronic pain compared to those living with other chronic health conditions (Hadi et al., 2019), in part attributed to the marked impact that chronic pain has on functional abilities (Salamon et al., 2014), as well as the high prevalence of physical and psychological health comorbidities (Treede et al., 2019).

The Current Study

Currently, there is a paucity of research investigating the health care transition process for adolescents and emerging adults with chronic pain. Recently, researchers have argued for the necessity of further research in this area (e.g., Forgeron et al., 2017; Higginson et al., 2019) due to the unique additional challenges that chronic pain patients may face during health care transition compared to other chronic health conditions, including pain-related stigma (Wakefield et al., 2018), pain dismissal (Defenderfer et al., 2018), heightened risk for physical and psychological health comorbidities (Treede et al., 2019), and functional disability (Salamon et al., 2014). Additionally, developing literature has shown that the negative impact chronic health conditions have on HRQoL may be even more pronounced among individuals with chronic pain (Hadi et al., 2019).

The current study aimed to utilize structural equation modeling in a sample of community-recruited emerging adults with chronic pain to: 1) evaluate the factor structure of common measures of health literacy (i.e., Brief Health Literacy Screening Tool [BRIEF; Haun et al., 2009]), psychological functioning (i.e., Patient-Reported Outcome Measurement Information System [PROMIS] -Anxiety and -Depression Scales [Irwin et al., 2010]), pain self-efficacy (i.e., Pain Self-Efficacy Questionnaire [PSEQ; Nicholas, 2007]), self-management (i.e., self-management domain of the Self-Management Transition to Adult Treatment [STARx; Ferris et al., 2015]), and HRQoL (i.e., PROMIS-Global Health; Hays et al., 2009); and 2) assess the impact of two context variables (i.e., health literacy and psychological functioning), one process variable (i.e., pain self-efficacy), and one proximal outcome variable (i.e., self-management) on the distal outcome variable of HRQoL. Data analyses were proposed to proceed in three stages: 1) five independent confirmatory factor analyses to validate each measure in the hypothesized model; 2) analysis of the hypothesized measurement model; and 3) analysis of the hypothesized structural model.

Five independent confirmatory factor analyses were conducted to validate each measure from the hypothesized model in the sample of community-recruited emerging adults with chronic pain. It was hypothesized that: 1) the four items of the BRIEF would load onto a latent construct of “health literacy”; 2) the four items of the PROMIS-Anxiety scale and the four items of the PROMIS-Depression scale would load onto latent constructs of “anxiety” and “depression”, respectively, and that these two latent constructs would significantly covary with one another; 3) the 10 items of the PSEQ would load onto a latent construct of “pain self-efficacy”; 4) the nine items of the STARx self-management domain would load onto a latent construct of “self-management”; and 5) the 10 items of the PROMIS-Global Health would load onto a latent construct of “HRQoL”.

In the measurement model (see Figure 2), it was hypothesized that: 1) items would demonstrate stronger loadings on their hypothesized latent constructs (see above) than on other latent constructs; 2) latent context variables (i.e., health literacy, anxiety, and depression) would significantly covary with one another; and 3) latent process (i.e., pain self-efficacy) and latent outcome (i.e., self-management and HRQoL) variables would not significantly covary with other latent variables.

In the structural model (see Figure 3), it was hypothesized that the context variables would covary with one another, such that health literacy would be negatively associated with anxiety and depression. Additionally, it was hypothesized that the process variable (i.e., pain self-efficacy) would partially mediate the relationship between the context variables (i.e., health literacy, anxiety, and depression) and the distal outcome variables (i.e., HRQoL). It was further hypothesized that the proximal outcome variable (i.e., self-management) would partially mediate the hypothesized positive association between the process variable (i.e., pain self-efficacy) and the distal outcome variable (i.e., HRQoL). Finally, it was hypothesized that gender, age, pain experience (i.e., frequency, severity, and duration), and transfer status (i.e., under the care of an adult provider [post-transfer] vs. not under the care of an adult provider [pre-transfer]) would be significant covariates in the structural model due to the known differential impact that these variables have on health outcomes for individuals with chronic pain (King et al., 2011; Salamon et al., 2014).

Methods

Participants

Over three academic semesters (i.e., Summer 2020, Fall 2020, and Spring 2021), 1,668 emerging adults (18 to 25 years of age) provided consent and participated in the current study as part of a larger Qualtrics survey. All participants were required to be between the age of 18 and 25 years and be proficient in reading and writing in English. Community-recruited emerging adults were also required to have access to a device that could connect to the internet in order to complete the online survey. For the current study, only emerging adults with current self-reported chronic pain were included. Of the 1,454 (87% of larger sample) emerging adult participants who responded to the following dichotomous (i.e., yes or no) screener question, "Do you currently have a chronic or recurrent pain condition that has lasted more than 3 months?", 15% (*n*=211) reported currently having a chronic or recurrent pain condition.

Procedure

The Institutional Review Board of a large Midwestern university approved the study procedures for the larger Qualtrics survey each semester. Emerging adults (ages 18 to 25 years) were recruited by graduate and undergraduate students in an advanced psychology laboratory course, who had been trained in the ethical conduct of research. Participants indicated (on Qualtrics) that they were 18 years of age or older, were voluntarily participating, and understood that the student who recruited them would not be penalized if they chose not to participate. The larger Qualtrics survey varied by semester based upon collaborators' ongoing research projects, included an average of 162 questions, and took approximately 30 to 45 minutes to complete. Participants did not receive compensation for their participation.

Measures

The following measures were completed by participants as part of the larger Qualtrics survey, which assessed health behaviors in adolescence and emerging adulthood, and took approximately 5 to 10 minutes to complete.

Demographic Information

Emerging adult participants provided basic demographic information including age, education level, socioeconomic status, gender, race/ethnicity, relationship status, parent status, sexual orientation, student status, and current living situation.

Pain-Related Descriptive Information

Emerging adults were instructed to describe the duration, location(s), and cause(s) of their chronic pain via free response. Free responses were coded utilizing a modified Delphi coding method (Holey et al., 2007; Jones & Hunter, 1995; detailed below) and reported descriptively.

Participants also completed the Pain Frequency-Severity-Duration Scale (PFSD Scale; Salamon et al., 2014), which is a 5-item multidimensional measure regarding respondents' recent pain experience. The PFSD Scale has demonstrated adequate internal consistency (α=0.87) and adequate criterion validity with pain-related impairment (i.e., activity limitations and quality of life; all $r \geq |.21|$) among pediatric patients (i.e., 8- to 18-year-olds) with complex chronic pain. Emerging adults indicated the number of days in the past two weeks (i.e., 0-14 days; Item 1) that they had experienced pain to assess frequency. Participants then reported their usual (Item 2) and worst (Item 3) pain intensity over the past two weeks on scales from 0 being "No Pain" to 10 being "The Worst Pain You Can Imagine". Daily duration of pain was assessed by responses to the number of hours (i.e., 1-2, 3-5, 6-8, 9-12, 12-18, or 18-24) their usual (Item 4) and worst (Item 5) pain lasted in a given day. A composite PFSD score was calculated by multiplying Item 1, Item 2, and Item 4, then dividing by 10 (range=0-140), with higher scores indicating greater pain frequency, severity, and duration.

Health-Related Descriptive Information

Participants indicated comorbid chronic physical and psychological health conditions from a list of 18 common conditions. They were allowed to select all that applied. Participants could also select "other (please specify)" and provide a free response if they had a comorbid chronic condition that was not included in the list of 18 common conditions. Responses to "other (please specify)" were coded using a modified Delphi coding method (Holey et al., 2007; Jones & Hunter, 1995; detailed below) and reported descriptively.

In order to assess health care transfer status, participants also indicated whether they were: 1) under the care of an adult provider (i.e., post-transfer); 2) under the care of an adolescent provider (i.e., pre-transfer); or 3) not under the care of a provider (i.e., pre-transfer).

Health Literacy

The Brief Health Literacy Screening Tool (BRIEF; Haun et al., 2009; see Appendix A) was used to assess health literacy. The BRIEF has demonstrated good convergent validity with other, more complex measures of health literacy (i.e., Short-Test of Functional Health Literacy in Adults and Rapid Estimate of Adult Literacy in Medicine; both $r \geq .40$), as well as high sensitivity (i.e., 79%) in detecting inadequate health literacy in adult samples (i.e., 23- to 89-year-olds) recruited in ambulatory care settings. The BRIEF contains four 5-point Likert scale items regarding self-perception of health literacy from 1 being "always" or "not at all" to 5 being "never" or "extremely". A total score was calculated by summing the four items, with higher scores indicating higher health literacy. Generally, respondents are characterized as having "inadequate" health literacy (i.e., total score of 4-12), "marginal" health literacy (i.e., total score of 13-16), or "adequate" health literacy (i.e., total score of 17-20).

Psychological Functioning

The Patient-Reported Outcome Measurement Information System (PROMIS; Cella et al., 2007) comprises a collection of measures, as well as individual items, evaluating physical, psychological, and social health. The 4-item PROMIS-Anxiety and the 4-item PROMIS-Depression scales (Irwin et al., 2010; see Appendix B) were utilized in the current study to assess mood and anxious symptoms, respectively. Both the PROMIS-Anxiety and PROMIS-Depression scales have demonstrated good internal reliability (α>.80) and strong convergent validity with the 7-item Generalized Anxiety Disorder scale (r=.79) and 9-item Patient Health Questionnaire (r=.75), respectively, among adult (i.e., 28- to 65-year-olds) chronic pain patients (Kroenke et al., 2014). Emerging adults indicated on a 5-point Likert scale from 1 being "never" to 5 being "always" how often each statement occurred in the past week. Composite scores were calculated by summing items pertinent to each scale, with higher scores indicating higher distress and poorer psychological functioning. Generally, anxiety and depression composite scores greater than or equal to 8 are indicative of probable anxiety disorder and probably major depression, respectively.

Pain Self-Efficacy

The Pain Self-Efficacy Questionnaire (PSEQ; Nicholas, 2007; see Appendix C) was used to measure pain self-efficacy. The PSEQ has been validated for 13- to 80-year-olds with chronic low back pain and has demonstrated high internal consistency (α=.92), good test-retest reliability

(r=.73), strong positive correlation with engagement in active coping strategies (all $r \geq .45$), and strong negative correlation with self- and other-reported pain-related disability (all $r \leq -.48$). The PSEQ is a 10-item measure that asks respondents to indicate on a 7-point Likert scale from 0 being “not at all” to 6 being “completely” how confident they are that they can complete activities of daily living, despite their pain. The questionnaire instructions specifically state, “This questionnaire is not asking whether or not you have been doing these things, but rather how confident you are that you can do them at present, despite the pain.” A total pain self-efficacy score was calculated by summing all items, with higher scores indicating more confidence in one’s abilities to engage in activities of daily living, despite their chronic pain. Generally, scores less than 20 indicate low pain self-efficacy and scores greater than 40 indicate high pain self-efficacy.

Self-Management

The Self-Management Transition to Adult Treatment (STARx; Ferris et al., 2015; see Appendix D) questionnaire is an 18-item assessment of transition related knowledge based on three domains: communication with medical provider, disease knowledge, and self-management. The STARx has been shown to have strong internal consistency and temporal stability (α=.80) among 12- to 25-year-olds with chronic health conditions (e.g., chronic kidney disease, inflammatory bowel disease, and cystic fibrosis). The STARx has also demonstrated strong concurrent validity with the UNC TRxSITION Scale^{TM} (r=.365) and the Transition Readiness Assessment Questionnaire (TRAQ; r=.775) and strong positive correlation with health literacy, self-efficacy, and adherence (all $\beta \geq .193$; Cohen et al., 2015). The current study utilized the self-management domain of the STARx, which evaluates medication management (4 items; all $r \geq .735$), adult health responsibilities (2 items; all $r \geq .773$), and resource utilization (3 items; all

$r \geq .646$). All items of the STARx are answered in regard to behaviors demonstrated in the past 3 months. Seven of the nine items for the STARx self-management subscale are answered on a 5-point Likert scale from 0 being “never” to 4 being “always”. The other two items for the STARx self-management subscale are answered on a 5-point Likert scale from 0 being “very hard” to 4 being “very easy”. Items specific to medication administration and adherence ($n=5$) also include an option of “I do not take any medicines”, which is scored as a “5” because the authors of the STARx argue “not having to take medications lessens the disease burden of an individual, which would seem beneficial to the transition process” (Ferris et al., 2015). A self-management domain score was calculated by summing the nine items after reverse-scoring two items, with higher scores indicating greater engagement in self-management behaviors.

HRQoL

The PROMIS Scale v.1.2 – Global Health (PROMIS-Global Health; Hays et al., 2009; see Appendix E) was used to evaluate HRQoL, which encompasses both health status and quality of life. The PROMIS-Global Health has high internal consistency ($\alpha=0.92$) and has demonstrated validity in both community and clinical (e.g., heart disease, cancer, and arthritis) samples of adults (i.e., 18- to 100-year-olds). On the 10-item PROMIS-Global Health, participants indicated on various Likert scales, how they would generally rate characteristics of their physical, psychological, and social health and how much impact each characteristic has on their daily activities. A total global health, or HRQoL, score was calculated by summing all responses after certain items were reverse-scored and converted to a 5-point Likert scale, with higher scores indicating greater HRQoL. Additionally standardized *t*-scores were calculated for the global mental health and global physical health subscales.

Data Analytic Plan

All data were exported from Qualtrics to an IBM Statistical Product and Service Solutions (SPSS), version 25.0 (IBM Corp, 2017), database. The sample was characterized using descriptive statistics in SPSS. Analysis of Moment Structures (Amos; Arbuckle, 2014), an SPSS module, was used to conduct structural equation modeling (SEM; detailed below).

Modified Delphi Coding Method

Descriptive qualitative responses (i.e., duration, location(s), and cause(s) of chronic pain), were coded by two doctoral students using a modified Delphi coding method (Holey et al., 2007; Jones & Hunter, 1995). First, coding team members independently developed categories that they felt best fit the data for each response. After collectively deciding which categories to utilize for coding, both coding team members independently coded individual qualitative responses for either presence of category (1) or absence of category (0) for each category. Independent codes were compiled and compared. Items that were at 50% agreement were discussed in order to reach acceptable agreement (i.e., 100% agreement).

Data Preparation

Continuous Data. All items from the six measures pertinent to the current study (i.e., BRIEF, PROMIS-Anxiety, PROMIS-Depression, PSEQ, STARx, and PROMIS-Global Health) utilized 5-, 6-, or 7-point Likert scale response options. Literature supports treating ordinal variables with five or more categories as continuous without disrupting the integrity of results (Norman, 2010; Sullivan & Artino, 2013; Zumbo & Zimmerman, 1993); thus, observed ordinal data in the current study were treated as continuous.

Missingness. Missingness was examined by questionnaire and found to be primarily due to attrition and at random. Literature suggests that cases should have at least one item per latent construct completed in order to effectively utilize multiple imputation (Byrne, 2016; Jakobsen et al., 2017; Kline, 2015). Thus, respondents who were missing all items on a given questionnaire were excluded from that independent confirmatory factor analysis (CFA), as well as the exploratory measurement model analysis. Additionally, due to the missing data of the remaining sample accounting for less than 5%, multiple imputation was not implemented per literature recommendations (Byrne, 2016; Jakobsen et al., 2017; Kline, 2015). Any remaining participants with partial missing data on a questionnaire were also excluded from that independent CFA, as well as the exploratory measurement model analysis.

Checking Assumptions. For each CFA, internal consistency, univariate skew, univariate kurtosis, multivariate normality, and outliers were assessed using Cronbach's alpha (*α*), standardized skew indices, standardized kurtosis indices, *z*-scores for Mardia's normalized estimate, and squared Mahalanobid distances, respectively, to identify any unusual data points or distributions. Emphasis was placed on univariate and multivariate kurtosis, as kurtosis, and in particular, multivariate kurtosis, has been shown to bias tests of variances and covariances, such as SEM (Byrne, 2016). Standardized skew indices greater than |2| (Byrne, 2016), individual item raw standardized kurtosis indices greater than 7 (West et al., 1995), and *z*-scores for Mardia's normalized estimate for each questionnaire greater than 5 (Bentler, 1990) were considered indicative of non-normality.

All independent CFAs demonstrated adequate internal consistency (α>.700; Nunnally & Bernstein, 1994). All items on the BRIEF and PSEQ and a few items on the STARx and PROMIS-Global Health demonstrated mild univariate skew. No items on the PROMIS-Anxiety and PROMIS-Depression scales demonstrated univariate skew. Across all measures, no items demonstrated univariate kurtosis. However, all measures demonstrated multivariate kurtosis.

Standardization, logarithmic, natural logarithmic, and square root normalizing transformations did not correct for univariate non-normality or multivariate kurtosis (i.e., all standardized skew indices remained >|2| and all Mardia's normalized estimate *z*-scores remained >5) for any of the measures; thus, raw scores were used for all analyses. Across all independent CFAs, no significant multivariate outliers were identified based on squared Mahalanobid distance values and analysis of standardized distributions of data points (Byrne, 2016). Partial results from assumption checking of each measure can be found in Appendices A, B, C, D, and E.

Power Analysis

The recommended minimum sample size for SEM is 100-200 participants (Boomsma, 1985). More importantly, however, the ratio of estimated parameters in the model to cases should be between 1:10 (considered adequate) and 1:20 (considered best; Jackson, 2003). A ratio of parameters to cases less than 1:5 is sometimes considered acceptable; however, it is at risk of producing biased estimates.

Of the 211 emerging adults participants in the current study, 10% (*n*=22) minimally engaged (i.e., <20% completed) in the survey after providing consent and notably did not complete any items from the six questionnaires (i.e., BRIEF, PROMIS-Anxiety, PROMIS-Depression, PSEQ, STARx Self-Management subscale, and PROMIS-Global Health) pertinent to the five latent constructs (i.e., health literacy, psychological functioning, pain self-efficacy, self-management, and HRQoL) of interest. Additionally, due to experimenter error 5% of participants (*n*=11) were not exposed to all questionnaires pertinent to the current study. Due to the current study's small overall sample size and limitations of Amos software (i.e., the inability to address multivariate kurtosis and obtain modification indices, while simultaneously addressing missing data; Byrne, 2016), independent CFAs were first conducted for each questionnaire with participants who had answered all items per latent construct of interest: health literacy (i.e., BRIEF; *n*=152; *n*=59 missing all data; *n*=0 missing partial data), psychological functioning (i.e., PROMIS-Anxiety and PROMIS-Depression scales; *n*=149; *n*=60 missing all data; *n*=2 missing partial data), pain self-efficacy (i.e., PSEQ; *n*=168; *n*=41 missing all data; *n*=2 missing partial data), self-management (i.e., STARx self-management domain; *n*=165; *n*=40 missing all data; *n*=6 missing partial data), and HRQoL (i.e., PROMIS-Global Health; *n*=144; *n*=63 missing all data; *n*=4 missing partial data). There were no significant differences between demographic representation in the sample of community-recruited emerging adults with chronic pain included in the current study (*n*=211) and the subsample of participants with sufficient data for analyses (all $p>.05$).

Each independent CFA demonstrated adequate power based on parameters to cases ratios: 1:19 for health literacy; 1:8 for psychological functioning; 1:7 for pain self-efficacy; 1:18 for self-management; and 1:7 for HRQoL. There was less than adequate power for the analysis of the respecified measurement model (i.e., approximately 1 parameter to 1 case) and, thus, this analysis was treated as exploratory in nature and should be interpreted with caution. A good fitting measurement model is a prerequisite for analysis of a structural model (Kline, 2015); however, the respecified measurement model demonstrated poor fit to the data. Thus, the structural model was not able to be assessed via SEM with the current sample.

Hypothesis Testing

Independent CFAs were first used to determine if observed variables (i.e., the items of each measure) loaded onto the hypothesized latent constructs (i.e., the constructs each measure was designed to assess). These analyses were initially considered strictly confirmatory in nature; however, if initial analyses demonstrated poor or mediocre fit, modification indices (detailed below) were examined in order to identify and analyze an alternative (i.e., respecified) model. The measurement model was respecified based on the results of the independent CFAs and all latent variables were allowed to covary freely. The analyzed measurement model was underpowered, treated as exploratory, demonstrated poor fit to the data, and not able to be respecified and reanalyzed. Thus, the structural model was not able to be assessed.

Bootstrapping. Due to the non-normality of the data, each analysis incorporated a bootstrap on 1,000 samples using maximum likelihood estimator (Boomsma, 1985), which provided bias-corrected 95% confidence intervals (CIs) for each of the parameter bootstrap estimates. Additionally, the Bollen-Stine bootstrapping option (Bollen & Stine, 1992) was utilized, which provided a *p*-value regarding the proportion of the time the model "fit worse" (i.e., the number of times that the model chi-square [χ^2] for the bootstrapped sample exceeded the χ^2 for the observed data). Non-significant Bollen-Stine *p*-values supported retention of the null hypothesis that the assessed model was correct.

Goodness of Fit Statistics. Parameter estimates were not evaluated until it was determined that the model was a good or excellent fit to the data. Model fit was determined using several indices, including the χ^2 statistic, χ^2/df ratio, comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized Root Mean Square Residual (SRMR; for review see Byrne, 2016 and Kline, 2015).

The χ^2 statistic is a measure of absolute model fit to the data. It assesses the discrepancy between the sample and fitted covariance matrices and is particularly sensitive to the size of the sample (Kline, 2015). The χ^2/df ratio is complementary to the χ^2 statistic. It is a measure of relative model fit to the data and is considered to be less sensitive to sample size (Wheaton et al., 1977). The CFI, which is a modified normed fit index that accounts for sample size, provides a measure of complete covariation of the data (Hu & Bentler, 1999). The RMSEA takes into account the error of approximation in the population and is sensitive to model complexities (Browne & Cudeck, 1993). The SRMR represents the average value across all standardized residuals (Byrne, 2016). Specifically, non-significant χ^2 values (Kline, 2015), χ^2/df values less than 5 (Byrne, 2016), CFI values greater than or equal to .95 (Hu & Bentler, 1999), RMSEA values less than or equal to .08 (Browne & Cudeck, 1993) SRMR values less than or equal to .05 (Steiger, 1990) were considered indicative of good model fit.

For the purpose of the current study (and based on previous literature recommendations; for review see Byrne, 2016), if a model met criteria for four or five out of the above five fit indices, it was described as having "good" or "excellent" fit to the data, respectively. If a model met criteria for three out of the above five fit indices, it was described as having "mediocre" fit to the data. If a model met criteria for zero, one, or two out of the above five fit indices analyzed for the current study, it was described as having "poor" fit to the data.

Modification Indices. Amos calculates modification indices for all constrained parameters in an assessed model, which indicate how much the model χ^2 would decrease if the identified parameter(s) were estimated instead of constrained (Byrne, 2016). In cases where the analyzed model demonstrated poor or mediocre fit and χ^2 change estimates greater than 5 were paired with substantial parameter change estimates (i.e., >|.10|), the model was respecified accordingly. Modification indices in Amos are based on a univariate approach; thus, only one estimated parameter (i.e., the one with the greatest χ^2 and parameter change estimates based on modification indices) was added per respecified model until the model demonstrated good to excellent fit or there were no more modification indices that fit the above criteria.

Interpretation of Parameter Estimates. Once a model demonstrated good or excellent fit to the data, parameter estimates were interpreted. First, the *p*-values and 95% bootstrap CIs for unstandardized and standardized parameter estimates were examined. Regression weights with significant *p*-values and 95% bootstrap CIs that did not contain 0 were considered to be significantly different from 0 (Byrne, 2016). Standardized regression weights were interpreted as the expected standard deviation change in items per 1 standard deviation change in the latent construct. Standardized regression weights greater than .400 are typically considered acceptable and indicative of adequate factor loading (Stevens, 1992); however, for the purpose of the current study, as long as the upper limit of the 95% bootstrap CI for the standardized regression weight included .4 or higher, the items were retained in the model. Squared multiple correlations (i.e., squared standardized regression weights) were also interpreted as the percent of variance in items accounted for by their respective latent constructs (Byrne, 2016).

Results

Descriptive Statistics

Demographic data for the sample of 211 emerging adults with chronic pain included in the current study are presented in Table 1. Participants had an average age of 21.95 years (*SD*=1.93), an average education level of 13.96 years (*SD*=2.34), and an average self-reported socioeconomic status in adolescence of 5.50 (on a 10-point Likert scale from 1-10; *SD*=1.89). The most commonly reported characteristic per demographic factor was: female (66%) for gender; White (79%) for race/ethnicity; partnered, but not married (54%) for relationship status; no children (94%) for parent status; straight (72%) for sexual orientation; full- or part-time college students (57%) for student status; and living outside of the family home with or without roommates (63%) for current living situation.

One-hundred and forty-seven participants (70% of the larger chronic pain sample) responded to the qualitative question regarding duration of their chronic pain. Pain duration ranged from .5 to 20 years (*M*=5.53, *SD*=3.66). The majority of respondents (94%) indicated that they had been experiencing chronic pain for one or more years. The average age of pain onset (i.e., participant age minus reported duration of current pain; *n*=133) was 16.49 years (*SD*=3.79, range=3-24). Sixty-three percent of respondents (*n*=84) indicated that their current pain was a continuation of chronic pain that began in childhood (i.e., before 18 years of age). Additionally, 4% of respondents (*n*=5) indicated that their current pain began in adulthood (i.e., 18 years of age or older), but that they had also experienced a different type of chronic pain in childhood.

One-hundred and seventy-nine participants (85% of the larger chronic pain sample) responded to the qualitative question regarding location(s) and cause(s) of their chronic pain. The most commonly reported locations of pain included: back (39%), upper and lower extremities (30%), and head (26%). One-fourth of respondents (24%) reported experiencing chronic pain in two or more locations. The most commonly reported causes of chronic pain included: underlying physical health condition (34%) and injury (22%). One-tenth of respondents (8%) reported two or more causes of their chronic pain. See Table 2 for summary of pain-related descriptive statistics.

One-hundred and sixty-five (78% of the larger chronic pain sample) completed the PFSD Scale. PFSD composite scores ranged from 0 to 113.40, with a mean score of 33.14 (*SD*=27.25). On average, emerging adult participants reported experiencing chronic pain 8.45 days in the past two weeks (*SD*=4.85, range=0-14). They also reported average pain ratings of 5.05 (*SD*=1.78, range=0-9) and worst pain ratings of 6.89 (*SD*=2.23, range=0-10) on a 0-10 pain severity scale.

Of the larger sample of emerging adults with chronic pain, the majority of participants had physical and/or psychological comorbidities (77%), with an average of .92 (*SD*=1.13, range=0-5) comorbid physical health conditions and 1.39 (*SD*=1.21) comorbid psychological conditions per participant. Forty-four percent of participants reported having both physical and psychological comorbid conditions, 23% percent of participants reported having only psychological comorbid conditions, and 10% of participants reported having only physical comorbid conditions. The most commonly reported comorbid conditions were anxiety (57%), depression (49%), asthma (23%), attention-deficit/hyperactivity disorder (ADHD; 22%), chronic headache/migraine (14%), and recurrent abdominal pain/irritable bowel syndrome (11%). A summary of comorbid physical and psychological health conditions observed in the sample is presented in Table 3.

Half of the sample (49%) had successfully undergone health care transfer and were currently under the care of an adult provider. Seventeen percent of participants were under the care of an adolescent provider and 27% were not currently under the care of a provider. Participants who had successfully transferred health care to an adult provider (*M*=22.24, *SD*=1.90) were significantly older than participants who had not established care with an adult provider (*M*=21.71, *SD*=1.89), *t*(191)=-1.95, *p*<.05.

Independent Confirmatory Factor Analyses (CFAs)

Fit indices for the hypothesized, and subsequent respecified, models of each measure (i.e., each latent construct) are presented in Tables 4, 6, 8, 10, and 12. Full model results, including unstandardized and standardized regression weights, standard errors, squared multiple correlations, variance estimates, covariance estimates, correlation estimates, 95% bootstrap CIs, and associated *p*-values for each measure's final model are presented in Tables 5, 7, 9, 11, and 13.

Health Literacy

The average self-perceived health literacy of the current sample was 16.93 (*SD*=2.86, range=6 to 20; see Appendix A), which was considered marginal to adequate. Nine percent of respondents demonstrated "inadequate" health literacy (i.e., total score of 4-12), 27% of participants demonstrated "marginal" health literacy (i.e., total score of 13-16), and 64% of participants demonstrated "adequate" health literacy (i.e., total score of 17-20; Haun et al., 2009).

The hypothesized model for the 4-item BRIEF (Haun et al., 2009) demonstrated excellent fit to the data: $\chi^2(2)=.312$, $p=.850$; $\chi^2/\text{df}=.156$; CFI=1.000; RMSEA=.000 (90% CI=.000-.087), $p=.898$; and SRMR=.012 (see Table 4). Additionally, the Bollen-Stine bootstrap analysis demonstrated that in 850 (of 1,000) bootstrap samples, the model fit worse or failed to fit; thus, the null hypothesis that the assessed model was correct was retained ($p=.850$). No post-hoc modifications were examined due to the excellent fit of the hypothesized model.

All four items of the BRIEF were significant parameter estimates in the model (see Table 5). Further, all 95% bootstrap CIs for standardized and unstandardized regression weights did not include 0, which supports the fact that the parameter estimates were significantly different from 0. Notably, the latent construct of "Health Literacy" accounted for 88% of the variance in item #2. "Health Literacy" accounted for 15%, 52%, and 17% of the variance in Items #1, #3, and #4, respectively. As "Health Literacy" increases by 1 standard deviation, item #2, item #3, and item #4 are expected to increase by .937, .723, and .413 standard deviations, respectively; thus, demonstrating acceptable convergence. Item #1 demonstrated slightly below acceptable factor loading with a standardized regression weight of .388; however, it was retained in the model as the upper cut-off of its 95% bootstrap CI was above .400.

Psychological Functioning

Participants demonstrated an average anxiety score of 11.36 (*SD*=3.72, range=4-20) and an average depression score of 10.78 (*SD*=4.42, range=4-20; see Appendix B). Responses indicated that 63% of participants had probable anxiety disorder (i.e., total score of ≥ 8) and 56% of participants had probable major depression (i.e., total score of ≥ 8), which is similar to self-reported rates of anxiety (57%) and depression (49%).

The hypothesized model for the 4-item PROMIS-Anxiety scale and 4-item PROMIS-Depression scale (Irwin et al., 2010), which were allowed to covary, demonstrated excellent fit to the data: $\chi^2(19)=29.751$, $p=.055$; $\chi^2/\text{df}=1.566$; CFI=.988; RMSEA=.062 (90% CI=.000-.103); and SRMR=.035 (see Table 6). Additionally, the Bollen-Stine bootstrap analysis demonstrated that in 132 (of 1,000) bootstrap samples, the model fit worse or failed to fit; thus, the null hypothesis that the assessed model was correct was retained ($p=.132$). No post-hoc modifications were examined due to the excellent fit of the hypothesized model.

The four items of the PROMIS-Anxiety and four items of the PROMIS-Depression scales were significant parameter estimates of their respective latent construct and demonstrated acceptable convergence with their respective latent construct (see Table 7). Further all 95% bootstrap CIs for standardized and unstandardized regression weights did not include 0, which supports the fact that the parameter estimates were significantly different from 0. The latent construct of "Anxiety" accounted for 42% to 76% of the variance in the four items of the PROMIS-Anxiety scale. As "Anxiety" increases by 1 standard deviation, item #1, item #2, item #3, and item #4 of the PROMIS-Anxiety scale are expected to increase by .647, .861, .871, and

.800, respectively. The latent construct of "Depression" accounted for 72% to 81% of the variance in the four items of the PROMIS-Depression scale. As "Depression" increases by 1 standard deviation, item #1, item #2, item #3, and item #4 of the PROMIS-Depression scale are expected to increase by .882, .869, .846, and .899, respectively. As hypothesized, the latent constructs of "Anxiety" and "Depression" also significantly covaried and were correlated with one another.

Pain Self-Efficacy

Participants reported an average pain self-efficacy score of 41.71 (*SD*=13.06, range=6-60; see Appendix C). Only 5% of participants were identified as having low pain self-efficacy (i.e., total score of <20), while the majority of participants (58%) were identified as having high pain self-efficacy (i.e., total score of >40).

The hypothesized model for the 10-item PSEQ (Nicholas, 2007) demonstrated poor fit to the data: $\chi^2(35)=152.783$, $p<.001$; $\chi^2/\mathrm{df}=4.365$; CFI=.895; RMSEA=.142 (90% CI=.119-.165); and SRMR=.058 (see Table 8). Post-hoc modifications were made to the hypothesized model, one at a time, until the model demonstrated good fit with the data. Respecifications included adding the following parameter estimates of the covariance among error terms for: item #4 and item #7 (respecified model #1), item #1 and item #2 (respecified model #2), item #5 and item #10 (respecified model #3), item #3 and item #10 (respecified model #4), and item #8 and item #9 (respecified model #5). The final respecified model demonstrated good fit with the data: $\chi^2(30)=67.409$, $p<.001$; $\chi^2/\mathrm{df}=.132$; CFI=.967; RMSEA=.080 (90% CI=.053-.108); and SRMR=.043. In the final respecified model, the Bollen-Stine bootstrap analysis demonstrated that in 132 (of 1,000) bootstrap samples, the model fit worse or failed to fit; thus, the null hypothesis that the assessed model was correct was retained ($p=.132$).

In the final respecified model, all 10 items of the PSEQ were significant parameter estimates in the model (see Table 9). Further, all 95% bootstrap CIs for standardized and unstandardized regression weights did not include 0, which supports the fact that the parameter estimates were significantly different from 0. The latent construct of “Pain Self-Efficacy” accounted for 35% to 74% of the variance in the 10 items of the PSEQ. As “Pain Self-Efficacy” increases by 1 standard deviations, all items of the PSEQ are expected to increase by .594 to .862 standard deviations, which demonstrates acceptable convergence.

Self-Management

Participants reported an average self-management domain score of 27.06 (*SD*=5.93, range=13-40; see Appendix D). The average subscale scores of the STARx self-management domain were: 14.61 (*SD*=4.28, range=4-20) for medication management; 7.65 (*SD*=2.67, range=0-13) for resource utilization, and 4.95 (*SD*=2.00, range=0-8). Notably, 54 (33%) of the 165 participants who completed the STARx indicated that they were not currently taking any medications.

The fit of the hypothesized model for the 9-item STARx (Ferris et al., 2015) self-management domain was unable to be determined as the analysis iteration limit (i.e., 50) was reached, which indicates poor model fit and precludes interpretation of results. Thus, post-hoc analyses proceeded in an informed exploratory manner. Ferris and colleagues (2015) demonstrated that the medication management subscale of the STARx self-management domain accounted for the greatest percentage of variance in composite STARx scores in its initial validation and argued for the critical role of medication management in successful health care transition and self-management for adolescents and emerging adults with chronic health conditions. Therefore, a respecified model that only included the four items of the medication management subscale of the STARx self-management domain was analyzed (i.e., item #2, item #5, item #8, and item #16). The initially respecified model demonstrated poor fit as well (see Table 10). Modification indices suggested incorporation of a parameter estimate of the covariance among the error terms for item #2 and item #16, which was added for respecified model #2. The final respecified model demonstrated excellent fit with the data: $\chi^2(1)=1.435$, $p=.231$; $\chi^2/\text{df}=1.435$; CFI=.987; RMSEA=.051 (90% CI=.000-.222); and SRMR=.010. In the final respecified model, the Bollen-Stine bootstrap analysis demonstrated that in 238 (of 1,000) bootstrap samples, the model fit worse or failed to fit; thus, the null hypothesis that the assessed model was correct was retained ($p=.238$).

In the final respecified model, all four items of the medication management subscale of the STARx self-management domain were significant parameter estimates in the model (see Table 11). Further, all 95% bootstrap CIs for standardized and unstandardized regression weights did not include 0, which supports the fact that the parameter estimates were significantly different from 0. The latent construct of “Self-Management” accounted for 80% and 72% of the variance in item #8 and item #5, respectively. The latent construct of “Self-Management” accounted for 31% and 47% of the variance in item #2 and item #16, respectively. As “Self-Management” increases by 1 standard deviation, item #2, item #5, item #8, and item #16 are expected to increase by .558, .847, .896, and .688 standard deviations, respectively, which demonstrates acceptable convergence.

HRQoL

Participants reported an average raw HRQoL score of 30.14 (*SD*=6.21, range=14-47; see Appendix E). Responses indicated that respondents had average global mental health (*t*=41.1, *SE*=3.6) and average global physical health (*t*=44.9, *SE*=4.3) compared to the general population.

The hypothesized model for the 10-item PROMIS-Global Health (Hays et al., 2009) demonstrated poor fit to the data: $\chi^2(35)=88.14$, $p<.001$; $\chi^2/\text{df}=2.518$; CFI=.892; RMSEA=.103 (90% CI=.376-.130); and SRMR=.066 (see Table 12). Post-hoc analyses incorporated modification indices one at a time until the model demonstrated adequate fit and allowed for interpretation of parameter estimates. First, the parameter estimate of the covariance among the error terms for item #5 and item #9 was added (i.e., respecified model #1). Then, the parameter estimate of the covariance among the error terms for item #4 and item #10 was added (i.e., respecified model #2). The final respecified model, demonstrated good fit with the data: $\chi^2(33)=41.11$, $p=.157$; $\chi^2/\text{df}=1.246$; CFI=.984; RMSEA=.041 (90% CI=.000-.078); and SRMR=.053. Additionally, the Bollen-Stine bootstrap analysis demonstrated that in 343 (of 1,000) bootstrap samples, the model fit worse or failed to fit; thus, the null hypothesis that the assessed model was correct was retained ($p=.343$).

The 10 items of the PROMIS-Global Health were significant parameter estimates model (see Table 13). All 95% bootstrap CIs for standardized and unstandardized regression weights did not include 0, which supports the fact that the parameter estimates were significantly different from 0. The latent construct of “HRQoL” accounted for the most variance in item #2 (66%) and the least variance in item #7 (9%). As “HRQoL” increases by 1 standard deviation, nine items on the PROMIS-Global Health items demonstrated acceptable convergence and are expected to increase by .418 to .811 standard deviations. Although the standardized regression weight for #8 (i.e., .295) fell below the acceptable cut-off of .400, the upper cut-off of its 95% bootstrap CI was above .400; thus, it was retained in the model.

Exploratory Measurement Model Analysis

The hypothesized measurement model was respecified to reflect the good fit latent models from the independent CFAs (see Figure 4) and included: the hypothesized BRIEF model; the hypothesized PROMIS-Anxiety and PROMIS-Depression model; the respecified PSEQ model; the respecified STARx self-management model (which only included the 4 items of the medication management subscale); and the respecified PROMIS-Global Health model. The analysis of the fit of the respecified measurement model was underpowered (i.e., 1:1 parameters to cases ratio) and considered exploratory; thus, results should be interpreted with caution. The respecified measurement model demonstrated poor fit to the data: $\chi^2(570)=854.882$, $p<.001$; $\chi2/\text{df}=1.500$; CFI=.873; RMSEA=.093 (90% CI=.086-.100); and SRMR=.091 (see Table 14). The Bollen-Stine bootstrap analysis demonstrated that in 47 (of 1,000) bootstrap samples, the model fit worse or failed to fit; thus, the null hypothesis that the assessed model was correct was rejected ($p=.047$). Post-hoc modification indices were not examined due to lack of power for these analyses. The lack of a good fitting measurement model precluded analysis of the structural model (Kline, 2015).

Discussion

The BRIEF (Haun et al., 2009), PROMIS-Anxiety and PROMIS-Depression scales (Irwin et al., 2010), PSEQ (Nicholas, 2007), and PROMIS-Global Health (Hays et al., 2009) have demonstrated validity in assessing health literacy, anxiety and mood symptoms, pain self-efficacy, and HRQoL, respectively, in chronic pain, adult, and/or clinical samples. However, this is the first study to the author's knowledge to provide preliminary validation of these measures in a sample of community-recruited, emerging adults with chronic pain. Although replication of analyses is required in a larger and more diverse sample, results are promising for more widespread use of the BRIEF (Haun et al., 2009), PROMIS-Anxiety and PROMIS-Depression scales (Irwin et al., 2010), PSEQ (Nicholas, 2007), and PROMIS-Global Health (Hays et al., 2009) among emerging adults with chronic pain in both clinical and research settings. This study also found that only the medication management subscale of the STARx self-management domain fit well to the data; thus, highlighting a need for further research regarding the development and validation of non-categorical measures that adequately capture the self-management needs and requirements of emerging adults with varying types and severities of chronic health conditions, including chronic pain. Additionally, further research is warranted in order to understand the relationships among these latent constructs and to inform interventions aimed to promote more successful health care transition for emerging adults with chronic pain.

Clinical Implications of Preliminary Measure Validations

Inadequate health literacy can negatively impact adherence, as well as management of health concerns, and is estimated to require $73 billion in additional health care costs per year (Kirsch et al., 1993). Health literacy impacts one's access to, communication with, and navigation of the health care system (Nutbeam, 2008) and is likely vital for successful health care transition (Crowley et al., 2011; Gabriel et al., 2017). Further, pain research suggests that higher health literacy may be an important protective factor that is associated with less pain intensity and more effective pain management (Koppen et al., 2018). However, minimal research has examined the impact of health literacy among adolescents and emerging adults (Sansom-Daly et al., 2016). In order to facilitate effective and timely interventions that promote a high quality and cost-efficient health care experience, health care providers require brief tools for detecting inadequate health literacy among their patients, such as the BRIEF (Haun et al., 2009), which has previously demonstrated reliability and validity in adults recruited from ambulatory care settings. The results of the current study suggest that the BRIEF is also likely a viable option for the assessment of health literacy among emerging adults with chronic pain. The BRIEF could aid in identification of inadequate health literacy in primary care or community clinic settings and inform early interventions focused on health decision-making, the health care transition process, and pain management (Crowley et al., 2011; Gabriel et al., 2017; Koppen et al., 2018), which in turn could promote adolescents' and emerging adults' self-management abilities and competence during this transitional period (Farley, 2020).

Adolescents (Noel et al., 2016) and emerging adults (Brown et al., 2021) with chronic pain are more likely than their healthy peers to have anxiety and/or mood symptoms. Poor psychological functioning in children and adolescents has been shown to compound the negative effects of chronic pain as it is associated with maladaptive coping skills and greater functional disability (Bursch et al., 2006; Kalapurakkel et al., 2015; Tomlinson et al., 2017). The PROMIS-Anxiety and PROMIS-Depression scales (Irwin et al., 2010) have demonstrated reliability and validity among adult chronic pain patients (Kroenke et al., 2014). The current study additionally provides preliminary validation of the PROMIS-Anxiety and PROMIS-Depression scales among community-recruited emerging adults with chronic pain. Brief screening measures of psychological functioning for emerging adults with chronic pain are vital for early identification of at-risk individuals, as well as early intervention to promote psychological functioning and successful health care transition. Further, these brief screening measures can be repeatedly administered to allow for assessment of changes in anxious and depressive symptoms over time (Cella et al., 2007). Thus, the PROMIS-Anxiety and PROMIS-Depression scales offer a viable option for screening and tracking of psychological functioning across the health care transition process for emerging adults with chronic pain.

Greater pain self-efficacy is associated with fewer anxious and mood symptoms (Bursch et al., 2006; Kalapurakkel et al., 2015; Tomlinson et al., 2017) and increased use of active coping skills (Nicholas, 2007). Pain self-efficacy has also been shown to effectively interrupt the fear-avoidance cycle (Carpino et al., 2014; Woby et al., 2007), contribute to lower functional disability (Kalapurakkel et al., 2015), and identify individuals who may be more likely to respond well to rehabilitative interventions (Nicholas, 2007). The PSEQ (Nicholas, 2007) has been validated among 13- to 80-year-olds with chronic low back pain recruited from clinical settings. However, there is a lack of research examining the validity of the PSEQ among community emerging adults with chronic pain, who may have less severe, but potentially more poorly managed, chronic pain (Department of Child and Adolescent Health and Development [CAH], 2007) than clinical samples. The results of the current study provide preliminary support for screening with the PSEQ among emerging adults with sub-clinical and clinical chronic pain in order to identify individuals who may require additional interventions aimed to promote their self-efficacy. Research in sickle cell disease populations suggests a positive association between self-efficacy, transition readiness, and self-management (Molter & Abrahamson, 2015; Treadwell et al., 2015); thus, screening and intervention focused on pain self-efficacy in primary care and community clinic settings could have widespread positive effects on health outcomes for emerging adults with chronic pain undergoing health care transition.

HRQoL is a well-established predictor of health outcomes across the lifespan (Novianti et al., 2020; Rendas-Baum et al., 2019; Megari, 2013). Diagnosis and management of a chronic health condition has been shown to negatively impact HRQoL (Ingerski et al., 2010), especially for individuals with more than one chronic health condition (Bai et al., 2017). Chronic pain is often accompanied by functional disability (Salamon et al., 2014), as well as physical and psychological health comorbidities (Treede et al., 2019). Recent research has shown that chronic pain has a greater negative impact on HRQoL than other chronic health conditions (Hadi et al., 2019). The PROMIS-Global Health (Hays et al., 2009) is a widely used measure of HRQoL that has demonstrated reliability and validity in both community and clinical adult samples. The PROMIS-Global Health demonstrated good fit to the data in the current study and shows promise as a HRQoL screener among emerging adults with chronic pain. Early identification of individuals with poor HRQoL could lead to interventions aimed to promote factors associated with HRQoL, such as pain self-efficacy (Nicholas, 2007) and self-management (Sawin et al., 2009).

Self-management skills are vital for optimal adherence, effective management of one's condition, and successful health care transition (Ryan & Sawin, 2009; Sawin et al., 2009). Emerging adults may need to engage in medical, cognitive, behavioral, and/or social self-management strategies to effectively manage their chronic pain (Davey, 2016; Friedrichsdorf et al., 2016; Liossi & Howard, 2016; Rabin et al., 2017), as they transition from family to individual self-management (Ryan & Sawin, 2009). The STARx (Ferris et al., 2015) is a measure of transition-related knowledge and skills that has demonstrated reliability and validity (Cohen et al., 2015) in adolescents and young adults (i.e., 12- to 25-year-olds) with chronic health conditions (e.g., chronic kidney disease, inflammatory bowel disease, and cystic fibrosis). The self-management domain of the STARx did not demonstrate adequate fit to the data from the current study. However, post-hoc analyses examined the medication management subscale of the STARx self-management domain, which demonstrated excellent fit to the sample data.

In its initial development (Ferris et al., 2015) the medication management subscale of the STARx self-management domain accounted for the greatest variance in composite STARx scores. However, the importance of medication management likely varies depending upon the severity of one's condition and the complexity of the medication regimen (CAH, 2007). Further, medication management is not always a necessary component of self-management, especially among community or sub-clinical populations. In the current sample of community-recruited emerging adults with chronic pain, one-third of participants reported not currently taking any medication, which was scored as a "5" on each item for the medication management subscale of the STARx and considered indicative of better self-management abilities according to the author guidelines (Ferris et al., 2015). Individuals who were currently taking medication were automatically assumed to have poorer self-management abilities (specifically as it related to their medication management) than those who were not currently taking medication, as they could only receive a maximum score per item on the medication management subscale of the STARx of "4". Further research is warranted to assess the validity of this scoring approach to the medication management items, as an absence of medications to manage may not necessarily indicate better self-management abilities, especially among community emerging adults with less severe chronic health conditions who may not be prescribed medications. If an individual is not currently prescribed any medication, it would be important to consider their previous ability to self-manage medications, as well as their past and present ability to self-manage other pertinent treatment regimens (e.g., lifestyle modifications).

Ultimately, additional research is necessary to assess the validity of the STARx, and, in particular, the self-management domain of the STARx, among: 1) community emerging adults with likely less severe (but potentially more poorly managed) health concerns; 2) emerging adults who do not take medication; and 3) emerging adults with chronic pain. Further, the results of the current study highlight the need for continued research focus on measure development and validation regarding self-management skills and transition readiness among adolescents and emerging adults (Schwartz et al., 2014).

Measures of Self-Management and Transition Readiness

Currently, there is a dearth of reliable and valid measures of self-management and transition readiness to predict health outcomes for adolescents and emerging adults in the midst of health care transition (Schwartz et al., 2014), which has significantly limited research in this area. More specifically, there is a lack of measures that could be used across conditions and, in particular, among individuals with less severe conditions, as well as across the entirety of the health care transition process (i.e., early adolescence to the end of emerging adulthood; Parfeniuk et al., 2020). While certain characteristics of transition readiness and self-management are disease-specific (e.g., disease knowledge, complex treatment regimens), there are many important components that are likely not disease-specific (e.g., health literacy, self-efficacy, and general health care knowledge; Schwartz et al., 2011). Further research is warranted to discern whether a disease-specific, non-categorical, or combined approach is most appropriate in reliably and validly assessing self-management and transition readiness among adolescents and emerging adults with chronic health conditions. The following is an abbreviated summary of the existing self-management and transition readiness measure development and validation literature (for review see Parfeniuk et al., 2020).

A large body of health care transition research has focused on type 1 diabetes, which has unique medical management requirements (e.g., frequent monitoring of blood sugar levels, daily lifestyle modifications; American Diabetes Association, 2011). Examples of measures of self-management and transition readiness that have been validated among adolescents and/or emerging adults with type 1 diabetes include the Self-Management of Type 1 Diabetes in

Adolescents (SMOD-A; Schilling et al., 2009) and Diabetes Self-Management Questionnaire (DSMP; Schmitt et al., 2013). Other measures related to self-management and transition readiness for type 1 diabetes populations have focused on constructs such as resilience (Diabetes Strengths and Resilience [DSTAR-Teen]; Hilliard et al., 2017), problem-solving abilities (Diabetes Adolescent Problem Solving Questionnaire [DAPSQ]; Mulvaney et al., 2014), self-care (Self-Care Inventory [SCI]; La Greca et al., 1988), and adherence barriers (Barriers to Diabetes Adherence [BDA]; Mulvaney et al., 2011).

Other populations have warranted development of their own disease-specific measures to assess self-management and transition readiness during adolescence and/or emerging adulthood, such as sickle cell disease (e.g., Transition Intervention Program – Readiness for Transition [TIP-RFT]; Treadwell et al., 2016), organ transplantation (e.g., Responsibility and Familiarity with Illness Survey [REFILS]; Annunziato et al., 2018), cancer (e.g., Transition Scales; Klassen et al., 2014), cystic fibrosis (e.g., Cystic Fibrosis Health Care Transition Readiness Scale; Dudman et al., 2011), spina bifida (e.g., Spina Bifida Self-Management Profile [SBSMP]; Wysocki & Gavin, 2006), and epilepsy (e.g., Adolescent Epilepsy Medication Self-Management Questionnaire [AEMSQ]; Carbone et al., 2013).

There has also been a growing number of non-categorical measures of self-management and transition readiness among adolescent and emerging adult populations; however, there are limitations in their utilization with community samples undergoing health care transition due to the normed populations, validated age ranges, and emphasis on medication management. The Readiness for Transition Questionnaire (RTQ) was normed among kidney transplant (Gilleland et al., 2012) and sickle cell disease (Speller-Brown et al., 2015) populations and further validation with a wider range of chronic health condition types and severities is likely required.

The majority of non-categorical self-management and transition readiness measures include items or subscales specific to medication management. Some of the measures are specific to medication adherence (e.g., Medication Adherence Measure [MAM]; Zelikovsky & Schast, 2008) and medication communication (e.g., Communication About Medications by Providers – Adolescent and Young Adult Version [CAMP-AYA]; Plevinsky et al., 2019). Other measures are only validated for adolescents, not emerging adults (e.g., TRANSITION-Q; Klassen et al., 2015). The UNC TR(x)ANSITION Questionnaire (Ferris et al., 2012) is considered a well-established non-categorical measure of self-management and transition readiness from the perspective of health care providers. The Transition Readiness Assessment Questionnaire (TRAQ; Wood et al., 2014) is considered one of the most well-established transition readiness measures (Parfeniuk et al., 2020) and has undergone multiple adaptations with the most recent (i.e., 5.0; Johnson et al., 2021) being validated for 16- to 26-year-olds with special health care needs. The STARx (Ferris et al., 2015) is currently the non-categorical self-management and transition readiness measure with the widest age range of validation that spans early adolescence through emerging adulthood (i.e., 12 to 25 years), which was the reason it was selected for use in the current study.

This brief review of the literature draws attention to the need for further research on measure development and validation related to self-management and transition readiness in order to advance health care transition research and interventions (Parfeniuk et al., 2020). This will likely require re-evaluation of: 1) whether a disease-specific, non-categorical, or combined approach is most appropriate; 2) whether emphasis should continue to be on medication management; and 3) what the most important contributing factors are for successful health care transition for adolescents and emerging adults with chronic health conditions.

Limitations

The results of the current study must be interpreted within the context of its limitations. A few limitations related to the sample utilized in the current study. The homogeneity of the sample likely limits the generalizability of the findings, as most participants identified as White and well-educated. Study replication with a more diverse sample is necessary in order to inform the extent of the generalizability of the current study's results. Further, the results are specific to community-recruited emerging adults, who may have less severe and more poorly managed chronic pain (CAH, 2007) than a clinical sample. In the development and validation of non-categorical, as well as disease-specific, self-management measures to advance health care transition research, it will be important to continue to explore the unique experiences of community versus clinical samples. Additionally, only two-thirds of participants indicated that they had experienced continuous chronic pain through the transition from adolescence into emerging adulthood. Thus, results likely more accurately reflect the utility of these measures in samples of emerging adults with chronic pain, but not necessarily as they undergo the health care transition process.

Other limitations of the current study included the format and timing of data collection. All data was collected via anonymous self-report online survey; thus, the data may have been influenced by false and/or socially desirable responses. Measures for the current study were generally non-invasive and, thus, less likely to illicit false and/or socially desirable responses. In order to further encourage participants to provide accurate information, they were informed that their responses were anonymous and confidential, they could skip questions that they felt uncomfortable answering, and their participation was voluntary prior to beginning the online survey. All data collection occurred during the COVID-19 pandemic, which has known (e.g., Osuch et al., 2021; Plevinsky et al., 2020; Shigeto et al., 2021) and likely additional unknown impacts on: 1) the health care transition process for emerging adults; 2) the experience and management of chronic pain; and 3) overall psychosocial functioning. Thus, results must be interpreted within the evolving context of the ongoing international pandemic.

There were also limitations due to the sample size and data analytic approach utilized. The small sample size of the current study was sufficient for individual measure validations, which is an important first step of SEM; however, it precluded analysis of the hypothesized measurement and structural models using SEM (Kline, 2015). Amos (Arbuckle, 2014) was selected for data analyses due to its accessibility and user-friendliness; however, Amos only allows for correction of missing data (using full-information maximum likelihood) or non-normal data (using bootstrapping or Bayesian statistical analyses), but not both concurrently. This limitation of Amos further contributed to the small sample size because listwise deletion of participants with missing data was used, so that multivariate skew could be addressed. Additional data collection, revision of the hypothesized model, and/or alteration of the data analytic approach is required to fully assess the relationship among the latent constructs in a sample of community-recruited emerging adults with chronic pain.

Future Directions

Despite its limitations, the current study provided preliminary validation of study measures among community-recruited emerging adults with chronic pain. Further, the findings of the current study contribute to the identified gap in the literature regarding health care transition for adolescents and emerging adults with chronic pain (Forgeron et al., 2017; Higginson et al., 2019) and provide invaluable information to guide future health care transition research.

The health care transition process spans early adolescence through emerging adulthood and is important for all individuals, but particularly for those with chronic health conditions (Devine et al., 2018). Thus, study replication and comparison are required among clinical chronic pain samples and among adolescent chronic pain samples. Replication of the current study with a clinical chronic pain sample could inform tailored interventions to support emerging adults with chronic pain through the health care transition process based on the context and/or severity of their chronic pain (i.e., clinical versus sub-clinical). Additionally, replication of the current study with an adolescent chronic pain sample would allow for investigation of differential experiences across the health care transition process based on developmental level. Further, in order to better understand the relationships among latent constructs, future research should utilize longitudinal, rather than cross-sectional designs. While longitudinal data collection would require additional resources and time, it also would allow for analysis of causal relationships among latent constructs related to health care transition. Specifically, individuals with chronic pain could be enrolled in early adolescence and followed through emerging adulthood in order to observe relationships among latent constructs across the health care transition process.

In the current study, only select components of IFSMT (Ryan & Sawin, 2009) were analyzed and the relationships among latent constructs were unable to be assessed due to small sample size. Future research with a larger sample size could examine the hypothesized model among emerging adults with chronic pain. Alternatively, as IFSMT is complex and research based in IFSMT is relatively novel, future research could utilize a non-categorical approach to examine the utility of IFSMT in predicting health outcomes among emerging adults with chronic health conditions broadly. Multiple regression or machine learning approaches may be better suited to examine the relationships among all of the many components of IFSMT and identify components with the strongest predictive ability of health outcomes among emerging adults with chronic health conditions. These approaches could then inform health care transition research with disease-specific (e.g., chronic pain) emerging adult populations focused on the most important components of IFSMT. Ultimately, future health care transition research likely requires larger sample sizes, extensive longitudinal data collection, and multiple data collection sites in order to inform further health care transition research and intervention.

Finally, there is a clear need for further development and validation of self-management and transition readiness measures, particularly among adolescents and emerging adults with chronic health conditions that vary in severity and type. Existing measures of self-management and transition readiness will be helpful in informing measure development; however, it will also be important to identify components of self-management that may be over- (e.g., medication management) or under-represented (e.g., general health care navigation knowledge skills) in existing measures. The development of non-categorical measures that could be used in combination with disease-specific measures, if applicable, would allow for more widespread data collection on health care transition experiences among adolescents and emerging adults with and without chronic health conditions and inform health care transition interventions.

Conclusions

Approximately 5% to 30% of adolescents and emerging adults undergo health care transition with chronic pain (Brown et al., 2021). In addition to standard barriers to successful health care transition (e.g., limited availability and training of providers, transition-related anxiety, and finances [Gray et al., 2018; Okumura et al., 2010; Schwartz et al., 2014]), emerging adults with chronic pain additionally have to manage pain-related stigma (Wakefield et al., 2018), physical and psychological comorbidities (Treede et al., 2019), functional disability, and significantly decreased HRQoL (Salamon et al., 2014). The current study partially addressed an identified gap in the literature regarding health care transition for adolescents and emerging adults with chronic pain (Forgeron et al., 2017; Higginson et al., 2019) utilizing SEM and the IFSMT. Findings provide preliminary validation of measures of health literacy, psychological functioning, pain self-efficacy, and HRQoL among community-recruited emerging adults with chronic pain that could be used to identify individuals who may be at risk for poorer health outcomes. Additionally, findings highlight the need for development of reliable and valid self-management and transition readiness measures that can be used across types and severities of chronic health conditions. Future longitudinal research designs utilizing valid and reliable measures of self-management and transition readiness is necessary to better understand the complicated, yet inevitable, process of health care transition and inform the development of tailored interventions to promote more successful health care transition.

Figure 1. Depiction of the Individual and Family Self-Management Theory (IFSMT; Ryan & Sawin, 2009)

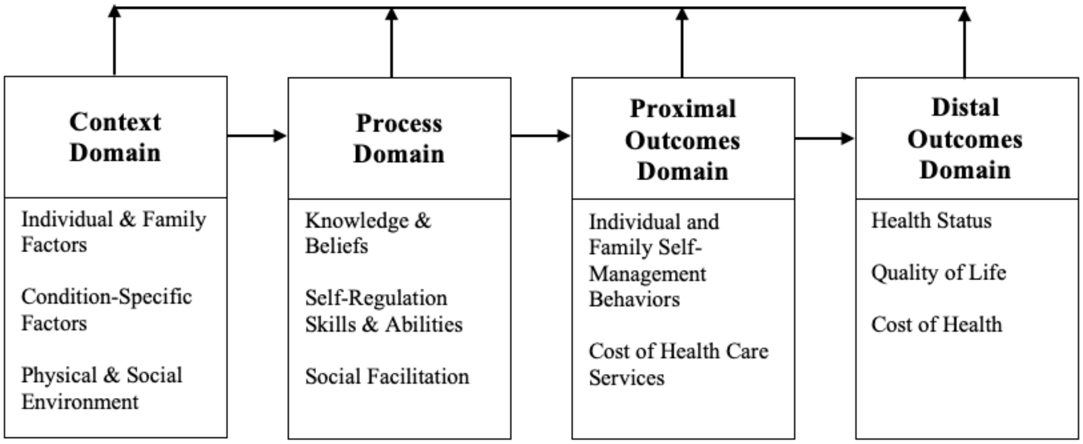

Figure 2. Hypothesized measurement model

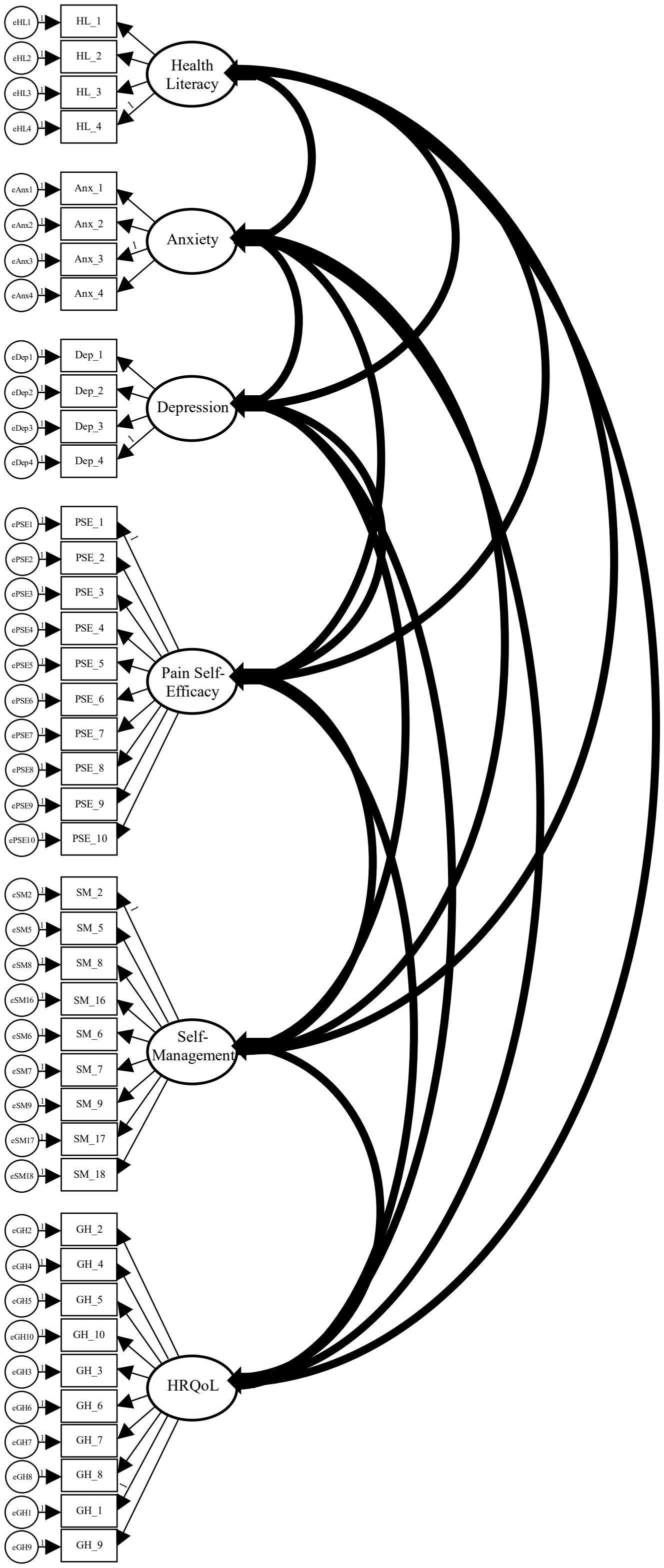

Figure 3. Hypothesized structural model

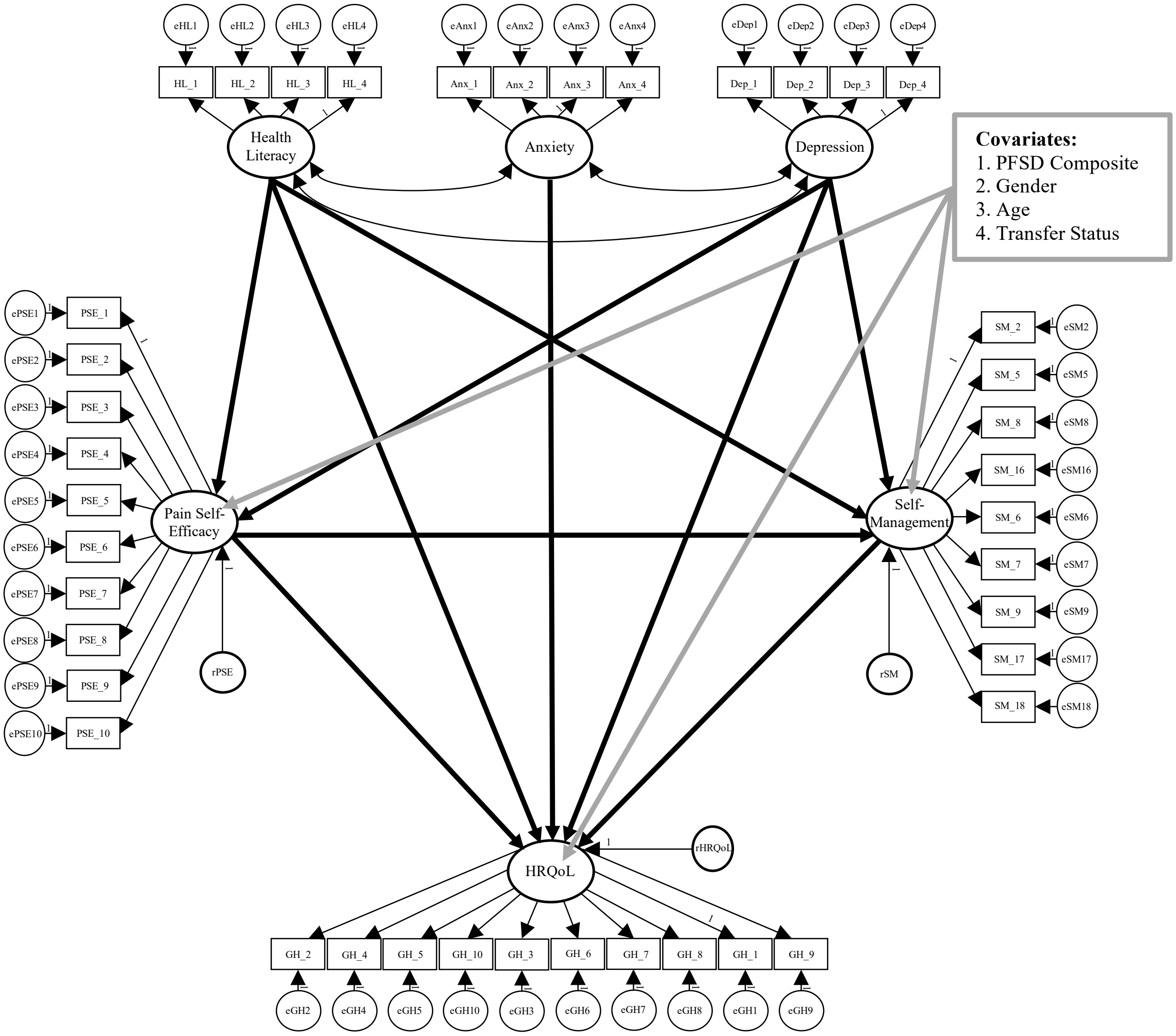

Figure 4. Assessed measurement model (*n*=138)

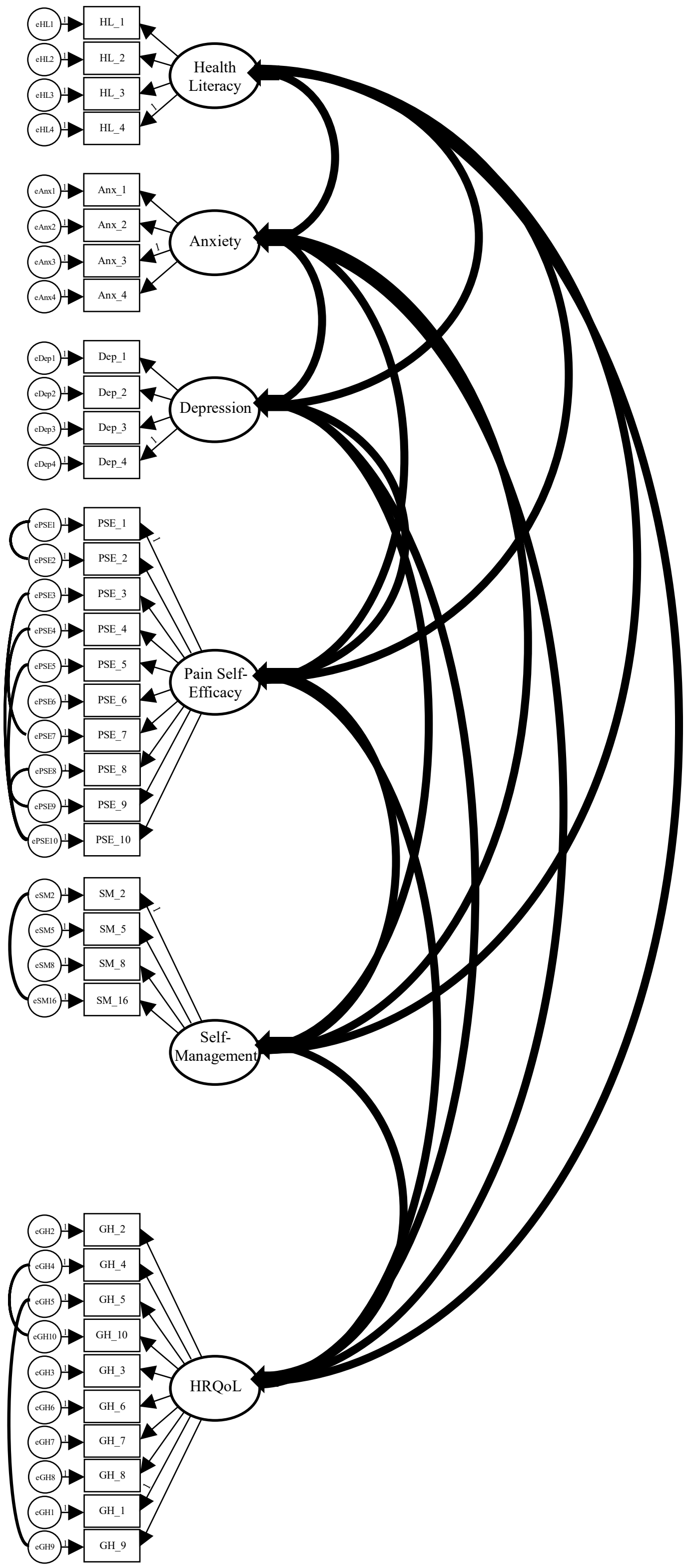

Table 1. Participant demographic information (*N*=211)

Characteristic	*n*	Percentage
Age (M_{years}=21.95, *SD*=1.93)		
Education Level (M_{years}=13.96, *SD*=2.34)		
Less than 12 years	18	8%
12 years – High School Graduate	27	13%
13-15 years – Some College	111	53%
16 years – College Degree	45	21%
More than 16 years	10	5%
Socioeconomic Status (*M*=5.50, *SD*=1.89, range=0-10)		
Gender		
Female	139	66%
Male	69	33%
Non-Binary	3	1%
Race/Ethnicity[a]		
Caucasian/White	166	79%
Latino/a	23	11%
African American/Black	15	7%
Asian (including South Asian and Southeast Asian)	9	4%
Native American	7	3%
Different race/ethnicity	6	3%
Middle Eastern	4	2%
Pacific Islander	2	1%
Multiracial	29	14%
Relationship Status		
Partnered but not married	113	54%
Single, never married, not currently partnered	90	43%
Married	7	3%
Divorced	1	<1%
Parent Status		
No children	198	94%
One or more children	13	6%
Sexual Orientation		
Straight	151	72%
Bisexual	40	19%
Gay/Lesbian	7	3%
Different Orientation	13	6%
Student Status		
Full-time college student	103	49%
Non-student	83	39%
Part-time college student	18	9%
High school student	7	3%
Current Living Situation		
Outside Family Home	132	63%
Live with roommate(s)	*59*	*28%*
Live with spouse/romantic partner	*48*	*23%*
Live alone	*24*	*11%*
Inside Family Home with one or more parents/guardians	79	37%

Note. Some percentages may not sum to 100 due to rounding error and intermittent missing responses.

[a] For the Summer 2020 and Fall 2020 semesters, participants were only allowed to select one racial/ethnic identity from a list that included an option of "multiracial". For the Spring 2021 semester, participants were allowed to select all that applied regarding the same list of racial/ethnic identities. For the Spring 2021 semester, participants who selected more than one racial/ethnic identity (*n*=23) were coded under their reported identities, as well as under "multiracial".

Table 2. Pain-related descriptives

Characteristic	Description/Examples	*n*	Percentage
Pain Duration (*n*=147)	M_{years}=5.53, *SD*=3.66		
Less than 1 year	-	9	6%
More than 1 year[a]	-	138	94%
1-4 years	-	*45*	*31%*
5-9 years	-	*58*	*39%*
10+ years	-	*23*	*16%*
Pain Location (*n*=179)			
Back	Back or spine	69	39%
Extremities	Arms, legs, shoulders, and ankles	54	30%
Head	Head, jaw, and neck	47	26%
Abdomen	Gastrointestinal and stomachaches	23	13%
Trunk	Chest and hips	20	11%
Other	Nerves, non-concentrated, and full body	12	7%
Multiple	Coded into two or more of the above categories	43	24%
Not Specified	Did not specify the location(s) of pain	22	12%
Pain Etiology (*n*=179)			
Underlying physical health condition	Arthritis, fibromyalgia, and irritable bowel syndrome	61	34%
Injury	"Wear and tear" and sports-related or accidental injury	40	22%
Post-operation or post-treatment	Resulting from effects of radiation, chemotherapy, and surgery	11	6%
Underlying psychological health condition	Depression, anxiety, and "stress" broadly	8	4%
Anatomical	Bone spurs and cysts	4	2%
Other	Lifestyle factors and genetics	8	4%
Multiple pain causes	Coded into two or more of the above categories	15	8%
Unknown	Unsure of the cause(s) of pain	5	3%
Not specified	Did not specify the cause(s) of pain	59	33%

Note. Percentages do not sum to 100 because participant free responses could be coded into multiple categories.

[a] 12 respondents (8%) indicated "years" without a specified number, so were coded as "more than 1 year", but not coded into a sub-category.

Table 3. Prevalence of comorbid chronic physical and psychological conditions (*N*=211)

Comobidities	*n*	Percentage
Comorbid Chronic Health Condition Status	162	77%
One Comorbid Condition	34	16%
Two or More Comorbid Conditions	128	61%
Physical Health Conditions	111	53%
Asthma	48	23%
Chronic headache/migraine	30	14%
Recurrent abdominal pain/Irritable bowel syndrome	24	11%
Arthritis/Rheumatological Condition	17	8%
Food Allergy	17	8%
Obesity	16	8%
Epilepsy/Seizure disorder	5	2%
Heart disease	4	2%
Inflammatory Bowel Disease	3	1%
Celiac disease	3	1%
Cancer/Cancer Survivor	2	1%
Type 1 Diabetes	2	1%
Type 2 Diabetes	1	<1%
Other Physical Health Condition	23	11%
Psychological Health Conditions	141	67%
Anxiety	120	57%
Depression	103	49%
Attention-deficit/hyperactivity disorder (ADHD)	44	21%
Eating Disorder	17	8%
Other Psychological Health Condition	17	8%
Both Physical and Psychological Health Conditions	92	44%

Note. Percentages do not sum to 100 because participants were allowed to select all chronic health conditions that applied.

Table 4. Goodness of fit statistics for the Brief Health Literacy Screening Tool (BRIEF; Haun et al., 2009; *n*=152)

	χ^2			χ^2/df	Bollen-Stine	CFI	RMSEA			SRMR	Fit
Model	Statistic	df	*p*-value	Statistic	*p*-value	Statistic	Statistic	90% CI	*p*-value	Statistic	Description
Hypothesized	.312	2	.850	.156	.850	1.000	0	.000-.087	.898	.012	Excellent

Table 5. Parameter estimates for the hypothesized Brief Health Literacy Screening Tool (BRIEF; Haun et al., 2009; *n*=152)

	Unstandardized						Standardized			Squared Multiple Correlations		
Variable	Estimate	S.E.	C.R.	*p*-value	95% CI	*p*-value	Estimate	95% CI	*p*-value	Estimate	95% CI	*p*-value
Regression Weights												
HL_1←Health Literacy (HL)	.979	.273	3.590	<.001	.509-1.713	.002	.388	.184-.585	.002	.151	.034-.342	.002
HL_2←HL	1.797	.400	4.488	<.001	1.245-3.462	.001	.937	.811-1.108	.002	.878	.657-1.228	.002
HL_3←HL	1.329	.277	4.803	<.001	.919-2.414	.001	.723	.520-.873	.004	.522	.271-.762	.004
HL_4←HL	1.000	-	-	-	1.000-1.000	-	.413	.223-.551	.003	.171	.050-.303	.003
Variances												
HL	.214	.087	2.454	.014	.066-.413	.002	-	-	-	-	-	-
eHL1	1.156	.138	8.405	<.001	.793-1.543	.001	-	-	-	-	-	-
eHL2	.096	.092	1.048	.295	-.181-.253	.397	-	-	-	-	-	-
eHL3	.346	.064	5.435	<.001	.162-.583	.001	-	-	-	-	-	-
eHL4	1.042	.124	8.374	<.001	.803-1.325	.001	-	-	-	-	-	-

Table 6. Goodness of fit statistics for the PROMIS-Anxiety and PROMIS-Depression scales (Irwin et al., 2010; *n*=149)

	χ^2			χ^2/df	Bollen-Stine	CFI	RMSEA			SRMR	Fit
Model	Statistic	df	*p*-value	Statistic	*p*-value	Statistic	Statistic	90% CI	*p*-value	Statistic	Description
Hypothesized	29.751	19	.055	1.566	.132	.988	.062	.000-.103	.296	.035	Excellent

Table 7. Parameter estimates for the hypothesized PROMIS-Anxiety and PROMIS-Depression scales (Irwin et al., 2010; *n*=149)

	Unstandardized						Standardized			Squared Multiple Correlations		
Variable	Estimate	S.E.	C.R.	*p*-value	95% CI	*p*-value	Estimate	95% CI	*p*-value	Estimate	95% CI	*p*-value
Regression Weights												
Anx_1←Anxiety (Anx)	.726	.086	8.459	<.001	.545-.911	.002	.647	.522-.763	.002	.419	.273-.582	.002
Anx_2←Anx	1.023	.076	13.516	<.001	.865-1.189	.002	.861	.724-.931	.006	.741	.525-.868	.006
Anx_3←Anx	1.000	-	-	-	1.000-1.000	-	.871	.791-.923	.004	.758	.626-.852	.004
Anx_4←Anx	.857	.074	11.638	<.001	.704-1.031	.001	.800	.702-.877	.001	.640	.492-.769	.001
Dep_1←Depression (Dep)	.956	.061	15.695	<.001	.856-1.061	.003	.882	.822-.927	.003	.778	.676-.859	.003
Dep_2←Dep	.958	.063	15.221	<.001	.795-1.064	.007	.869	.742-.931	.007	.756	.551-.867	.007
Dep_3←Dep	.933	.065	14.378	<.001	.834-1.037	.002	.846	.782-.891	.002	.715	.612-.794	.002
Dep_4←Dep	1.000	-	-	-	1.000-1.000	-	.899	.842-.936	.003	.808	.709-.877	.003
Variances												
Anx	.931	.144	6.457	<.001	.687-1.219	.001	-	-	-	-	-	-
Dep	1.227	.177	6.943	<.001	.973-1.537	.001	-	-	-	-	-	-
eAnx1	.680	.087	7.859	<.001	.498-.883	.001	-	-	-	-	-	-
eAnx2	.340	.058	5.861	<.001	.177-.600	.001	-	-	-	-	-	-
eAnx3	.297	.053	5.631	<.001	.195-.460	<.001	-	-	-	-	-	-
eAnx4	.384	.057	6.785	<.001	.256-.548	.002	-	-	-	-	-	-
eDep1	.320	.050	6.408	<.001	.210-.468	.001	-	-	-	-	-	-
eDep2	.364	.055	6.640	<.001	.200-.689	<.001	-	-	-	-	-	-
eDep3	.426	.061	6.985	<.001	.327-.577	.001	-	-	-	-	-	-
eDep4	.291	.049	5.964	<.001	.194-.432	.001	-	-	-	-	-	-
Covariances												
Anx←→Dep	.790	.124	6.394	<.001	.606-1.012	.001	-	-	-	-	-	-
Correlations												
Anx←→Dep	.739	-	-	-	.617-.827	.003	-	-	-	-	-	-

Table 8. Goodness of fit statistics for the Pain Self-Efficacy Questionnaire (PSEQ; Nicholas, 2007; *n*=168)

	χ^2			χ^2/df	Bollen-Stine	CFI	RMSEA			SRMR	Fit
Model	Statistic	df	*p*-value	Statistic	*p*-value	Statistic	Statistic	90% CI	*p*-value	Statistic	Description
Hypothesized	152.783	35	<.001	4.365	.001	.895	.142	.119-.165	<.001	.058	Poor
Respecified #1	114.173	34	<.001	3.358	.002	.929	.119	.095-.143	<.001	.051	Poor
Respecified #2	96.348	33	<.001	2.920	.017	.944	.107	.083-.132	<.001	.049	Poor
Respecified #3	84.944	32	<.001	2.654	.047	.953	.100	.074-.126	.001	.047	Mediocre
Respecified #4	75.290	31	<.001	2.429	.088	.961	.092	.066-.119	.006	.045	Mediocre
Respecified #5	67.409	30	<.001	2.247	.132	.967	.080	.053-.108	.027	.043	Good

Note. Respecifications included adding the following parameter estimates of the covariance among error terms for: item #4 and item #7 (respecified model #1), item #1 and item #2 (respecified model #2), item #5 and item #10 (respecified model #3), item #3 and item #10 (respecified model #4), and item #8 and item #9 (respecified model #5).

Table 9. Parameter estimates for the respecified Pain Self-Efficacy Questionnaire (PSEQ; Nicholas, 2007; *n*=168)

	Unstandardized						Standardized			Squared Multiple Correlations		
Variable	Estimate	S.E.	C.R.	*p*-value	95% CI	*p*-value	Estimate	95% CI	*p*-value	Estimate	95% CI	*p*-value
Regression Weights												
PSE_1←Pain Self-Efficacy (PSE)	1.000	-	-	-	1.000-1.000	-	.701	.587-.789	.003	.491	.345-.623	.003
PSE_2←PSE	1.132	.111	10.223	<.001	.937-1.381	.001	.714	.600-.802	.002	.510	.360-.643	.002
PSE_3←PSE	1.291	.137	9.419	<.001	1.072-1.587	.002	.771	.666-.840	.003	.594	.443-.706	.003
PSE_4←PSE	1.115	.117	9.572	<.001	.892-1.390	.002	.775	.662-.856	.004	.601	.439-.733	.004
PSE_5←PSE	1.220	.127	9.598	<.001	.986-1.531	.001	.791	.675-.860	.003	.625	.456-.739	.003
PSE_6←PSE	1.458	.137	10.661	<.001	1.251-1.746	.002	.862	.781-.910	.004	.743	.611-.828	.004
PSE_7←PSE	1.252	.170	7.381	<.001	.971-1.638	.002	.594	.471-.696	.003	.353	.221-.485	.003
PSE_8←PSE	1.271	.131	9.728	<.001	1.045-1.599	.002	.788	.694-.850	.004	.622	.481-.722	.004
PSE_9←PSE	1.302	.133	9.803	<.001	1.051-1.671	.002	.796	.713-.848	.005	.633	.509-.720	.005
PSE_10←PSE	1.318	.148	8.891	<.001	1.056-1.720	.001	.742	.629-.826	.003	.551	.396-.682	.003
Variances												
PSE	1.024	.202	5.082	<.001	.634-1.441	.002	-	-	-	-	-	-
ePSE1	1.062	.125	8.532	<.001	.806-1.360	.001	-	-	-	-	-	-
ePSE2	1.260	.147	8.563	<.001	.992-1.587	.001	-	-	-	-	-	-
ePSE3	1.167	.149	7.842	<.001	.850-1.635	.001	-	-	-	-	-	-
ePSE4	.845	.102	8.301	<.001	.536-1.343	.001	-	-	-	-	-	-
ePSE5	.914	.117	7.784	<.001	.658-1.331	.001	-	-	-	-	-	-
ePSE6	.751	.100	7.487	<.001	.484-1.176	.001	-	-	-	-	-	-
ePSE7	2.945	.334	8.815	<.001	2.274-3.618	.001	-	-	-	-	-	-
ePSE8	1.007	.124	8.116	<.001	.733-1.451	.001	-	-	-	-	-	-
ePSE9	1.006	.124	8.133	<.001	.775-1.386	.001	-	-	-	-	-	-
ePSE10	1.450	.185	7.853	<.001	1.010-2.069	.001	-	-	-	-	-	-
Covariances												
ePSE4←→ePSE7	.359	.135	2.654	.008	.037-.782	.026	-	-	-	-	-	-
ePSE1←→ePSE2	.291	.100	2.906	.004	.059-.555	.017	-	-	-	-	-	-
ePSE5←→ePSE10	-.400	.104	-3.835	<.001	-.7.23- -.199	.001	-	-	-	-	-	-
ePSE3←→ePSE10	-.595	.122	-.4893	<.001	-.928- -.327	.001	-	-	-	-	-	-
ePSE8←→ePSE9	.507	.101	5.026	<.001	.299-.789	.001	-	-	-	-	-	-
Correlations												
ePSE4←→ePSE7	.228	-	-	-	.016-.435	.033	-	-	-	-	-	-
ePSE1←→ePSE2	.251	-	-	-	.043-.444	.023	-	-	-	-	-	-
ePSE5←→ePSE10	-.347	-	-	-	-.579- -.151	.001	-	-	-	-	-	-
ePSE3←→ePSE10	-.457	-	-	-	-.680- -.254	.002	-	-	-	-	-	-
ePSE8←→ePSE9	.504	-	-	-	.310-.656	.002	-	-	-	-	-	-

Table 10. Goodness of fit statistics for the self-management domain and the medication management subscale of the self-management domain of the Self-Management Transition to Adult Treatment (STARx; Ferris et al., 2015; *n*=165)

	χ^2			χ^2/df	Bollen-Stine	CFI	RMSEA			SRMR	Fit
Model	Statistic	df	*p*-value	Statistic	*p*-value	Statistic	Statistic	90% CI	*p*-value	Statistic	Description
Hypothesized	-	-	-	-	-	.777	.155	.129-.181	.000	-	N/A
Respecified #1	13.070	2	.001	6.535	.028	.962	.184	.098-.284	.007	.050	Poor
Respecified #2	1.435	1	.231	1.435	.238	.987	.051	.000-.222	.322	.010	Excellent

Note. Respecifications included examination of just the four items of the medication management subscale of the STARx self-management domain (i.e., respecified model #1) and the addition of a parameter estimate of the covariance among the error terms for item #2 and item #16 (i.e., respecified model #2).

Table 11. Parameter estimates for the respecified medication management subscale of the self-management domain of the Self-Management Transition to Adult Treatment (STARx; Ferris et al., 2015; *n*=165)

	Unstandardized						Standardized			Squared Multiple Correlations		
Variable	Estimate	S.E.	C.R.	*p*-value	95% CI	*p*-value	Estimate	95% CI	*p*-value	Estimate	95% CI	*p*-value
SM_2←Self-Management (SM)	1.000	-	-	-	1.000-1.000	<.001	.558	.406-.706	.002	.311	.165-.498	.002
SM_5←SM	1.484	.203	7.311	<.001	1.161-1.976	.003	.847	.765-.916	.002	.718	.585-.839	.002
SM_8←SM	1.685	.238	7.078	<.001	1.305-2.306	.003	.896	.818-.976	.002	.803	.669-.952	.002
SM_16←SM	1.274	.167	7.627	<.001	.999-1.628	.003	.688	.577-.788	.002	.473	.333-.620	.002
Variances												
SM	.463	.128	3.622	<.001	.276-.736	.001	-	-	-	-	-	-
eSM2	1.027	.122	8.385	<.001	.651-1.541	.001	-	-	-	-	-	-
eSM5	.401	.080	4.995	<.001	.249-.583	.001	-	-	-	-	-	-
eSM8	.324	.094	3.460	<.001	.078-.550	.016	-	-	-	-	-	-
eSM16	.838	.106	7.904	<.001	.544-1.133	.002	-	-	-	-	-	-
Covariances												
eSM2←→eSM16	.268	.086	3.118	.002	.024-.529	.025	-	-	-	-	-	-
Correlations												
eSM2←→eSM16	.289	-	-	-	.020-.506	.031	-	-	-	-	-	-

Table 12. Goodness of fit statistics for the PROMIS-Global Health (Hays et al., 2009; *n*=144)

	χ^2			χ^2/df	Bollen-Stine	CFI	RMSEA			SRMR	Fit
Model	Statistic	df	*p*-value	Statistic	*p*-value	Statistic	Statistic	90% CI	*p*-value	Statistic	Description
Hypothesized	88.141	35	<.001	2.518	.006	.892	.103	.076-.130	.001	.066	Poor
Respecified #1	62.293	34	.002	1.832	.063	.943	.076	.045-.106	.077	.059	Poor
Respecified #2	41.110	33	.157	1.246	.343	.984	.041	.000-.078	.610	.053	Excellent

Note. Respecifications included adding the following parameter estimates of the covariance among error terms for: item #5 and item #9 (respecified model #1) and item #4 and item #10 (respecified model #2).

Table 13. Parameter estimates for the respecified PROMIS-Global Health (Hays et al., 2009; *n*=144)

	Unstandardized						Standardized			Squared Multiple Correlations		
Variable	Estimate	S.E.	C.R.	*p*-value	95% CI	*p*-value	Estimate	95% CI	*p*-value	Estimate	95% CI	*p*-value
Regression Weights												
GH_2←Health-Related Quality of Life (HRQoL)	1.152	.112	10.273	<.001	.977-1.369	.002	.811	.720-.885	.002	.658	.519-.784	.002
GH_4←HRQoL	.891	.121	7.337	<.001	.653-1.143	.002	.613	.483-.718	.002	.376	.233-.516	.002
GH_5←HRQoL	.962	.136	7.057	<.001	.712-1.213	.002	.590	.439-.707	.002	.349	.192-.499	.002
GH_10←HRQoL	.769	.130	5.906	<.001	.535-.997	.002	.502	.336-.629	.004	.252	.113-.396	.004
GH_3←HRQoL	1.032	.099	10.427	<.001	.868-1.235	.002	.804	.712-.871	.002	.647	.506-.759	.002
GH_6←HRQoL	.589	.105	5.594	<.001	.382-.806	.002	.478	.319-.594	.004	.288	.102-.352	.004
GH_7←HRQoL	.324	.097	3.346	<.001	.086-.574	.003	.295	.084-.482	.004	.087	.007-.233	.004
GH_8←HRQoL	.599	.123	4.865	<.001	.298-.865	.003	.418	.216-.564	.005	.175	.047-.318	.005
GH_1←HRQoL	1.000	-	-	-	1.000-1.000	<.001	.807	.732-.865	.003	.651	.535-.748	.003
GH_9←HRQoL	.769	.124	6.210	<.001	.442-1.052	.002	.531	.325-.691	.003	.282	.105-.478	.003
Variances												
HRQoL	.457	.082	5.570	<.001	.334-.616	.001	-	-	-	-	-	-
eGH2	.315	.051	6.220	<.001	.213-.443	.001	-	-	-	-	-	-
eGH4	.602	.078	7.724	<.001	.461-.769	.001	-	-	-	-	-	-
eGH5	.790	.101	7.799	<.001	.603-1.025	.001	-	-	-	-	-	-
eGH10	.801	.100	8.022	<.001	.614-1.056	.001	-	-	-	-	-	-
eGH3	.266	.042	6.324	<.001	.192-.362	.001	-	-	-	-	-	-
eGH6	.536	.066	8.119	<.001	.418-.690	<.001	-	-	-	-	-	-
eGH7	.503	.060	8.345	<.001	.395-.650	<.001	-	-	-	-	-	-
eGH8	.773	.094	8.212	<.001	.627-1.002	<.001	-	-	-	-	-	-
eGH1	.244	.039	6.270	<.001	.185-.328	<.001	-	-	-	-	-	-
eGH9	.687	.086	7.957	<.001	.519-.941	<.001	-	-	-	-	-	-
Covariances												
eGH5←→eGH9	.325	.073	4.430	<.001	.183-.471	.002	-	-	-	-	-	-
eGH4←→eGH10	.272	.068	4.001	<.001	148-.459	.001	-	-	-	-	-	-
Correlations												
eGH5←→eGH9	.442	-	-	-	.256-.592	.004	-	-	-	-	-	-
eGH4←→eGH10	.392	-	-	-	.221-.573	.001	-	-	-	-	-	-

Table 14. Goodness of fit statistics for the respecified exploratory measurement model (*n*=138)

	χ^2			χ^2/df	Bollen-Stine	CFI	RMSEA			SRMR	Fit
Model	Statistic	df	*p*-value	Statistic	*p*-value	Statistic	Statistic	90% CI	*p*-value	Statistic	Description
Hypothesized	854.882	570	<.001	1.500	.047	.873	.093	.086-.100	.017	.091	Poor

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Appendix A: Brief Health Literacy Screening Tool (BRIEF; Haun et al., 2009; *n*=152)

Directions: Please indicate the answer that best represents your response.

Variable Name	Item	Response Options	Mean	*SD*	Min.	Max.	Skew	Kurtosis
HL_1	How often do you have someone help you read hospital materials?	1=Always 2=Often 3=Sometimes 4=Occasionally 5=Never	4.24	1.15	1	5	-7.292	.972
HL_2	How often do you have problems learning about your medical condition because of difficulty understanding written information?		4.54	.88	1	5	-7.779	1.530
HL_3	How often do you have a problem understanding what is told to you about your medical condition?		4.41	.84	2	5	-6.129	.501
HL_4	How confident are you filling out medical forms by yourself?	1=Not at all 2=A little bit 3=Somewhat 4=Quite a bit 5=Extremely	3.83	1.11	1	5	-3.862	-.214
HL_Composite	HL_1 + HL_2 _ HL_3 + HL_4	-	16.93	2.86	6	20	-	8.355

Appendix B: PROMIS-Anxiety and PROMIS-Depression Scales (Irwin et al., 2010; *n*=149)

Directions: In the past 7 days…

Variable Name	Item	Response Options	Mean	*SD*	Min.	Max.	Skew	Kurtosis
Anx_1	I felt fearful.	1=Never	2.33	1.08	1	5	1.459	-.836
Anx_2	I found it hard to focus on anything other than my anxiety.	2=Rarely 3=Sometimes	2.86	1.14	1	5	-.283	-.876
Anx_3	My worries overwhelmed me.	4=Often	3.06	1.12	1	5	-1.421	-.630
Anx_4	I felt uneasy.	5=Always	3.11	1.03	1	5	-1.142	-.610
Dep_1	I felt worthless.		2.60	1.20	1	5	1.126	-.832
Dep_2	I felt helpless.		2.61	1.23	1	5	.749	-.983
Dep_3	I felt depressed.		3.01	1.22	1	5	-.996	-.829
Dep_4	I felt hopeless.		2.56	1.22	1	5	1.236	-.986
Anx_Composite	Anx_1 + Anx_2 + Anx_3 + Anx_4	-	11.36	3.72	4	20	-	-
Dep_Composite	Dep_1 + Dep_2 + Dep_3 + Dep_4	-	10.78	4.42	4	20	-	-

Appendix C: Pain Self-Efficacy Questionnaire (PSEQ; Nicholas, 2007; *n*=168)

Directions: Please rate how confident you are that you can do the following things at present, despite the pain. To answer, select one of the numbers on the scale under each item, where 0="Not at all confident" and 6="Completely Confident". Remember, this questionnaire is not asking whether or not you have been doing these things, but rather how confident you are that you can do them at present, despite the pain.

Variable Name	Item	Response Options	Mean	*SD*	Min.	Max.	Skew	Kurtosis
PSE_1	I can enjoy things, despite the pain.	0=Not at all confident 1=1 2=2 3=3 4=4 5=5 6=Completely confident	4.14	1.45	0	6	-2.453	-.357
PSE_2	I can do most of the household chores (e.g., tidying-up, washing dishes, etc.), despite the pain.		4.39	1.61	0	6	-4.379	-.154
PSE_3	I can socialize with my friends or family members as often as I used to do, despite the pain.		4.16	1.70	0	6	-3.159	-.668
PSE_4	I can cope with my pain in most situations.		4.35	1.46	0	6	-4.591	.367
PSE_5	I can do some form of work, despite the pain ("work" includes housework, paid and unpaid work).		4.38	1.57	0	6	-4.810	.076
PSE_6	I can still do many of the things I enjoy doing, such as hobbies or leisure activities, despite the pain.		3.92	1.72	0	6	-2.380	-.803
PSE_7	I can cope with my pain without medication.		3.64	2.14	0	6	-2.262	-1.153
PSE_8	I can still accomplish most of my goals in life, despite the pain.		4.43	1.64	0	6	-4.146	-.420
PSE_9	I can live a normal lifestyle, despite the pain.		4.36	1.66	0	6	-4.143	-.323
PSE_10	I can gradually become more active, despite the pain.		3.93	1.80	0	6	-3.236	-.600
PSE_Composite	PSE_1 + PSE_2 + … +PSE_10	-	41.71	13.1	6	60	-	22.861

Appendix D: Self-Management Domain of the Self-Management Transition to Adult Treatment (STARx; Ferris et al., 2015; *n*=165)

Directions: Please respond to the following in relation to your physical and mental health in the past 3 months.

Variable Name	Item	Response Options	Mean	*SD*	Min.	Max.	Skew	Kurtosis
SM_2	How often did you take your medicines on your own?	0=Never 1=Almost Never 2=Sometimes 3=Almost Always 4=Always 5=I do not take any medicine	3.76	1.21	0	5	-6.722	1.295
SM_5	How often did you need someone to remind you to take your medicines?		3.67	1.18	0	5	-4.022	-.082
SM_8	How often did you forget to take your medicines?		3.29	1.29	0	5	.026	-1.036
SM_16	How easy or hard is it for you to take your medicines the way you are supposed to?	0=Very Hard 1=Somewhat Hard 2=Neither Hard nor Easy 3=Somewhat Easy 4=Very Easy 5=I do not take any medicine	3.74	1.25	0	5	-5.219	.316
SM_17	How easy or hard is it for you to take care of yourself?	0=Very Hard 1=Somewhat Hard 2=Neither Hard nor Easy 3=Somewhat Easy 4=Very Easy	2.55	1.15	0	4	-.843	-1.078
SM_18	How easy or hard do you think it has been for you to move from pediatrics to adult-focused care?		2.51	1.25	0	4	-1.341	-.993
SM_6	How often did you use things like pillboxes, schedules, or an alarm to help you take your medicines when you were supposed to?	0=Never 1=Almost Never 2=Sometimes 3=Almost Always 4=Always 5=I do not take any medicine	2.51	2.01	0	5	-.393	-1.576
SM_7	How often did you use the internet, books, or other guides to find out more about your physical and mental health concerns?	0=Never 1=Almost Never 2=Sometimes 3=Almost Always 4=Always	2.71	1.15	0	4	-2.981	-.391
SM_9	How often did you work with your doctor to take care of new health problems that came up?		2.36	1.50	0	4	-2.129	-.798
SM_Composite	SM_2 + SM_5 + … + SM_9	-	27.06	5.93	13	40	-	9.968

Appendix E: PROMIS-Global Health (Hays et al., 2009; *n*=144)

Directions: Please respond to each question by marking one box per row.

Variable Name	Item	Response Options	Mean	*SD*	Min.	Max.	Skew	Kurtosis
GH_1	In general, would you say your health is:	1=Poor	2.92	.86	1	5	.058	-.473
GH_2	In general, would you say your quality of life is:	2=Fair	3.08	.96	1	5	-.245	-.641
GH_4	In general, how would you rate your mental health, including your mood and ability to think?	3=Good 4=Very Good	2.35	.98	1	5	3.028	.049
GH_5	In general, how would you rate your satisfaction with your social activities and relationships?	5=Excellent	2.82	1.09	1	5	.073	-.739
GH_9	In general, please rate how well you carry out your usual social activities and roles (this includes activities at home, at work, and in your community, and responsibilities as a parent, child, spouse, employee, friend, etc.).		3.17	1.00	1	5	-.361	-.359
GH_10	In the past 7 days, how often have you been bothered by emotional problems, such as feeling anxious, depressed, or irritable?	1=Always 2=Often 3=Sometimes 4=Rarely 5=Never	2.23	1.02	1	5	2.450	-.455
GH_3	In general, how would you rate your physical health?	1=Poor 2=Fair 3=Good 4=Very Good 5=Excellent	2.79	.86	1	5	-.84	-.359
GH_6	To what extent are you able to carry out your everyday physical activities, such as walking, climbing stairs, carrying groceries, or moving a chair?	1=Not At All 2=A Little 3=Moderately 4=Mostly 5=Completely	4.41	.83	1	5	-6.444	1.405
GH_7	In the past 7 days, how would you rate your pain on average?	1=10-Worst Imaginable Pain 2=9, 8, 7 3=6, 5, 4 4=3, 2, 1 5=0-No Pain	3.36	.79	2	5	1.491	-.092
GH_8	In the past 7 days, how would you rate your fatigue on average?	1=Very Severe 2=Severe 3=Moderate 4=Mild 5=None	3.01	.97	1	5	-1.146	-.247
GH_Composite	GH_1 + GH_2 + … + GH_8	-	30.14	6.21	14	47	-	6.221

CURRICULUM VITAE

AMY C. LANG, M.S.

EDUCATION

2021 – Present	**Pre-Doctoral Internship, O'Grady Residency in Psychology (APA Accredited), Behavioral Medicine Track** **Cincinnati Children's Hospital Medical Center, Cincinnati, OH** Training Directors: Sanita Ley, Ph.D. & Allison K. Zoromski, Ph.D. Research Rotation Mentor: Avani C. Modi, Ph.D.
2016 – Present	**Doctor of Philosophy, Clinical Psychology (APA Accredited)** **University of Wisconsin-Milwaukee, Milwaukee, WI** Expected Conferral of Degree: August 2022 Dissertation: *Utilizing structural equation modeling to examine factors impacting health-related quality of life for emerging adults with chronic pain as they transition to adulthood* Chair: W. Hobart Davies, Ph.D.
2018	**Master of Science, Psychology** **University of Wisconsin-Milwaukee, Milwaukee, WI** Master's Thesis: *Impact of perceived health competence and current living situation on the quality of life of emerging adults with chronic health conditions* Chair: W. Hobart Davies, Ph.D.
2016	**Bachelor of Science, Psychology with Honors** **University of Wisconsin-Madison, Madison, WI** Senior Honors Thesis: *Early life adversity, depression, and negative memory bias* Research Mentor: Heather C. Abercrombie, Ph.D.

AWARDS, FELLOWSHIPS, AND HONORS

2022	**Student Poster Award, Adherence & Self-Management Special Interest Group** *Drug side effects and motivation predict treatment adherence in adolescents with epilepsy* Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States Society of Pediatric Psychology (Division 54), American Psychological Association
2021	**2020 Asher Pacht, Ph.D., Graduate Scholarship Award** Wisconsin Psychology Foundation
2021	**Outstanding Graduate Student in Pediatric Psychology (Student Spotlight)** Society of Pediatric Psychology (Division 54), American Psychological Association
2020	**Student Travel Award** Society of Pediatric Psychology Annual Conference, Dallas, TX, United States Society of Pediatric Psychology (Division 54), American Psychological Association

2020; **2019**	**Summer Graduate Research Fellowship** Department of Psychology, University of Wisconsin-Milwaukee Description: Merit-based fellowship in support of graduate student research
2019	**Student Poster Award** *Health competence as a predictor of satisfaction with life and health status in emerging adulthood* American Psychological Association Convention, Chicago, IL, United States Society of Pediatric Psychology (Division 54), American Psychological Association
2019	**Student Travel Award** American Psychological Association Convention, Chicago, IL, United States Clinical Child/Pediatric Psychology Association, University of Wisconsin-Milwaukee
2019	**Student Travel Award** Society of Pediatric Psychology Annual Conference, New Orleans, LA, United States Association of Graduate Students in Psychology, University of Wisconsin-Milwaukee
2019 – 2020; **2018 – 2019;** **2017 – 2018**	**Advanced Opportunity Program Fellowship** University of Wisconsin-Milwaukee Description: Merit-based fellowship for underrepresented racial/ethnic minority, as well as disadvantaged, non-minority students in graduate study
2017	**Student Poster Award, Pain Special Interest Group** *Reactions to different physician pain dismissal topographies* Society of Pediatric Psychology Annual Conference, Portland, OR, United States Society of Pediatric Psychology (Division 54), American Psychological Association
2014 – 2015	**Hilldale Undergraduate/Faculty Research Fellowship** *Early life stress, depression, and cortisol's effects on emotional memory* University of Wisconsin-Madison Description: Merit-based research fellowship to support undergraduate students in collaboratively pursuing a research project with UW-Madison faculty

RESEARCH EXPERIENCE

2021 – present **O'Grady Resident Research Assistant**
Cincinnati Children's Hospital Medical Center, Cincinnati, OH
Division of Behavioral Medicine & Clinical Psychology
Mentor: Avani C. Modi, Ph.D.
Responsibilities:

- Fostering Medication Adherence in Children with Epilepsy Using mHealth Technology (eACT Study; R01NR017794-04, National Institute of Nursing Research)
  - Principal Investigator (PI): Avani C. Modi, Ph.D.
  - Clinical Supervisor: Shanna M. Guilfoyle, Ph.D.
  - Serve as a study interventionist conducting adherence-focused telehealth structured problem-solving sessions for families of children with epilepsy
- Behavioral Economics and Adherence in Teens (BEAT!): A Randomized Controlled Clinical Trial (R21NR017633-02, National Institute of Nursing Research)
  - PI: Avani C. Modi, Ph.D.
  - Investigate impact of modifiable and non-modifiable predictors of adolescent anti-seizure medication adherence using Statistical Package for the Social Sciences (SPSS) for conference poster presentation and manuscript preparation
- Obtain training in Sequential Multiple Assignment Randomized Trial (SMART) procedures, pediatric epilepsy management, and mHealth intervention strategies
- Participate in weekly lab meetings with mentor, clinical research coordinators, post-doctoral fellows, and graduate research assistants, which include discussions of ongoing research projects and pediatric psychology and professional development didactics

2016 – present **Graduate Research Assistant**
University of Wisconsin-Milwaukee, Milwaukee, WI
Child Stress and Coping Lab, Psychology Department
Mentor: W. Hobart Davies, Ph.D.
Responsibilities:

- Utilize mixed-methods data collection program with community emerging adults and parents to investigate novel research questions pertaining to psychological correlates (e.g., health competence, self-management, and health-related quality of life) of the following:
  - Chronic health conditions in adolescence and emerging adulthood
  - Healthcare transition
  - Symptom (e.g, pain) dismissal
  - Pediatric chronic pain
- Conduct data analyses in SPSS and Statistical Analysis Software (SAS)
- Synthesize literature reviews, methodologies, results, and clinical implications into manuscripts for publication
- Present manuscripts at regional, national, and international conferences

- Developed and conducted semi-structured interviews with pediatric psychologists to further understand the ethical challenges associated with qualitative methods aimed to improve pediatric clinical care
- Developed and validated measures of parenting styles and adverse childhood experiences
- Organized and co-led qualitative coding teams of graduate, undergraduate, and post-baccalaureate research assistants for community health-related research projects using Delphi and content analysis coding methods
- Co-founded and co-led Pain/Adolescent Young Adult Special Interest Group to provide education and mentorship to master's and undergraduate students interested in pediatric chronic pain and healthcare transition
- Participated in weekly lab meetings with mentor and graduate, undergraduate, and post-baccalaureate research assistants, which included: discussions of research projects from development through publication; reviews of manuscripts, presentations, and professional application materials; and pediatric psychology and professional development didactics
- Mentored undergraduate research assistants working on senior research theses (2) and Ronald E. McNair Post-Baccalaureate Achievement Program projects (2) pertaining to adverse childhood experiences, symptom dismissal, and adolescent media use under the supervision of W. Hobart Davies, Ph.D.

2016 – 2021 **Graduate Research Assistant**
Children's Wisconsin, Wauwatosa, WI
Jane B. Pettit Pain Management & Headache Center
Mentor: Keri Hainsworth, Ph.D.
Responsibilities:

- Assisted with recruitment and coordination of patient and caregiver completion of Collaborative Health Outcomes Registry (CHOIR) measures for clinical research projects
- Conducted phone interviews of chronic pain patients and their caregivers to investigate the psychological impact of comorbid chronic pain and obesity among adolescents
- Aided in preparation of pediatric chronic pain project proposals and amendments for Institutional Review Board (IRB) approval
- Coded qualitative data using content analysis coding methods
- Conducted data analyses in SPSS
- Synthesized literature reviews, methodologies, results, and clinical implications into manuscripts for publication
- Participated in monthly research team meetings with psychologists, physicians, and other clinical research project collaborators, which included discussions of research projects from development through publication

2013 – 2016 **Undergraduate Research Assistant**
University of Wisconsin-Madison, Madison, WI
Mood & Memory Laboratory, Psychiatry Department
Mentor: Heather C. Abercrombie, Ph.D.
Responsibilities:

- Learning, Neural Signaling of Cortisol, and Early Adversity in Depression (R01MH094478-05, National Institute of Mental Health)
  - PI: Heather C. Abercrombie, Ph.D.
  - Prescreened potential participants utilizing semi-structured clinical phone interviews
  - Conducted in-person participant research sessions, which included questionnaire and task administration, collection of Buccal swab samples, and coordination of blood draws and magnetic resonance imaging
  - Assisted in DNA extraction
  - Entered and analyzed quantitative and qualitative data utilizing Microsoft Excel and SAS
- Presented posters summarizing independent research projects at regional conferences
- Participated in monthly lab meetings with mentor, collaborators, research coordinators, and graduate and undergraduate research assistants, which included discussions of research projects from development through publication and research-related didactics
- Served as a mentor for junior undergraduate research assistants under the supervision of Heather C. Abercrombie, Ph.D.

PEER-REVIEWED PUBLICATIONS

1. **Lang, A. C.**, Lim, P. S., Everhart, S. A., Linneman, N. G., Davies, W. H., & Alderfer, M. (in press). Ethical challenges in qualitative methods to improve pediatric clinical care: Researcher perspectives. *Clinical Practice in Pediatric Psychology.*

2. Igler, E. C., Everhart, S. A., Austin, J. E., **Lang, A. C.**, & Davies, W. H. (in press). Student concerns regarding school based weight measurement: Implications for policy. *Health Behavior and Policy Review.*

3. Gremillion, M. L., **Lang, A. C.**, Everhart, S. A., Davies, W. H., Stolzman, S. C., Weisman, S. J., & Hainsworth, K. R. (in press). The lived experience of youth with co-occurring chronic pain and obesity: Important insights and applications. *Childhood Obesity.*

4. **Lang, A. C.**, Ankey, R. L., Berlin, K., & Davies, W. H. (2022). Development and validation of 18-item short form for the Parents as a Social Context Questionnaire. *Journal of Child and Family Studies, 31,* 507-517. https://doi.org/10.1007/s10826-021-02177-x

5. **Lang, A. C.**, Greenley, R. N., & Davies, W. H. (2022). Impact of health competence on the quality of life of emerging adults with chronic health conditions. *Emerging Adulthood, 10*(3), 702-711. https://doi.org/10.1177/2167696820938647

6. Austin, J. E., **Lang, A. C.**, Nacker, A. M., Wallace, A. L., Schwebel, D. C., Brown, B. B., & Davies, W. H. (2021). Adolescent experiences with self-asphyxial behaviors and problematic drinking in emerging adulthood. *Global Pediatric Health, 8,* 1-9. https://doi.org/10.1177/2333794X211037985

7. Lim, P. S., **Lang, A. C.**, & Davies, W. H. (2021). Parent ethical concerns regarding patient feedback measures to improve pediatric clinical care. *Journal of Empirical Research on Human Research Ethics*, *16*(1-2), 46-53. https://doi.org/10.1177/1556264620969327

8. Pizur-Barnekow, K., **Lang, A. C.**, & Barger, B. (2021). Short report: Development and utility of the Family-Centered Autism Navigation (Family CAN) Interview. *Autism, 25*(4), 1154-1160. https://doi.org/10.1177/1362361320972890

9. Igler, E. C., **Lang, A. C.**, Balistreri, K. A., Sejkora, E. K., Drendel, A., & Davies, W. H. (2020). Parent perceptions of dismissive provider reactions to pediatric chronic pain reports. *The Clinical Journal of Pain, 36*(2), 80-87. https://doi.org/10.1097/AJP.0000000000000776

10. Choi, C., Mersky, J. P., Janczewski, C. E., Lee, C.-T. P., Davies, W. H., & **Lang, A. C.** (2020). Validity of an expanded assessment of adverse childhood experiences: A replication study. *Children and Youth Services Review, 117*, 105216. https://doi.org/10.1016/j.childyouth.2020.105216

11. **Lang, A. C.**, Igler, E. C., Defenderfer, E. K., Uihlein, J., Brimeyer C., & Davies, W. H. (2018). Evaluating differential effects of specific pain dismissal interactions with physicians. *The Clinical Journal of Pain, 34*(7), 664-669. https://doi.org/10.1097/AJP.0000000000000586

12. Igler, E. C., Defenderfer, E. K., **Lang, A. C.**, Bauer, K., Uihlein, J., & Davies, W. H. (2017). Gender differences in the experiences of pain dismissal in adolescence. *Journal of Child Health Care, 21*(4), 381-391. https://doi.org/10.1177/1367493517727132

MANUSCRIPTS IN PREPARATION AND UNDER REVIEW

1. **Lang, A. C.**, Linneman, N. G., Hinojosa, J., Jarvis, J., Greenley, R. N., & Davies, W. H. (in preparation). *Barriers and facilitators to chronic health condition disclosure among emerging adults: Examination of the role of illness identity.*

2. **Lang, A. C.**, Igler, E. C., Linneman, N. G., Brimeyer, C. T., Drendel, A., & Davies, W. H. (in preparation). *Psychological explanations of headache pain perceived as more acceptable when contextualized within a biopsychosocial model.*

3. **Lang, A. C.**, Davies, W. H., Dunn, J., Luo, J., & Chesley, N. (in preparation). *Parental compliance with the AAP's recommendations for media use for 2- to 5-year-old children.*

4. Tager, J. B., **Lang, A. C.**, Jarvis, J., Farrell, M., & Davies, W. H. (under review). *"Frustrated, dismissed, and invalidated": Community parent perspectives of concern dismissal by pediatric providers.*

ORAL SYMPOSIA PRESENTATIONS

1. **Lang, A. C.**, Hinojosa, J., Jarvis, J., Greenley, R. N., & Davies, W. H. (2021, October 4–8). *Factors influencing whether emerging adults regularly discuss their chronic health conditions with others* [Virtual Flash Talk]. European Paediatric Psychology Conference 2021, Stockholm, Sweden.

2. Buscemi, J., Davies, W. H., Feldman, E., Greenley, R. N., **Lang, A. C.**, Miller, S., Reed, B., & Tran, S. (2020, May 21–24). *Risk and resilience among emerging adults: Sleep, substance use, and statistical methodology* [Symposium]. Association for Psychological Science, Chicago, IL, United States. (Conference canceled)

3. Sekjora, E. K., Igler, E. C., Brimeyer, C., **Lang, A. C.,** Davies, W. H., & Logan, D. (2019, April 4–6). *Real pain? Patterns and clinical implications of provider pain dismissal in adolescents and emerging adults* [Symposium]. Society of Pediatric Psychology Annual Conference, New Orleans, LA, United States.

4. **Lang, A. C.**, Igler, E.C., Defenderfer, E. K., Uihlein, J., Brimeyer, C., & Davies, W. H. (2017, April 7). *Evaluating differential effects of specific pain dismissal interactions with physicians* [Symposium]. The Association for Graduate Students in Psychology Symposium – University of Wisconsin-Milwaukee, Milwaukee, WI, United States.

CONFERENCE POSTER PRESENTATIONS

1. **Lang, A. C.,** Stevens, J., Mara, C. A., Patel, A. D., Schmidt, M., Tenney, J., Heckaman, L., Wentzel, E., Adams, K., & Modi, A. C. (2022, April 7-9). *Drug side effects and motivation predict treatment adherence in adolescents with epilepsy* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States.

2. Linneman, N. G., Hainsworth, K., **Lang, A. C.,** Michlig, J., & Davies, W. H. (2022, April 7-9). *Assessing pediatric chronic pain treatment engagement: Development and initial validation of the Pediatric Pain Perceived Behavioral Control Measure* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States.

3. **Lang, A. C.,** Linneman, N. G., Zwick, S., Jarvis, J., Greenley, R. N., & Davies, W. H. (2021, April 8-9). *"How to cope with everything when it's all happening at once": Challenges associated with intersecting transitions for emerging adults with chronic health conditions* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States.

4. Hinojosa, J., **Lang, A. C.**, Greenley, R. N., & Davies, W. H. (2021, April 8-9). *Impairment of sleep health in emerging adults with chronic health conditions* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States.

5. *Jarvis, J., **Lang, A. C.**, Linneman, N. G., Hinojosa, J., Greenley, R. N., & Davies, W. H. (2021, April 8-9). *Healthier illness identity may promote satisfaction with life and less threatening illness perception among emerging adults with chronic health conditions* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States.
   **Mentored undergraduate research assistant*

6. Linneman, N. G., **Lang, A. C.**, Jarvis, J., Zwick, S., Greenley, R. N., & Davies, W. H. (2021, April 8-9). *Caught in the middle: Barriers to successful health care transfer for emerging adults with chronic health conditions* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States.

7. Zwick, S., **Lang, A. C.**, Sejkora, E. K., Igler, E. C., & Davies, W. H. (2021, April 8-9). *Defining high-impact dismissers in pediatric chronic pain* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Phoenix, AZ, United States.

8. Tager, J., **Lang, A. C.**, & Davies, W. H. (2020, August 6–9) *"Doc just said I was worried": Parent experiences of pediatric provider concern dismissal* [Poster presentation]. American Psychological Association Convention, Washington, D. C., United States.

9. *Jarvis, J. E., **Lang, A. C.**, Tager, J. B., & Davies, W. H. (2020, August 6). *Parental experiences of pediatric provider concern dismissal: Association with satisfaction with life and health competence* [Poster presentation]. 29th Annual Ronald E. McNair Post-Baccalaureate Achievement Program Summer Research Presentations – University of Wisconsin-Milwaukee, Milwaukee, WI, United States.
   **Mentored undergraduate research assistant*

10. *Cha, K., **Lang, A. C.**, & Davies, W. H. (2020, April 23–25). *The influence of parental adverse childhood experiences on parenting styles and behavior in pre-schoolers* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States. (Conference canceled)
    **Mentored undergraduate research assistant*

11. *Jarvis, J. E., **Lang, A. C.**, Linneman, N. G., & Davies, W. H. (2020, April 23–25). *Associations between sleep chronotype and sleep health in college freshmen* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States. (Conference canceled)
    **Mentored undergraduate research assistant*

12. Xu, N., **Lang, A. C.**, Linneman, N. G., & Davies, W. H. (2020, April 23–25). *Association between lucid dreaming, distress, and life satisfaction* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States. (Conference canceled)

13. Hinojosa, J. T., Lu, Y., Xu, N., Zwick, S., **Lang, A. C.**, Linneman, N. G., & Davies, W. H. (2020, April 23–25). *Impact of sleep behaviors on college student adjustment* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States. (Conference canceled)

14. Zwick, S. I., Hinojosa, J., Lu, Y., Xu, N., **Lang, A. C.**, Linneman, N. G., & Davies, W. H. (2020, April 23–25). *Analysis of first-year undergraduate students' motivations to improve sleep behavior* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States. (Conference canceled)

15. **Lang, A. C.,** Greenley, R. N., & Davies, W. H. (2020, March 19–20). *Experiences of symptom dismissal among emerging adults with chronic health conditions* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Dallas, TX, United States.

16. Balistreri, K. A., **Lang, A. C.**, Sejkora, E. D., & Davies, W. H. (2020, March 19–20). *The impact of caregiver role on siblings of children with chronic conditions* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Dallas, TX, United States.

17. Hinojosa, J. T., **Lang, A. C.**, & Davies, W. H. (2020, March 19–20). *Differential impact of chronic health condition type on grit in emerging adults* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Dallas, TX, United States.

18. Linneman, N. G., **Lang, A. C.,** Igler, E., Drendel, A., Brimeyer, C., & Davies, W. H. (2020, March 19–20). *Physician-generated explanations of psychogenic causes of pain* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Dallas, TX, United States.

19. Lu, Y., **Lang, A. C.**, Mersky, J. P., & Davies, W. H. (2020, March 19–20). *Associations between childhood adverse events and sleep in emerging adults* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Dallas, TX, United States.

20. Zwick, S., Igler, E. C., **Lang, A. C.**, Brimeyer, C. T., Drendel, A. L., & Davies, W. H. (2020, March 19–20). *Impact of provider years of experience on reactions to a standardized pediatric headache presentation* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Dallas, TX, United States.

21. Tager, J. B., Balistreri, K. A., Lim, P. S., **Lang, A. C.**, & Davies, W. H. (2020, March 19–20). *Parent perspectives on concern dismissal by pediatric providers* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Dallas, TX, United States.

22. **Lang, A. C.**, Naftaly, J., Greenley, R. N., & Davies, W. H. (2019, August 8–11). *Health competence as a predictor of satisfaction with life and health status in emerging adulthood* [Poster presentation]. American Psychological Association Convention, Chicago, IL, United States.

23. Linneman, N. G., **Lang, A. C.**, Lim, P. S., Everhart, S. A., Davies, W. H., & Alderfer, M. A. (2019, August 8–11). *Ethical challenges in using qualitative methods to improve pediatric clinical care* [Poster presentation]. American Psychological Association Convention, Chicago, IL, United States.

24. *Michlig, J. R., **Lang, A. C.**, & Davies, W. H. (2019, August 8–11). *Associations between parenting styles and parent-child co-viewing on Youtube* [Poster presentation]. American Psychological Association Convention, Chicago, IL, United States.
    **Mentored undergraduate research assistant*

25. Balistreri, K. A., Lim, P. S., **Lang, A. C.**, Sejkora, E. K. D., Luke, A., Wilton, E. P., Flessner, C. A., Silverman, A. H., & Davies, W. H. (2019, August 8–11). *Parenting style mediates the relationship between pediatric food allergy and internalizing symptoms* [Poster presentation]. American Psychological Association Convention, Chicago, IL, United States.

26. Pizur-Barnekow, K., & **Lang, A. C.** (2019, July 18–19). *The development and utility of the Family-Centered Autism Navigation (Family CAN) semi-structured interview* [Poster presentation]. 2019 Autism CARES Grantee Meeting, Washington, D. C., United States.

27. Xu, N., Balistreri, K. A., Lim, P. S., **Lang, A. C.**, & Davies, W. H. (2019, April 23–25). *Association between parental smartphone overuse and young adults' well-being* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States.

28. **Lang, A. C.**, Ankney, R. L., Berlin, K. S., & Davies, W. H. (2019, April 4–6). *Development and validation of a short-form for the Parents as Social Context Questionnaire* [Poster presentation]. Society of Pediatric Psychology Annual Conference, New Orleans, LA, United States.

29. Igler, E. C., **Lang, A. C.**, Sejkora, E. K., Uihlein, J., & Davies, W. H. (2019, April 4–6). *Parental perception of dismissive provider-child interactions in chronic pain: The influence of provider gender* [Poster presentation]. Society of Pediatric Psychology Annual Conference, New Orleans, LA, United States.

30. Everhart, S. A., Gremillion, M. L., **Lang, A. C.**, Davies, W. H., Weisman, S. J., & Hainsworth, K. R. (2019, April 4–6). *Perceived barriers to physical activity engagement in adolescents with co-occurring chronic pain and obesity* [Poster presentation]. Society of Pediatric Psychology Annual Conference, New Orleans, LA, United States.

31. McHugh, M., Linneman, L. G., **Lang, A. C.**, Schwebel, D. C., Brown, B. B., & Davies, W. H. (2019, April 4–6). *Downward trend in adolescent engagement in The Choking Game: Implications for risk prevention programs* [Poster presentation]. Society of Pediatric Psychology Annual Conference, New Orleans, LA, United States.

32. Naftaly, J. P., Carreron, S., Durkin, L., **Lang, A. C.**, Davies, W. H., & Greenley, R. N. (2019, March 6–9). *Reliability of the beliefs about medication scale (BAMS) short and long form in young adults with and without chronic medical conditions* [Poster presentation]. Society for Behavioral Medicine Annual Meeting, Washington, D.C., United States.

33. *Bastow, S. R., *Brown, M. K., *Perez, J., *Wood, O. L., **Lang, A. C.**, & Davies, W. H. (2018, December 6). *Relationship between adverse childhood experiences, parental education, and mental health in young adulthood* [Poster presentation]. First-Year Seminar Symposium – University of Wisconsin-Milwaukee, Milwaukee, WI, United States.
**Mentored undergraduate research assistants*

34. Naftaly, J. P., Bugno, L. T., **Lang, A. C.**, Igler, E. C., Davies, W. H., & Greenley, R. N. (2018, August 9–12). *Correlates of provider communication about medication prescriptions in a young adult sample* [Poster presentation]. American Psychological Association Annual Convention, San Francisco, CA, United States.

35. Igler, E. C., Everhart, S. A., **Lang, A. C.**, Austin, J. E., & Davies, W. J. (2018, April 19–21). *Perspectives on weight measurement within a physical education classroom* [Poster presentation]. International Conference on Eating Disorders, Chicago, IL, United States.

36. **Lang, A. C.**, Michlig, J. R., Chesley, N., Luo, J., & Davies, W. H. (2018, April 12–14). *Parental reactions to the American Academy of Pediatrics' media use recommendations for preschoolers* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States.

37. Michlig, J. R., **Lang, A. C.**, Wandrey, R. L., Chesley, N. A., Luo, J., & Davies, W. H. (2018, April 12–14). *American Academy of Pediatrics' recommendations for adolescent media use* [Poster presentation]. Midwestern Psychological Association Annual Conference, Chicago, IL, United States.

38. Carreon, S., Naftaly, J. P., **Lang, A. C.**, Lim, P. S., Davies, W. H., & Greenley, R. N. (2018, April 11–14). *The creation and utilization of clinical vignettes to induce outcome expectancies in emerging adults* [Poster presentation]. Society of Behavioral Medicine Annual Meeting, New Orleans, LA, United States.

39. **Lang, A. C.**, Naftaly, J. P., Greenley, R. N., & Davies, W. H. (2018, April 5–7). *Impact of perceived health competence and current living situation on the quality of life of emerging adults with chronic health conditions* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Orlando, FL, United States.

40. Lim, P. S., **Lang, A. C.**, & Davies, W. H. (2018, April 5–7). *Parent ethical concerns regarding participation in qualitative research to improve the clinical care of their child* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Orlando, FL, United States.

41. Brown, S. A., Igler, E. C., **Lang, A. C.**, Austin, J. E., & Davies, W. H. (2018, April 5–7). *Attitudes toward weight measurement in a secondary school setting* [Poster presentation]. Society of Pediatric Psychology 2018 Annual Conference, Orlando, FL, United States.

42. Igler, E. C., Defenderfer, E. K., **Lang, A. C.**, Brimeyer, C. T., Uihlein, J., & Davies, W. H. (2018, April 5–7). *The association of stress and reaction to physician-generated pain dismissal* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Orlando, FL, United States.

43. Bugno, L., Durkin, L., Carreon, S., **Lang, A. C.**, Lim, P. S., Naftaly, J., Davies, W. H., & Greenley, R. N. (2018, April 5–7). *Examining differences in health literacy and self-efficacy among late adolescents and young adults with and without chronic health conditions* [Poster presentation]. Society for Pediatric Psychology Annual Convention, Orlando, FL, United States.

44. Naftaly, J. P., Greenley, R. N., **Lang, A. C.**, & Davies, W. H. (2017, August 3–6). *Emerging adults with chronic medical conditions: Ongoing research and dissemination barriers* [Poster presentation]. American Psychological Association Annual Convention, Washington, D.C., United States.

45. **Lang, A. C.**, Igler, E. C., Defenderfer, E. K., Uihlein, J., Davies, W. H., & Brimeyer, C. (2017, March 30 – April 1). *Reactions to different physician pain dismissal topographies* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Portland, OR, United States.

46. Defenderfer, E. K., Igler, E. C., Austin, J. E., **Lang, A. C.**, & Davies, W. H. (2017, March 30 – April 1). *Parent compliance with AAP toilet training recommendations and the role of primary care providers* [Poster presentation]. Society of Pediatric Psychology Annual Conference, Portland, OR, United States.

47. Igler, E. C., Defenderfer, E. K., **Lang, A. C.**, Uihlein, J., & Davies, W. H. (2017, March 2 – 5). *Gender differences in the experience of perceived pain dismissal in adolescence* [Poster presentation]. Association for Women in Psychology Annual Conference, Milwaukee, WI, United States.

48. **Lang, A. C.**, Sampe, M. C., Hoks, R. M., Blumenfeld, A. A., & Abercrombie, H. C. (2016, April 14). *Early life adversity, depression, and negative memory bias* [Poster presentation]. Undergraduate Symposium – University of Wisconsin-Madison, Madison, WI, United States.

49. **Lang, A. C.**, Siwik, C. J., Hoks, R. M., Blumenfeld, A. A., & Abercrombie, H. C. (2015, April 16). *Early life stress, depression, and cortisol's effects on emotional memory* [Poster presentation]. Undergraduate Symposium – University of Wisconsin-Madison, Madison, WI, United States.

TEACHING EXPERIENCE

Spring 2021;
Fall 2020

Associate Lecturer, Psychology 550/750: History of Psychology (Online)
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisor: Susan D. Lima, Ph.D.
Responsibilities:

- Developed own curriculum
- Taught an undergraduate and graduate online course (via Canvas) regarding the history of psychology
- Graded discussion assignments, quizzes, and exams.

Spring 2021;
Spring 2020;
Spring 2019

Adjunct Instructor, Psychology 323: Health Psychology (In-Person; Online)
Mount Mary University, Milwaukee, WI
Supervisor: Laurel End, Ph.D.
Responsibilities:

- Developed own curriculum and adapted to online format (via eLearning) in March of 2020
- Taught undergraduates about the application of health psychology to their lives
- Graded discussion assignments, quizzes, exams, and papers

Spring 2021
Fall 2020

Grader, Psychology 319: Gay and Lesbian Psychology (Online)
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisor: Kristen L. Payne, Ph.D.

Fall 2019

Associate Lecturer, Psychology 260: Child Psychology (Online)
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisor: Susan D. Lima, Ph.D.
Responsibilities:

- Developed own curriculum
- Taught an undergraduate online course (via Desire2Learn) regarding child development and its relation to psychology
- Graded discussion assignments, quizzes, and exams

Spring 2017

Teaching Assistant, Psychology 660/760: Experimental Child Psychology (Online)
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisor: W. Hobart Davies, Ph.D.
Responsibilities:

- Graded undergraduate and graduate article critiques and lab reports (via Desire2Learn)
- Assisted with student statistical analyses for lab reports

Fall 2016 **Teaching Assistant, Psychology 260: Child Psychology (In-Person)**
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisor: Kristin Smith, Ph.D.
Responsibilities:

- Developed and taught content for in-person discussion section meetings with undergraduates
- Graded weekly discussion assignments

CLINICAL EXPERIENCE

2021 – Present **O'Grady Resident, Pre-Doctoral Internship (APA Accredited)**
Behavioral Medicine Track, Division of Behavioral Medicine & Clinical Psychology (BMCP)
Cincinnati Children's Hospital Medical Center, Cincinnati, OH
Training Directors: Sanita Ley, Ph.D. & Allison K. Zoromski, Ph.D.

BMCP Outpatient Training Clinic (in-person & via telehealth; 12 months)
Supervisor: Sanita Ley, Ph.D.
Responsibilities:

- Conduct intakes and psychotherapy for patients (age 7 to 20 years) with a variety of chronic health conditions (e.g., chronic kidney disease, eosinophilic gastritis, and epilepsy) and comorbid medical non-adherence and anxious, behavioral, and/or mood concerns utilizing cognitive-behavioral therapy (CBT) and behavior therapy techniques

Consultation-Liaison Service (in-person & via telehealth; 6 months)
Supervisor: Katherine Bedard-Thomas, PhD
Responsibilities:

- Conduct initial and follow-up consults for behavioral medicine and clinical psychology services with patients (age 0 to 28 years) and their families during hospitalization, with an emphasis on coping with hospitalization, medical non-adherence, coping with and integration of new diagnoses, and relaxation training
- Coordinate with medical teams regarding patient care

Headache Center and Biofeedback-Assisted Relaxation Training (in-person; 4 months)
Supervisor: Shalonda Slater, PhD
Responsibilities:

- Conduct multidisciplinary intakes with pediatric headache patients (age 5 to 19 years)
- Train patients (age 7 to 16 years) in biofeedback-assisted relaxation techniques
- Provide clinical supervision to doctoral graduate student

Pain Management (in-person & via telehealth; 6 months)
Supervisor: Anne Lynch-Jordan, Ph.D.
Responsibilities:

- Conducted multidisciplinary intakes for pediatric chronic pain patients (age 6 to 20 years)
- Conducted psychotherapy for patients (age 8 to 17 years) with comorbid pediatric chronic pain (e.g., arthralgia, diffuse amplified musculoskeletal pain, and migraines) and mental health concerns utilizing CBT and acceptance and commitment therapy (ACT) techniques

Neuropsychology Assessment (in-person & via telehealth; 4 months)
Supervisors: Dean Beebe, Ph.D., & Eman Rettig, Psy.D.
Responsibilities:

- Administered and score neuropsychological assessment measures, discuss case conceptualization, and write brief reports summarizing each case in collaboration with supervising neuropsychology fellow

Diabetes (in-person; 4 months)
Supervisor: Laura Smith, Ph.D.
Responsibilities:

- Conducted intakes and psychotherapy for patients (age 8 to 12 years) with comorbid Type 1 Diabetes and medical non-adherence, behavioral dysregulation, anxiety, and/or depression
- Co-facilitated Kicking In Diabetes Support (KIDS) group for adolescents

2020 – 2021 **Psychology Extern, Community Placement in Clinical Psychology (in-person & via telehealth)**
Jane B. Pettit Pain Management and Headache Center
Children's Wisconsin, Wauwatosa, WI
Supervisors: Kim Anderson Khan, Psy.D., Chasity Brimeyer, Ph.D., & Monica Gremillion, Ph.D.
Responsibilities:

- Conducted multidisciplinary intakes for pediatric chronic pain patients (age 6 to 18 years) alongside medical providers
- Conducted psychotherapy with patients with comorbid pediatric chronic pain (e.g., headaches, functional abdominal pain, and migraines) and mental health concerns (e.g., anxiety and depression) utilizing CBT and ACT
- Co-facilitated virtual Comfort Ability Program (vCAP), a 6-hour group intervention aimed to promote functioning, for adolescents with chronic pain and for their parents

May 2021; **Psychology Extern, Supplemental Clinical Experience (in-person)**
December 2019 **Psychiatry Consultation Liaison Services**
Children's Wisconsin, Wauwatosa, WI
Supervisors: Patricia Marik, Psy.D. & Jaquelyn Smith, Ph.D.
Responsibilities:

- Conducted inpatient consults for children and adolescents (age 10 to 18 years) recently admitted to the hospital, who were identified as at risk for post-traumatic stress disorder as indicated by the Screening Tool for Early Predictors of PTSD (STEPP) or referred by medical team member

2019 – 2020 **Psychology Extern, Community Placement in Clinical Psychology (in-person)**
Psychiatry and Behavioral Health Clinic
Children's Wisconsin, Wauwatosa, WI
Supervisor: Amy Ridley Meyers, Ph.D.
Responsibilities:

- Conducted psychodiagnostic intakes and psychotherapy for patients (age 11 to 18 years), who primarily identified as gender non-conforming and/or as part of the LGBTQIA+ community utilizing CBT and humanistic therapy techniques
- Co-led 6-session psychotherapy group for transgender and gender non-conforming adolescents

2019 – 2020 **Psychology Extern, Community Placement in Clinical Psychology (in-person)**
Feeding, Swallowing, and Nutrition Clinic
Children's Wisconsin, Wauwatosa, WI
Supervisor: Andrea Begotka, Ph.D.
Responsibilities:

- Conducted multidisciplinary intakes for pediatric feeding disorder patients (age 1 to 16 years) alongside speech-language pathologists, dieticians, and physicians
- Conducted psychotherapy with pediatric feeding disorder patients with comorbid behavioral, mood, and/or medical concerns utilizing behavioral therapy and CBT techniques

2018 – 2021 **Graduate Student Therapist, Practicum in Therapy (in-person & via telehealth)**
Anxiety Disorders Vertical Team, Department of Psychology Clinic
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisor: Shawn P. Cahill, Ph.D.
Responsibilities:

- Conducted psychotherapy with young adults (age 19 to 22 years) with anxiety, depression, obsessive-compulsive disorder, and excoriation disorder utilizing CBT, ACT-enhanced behavior therapy, and dialectical behavior therapy (DBT) techniques

2018 – 2020 **Graduate Student Therapist, Supplemental Clinical Experience (in-person & via telehealth)**
Eating Disorders, Body Image, Anxiety, and Mood Difficulties Vertical Team, Department of Psychology Clinic
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisors: Stacey Nye, Ph.D., FAED, & Eva Igler, M.A.
Responsibilities:

- Conducted psychotherapy with adolescents (age 14 to 15 years) with anxiety, depression, body image, and identity concerns utilizing CBT and DBT techniques

2018 – 2020 **Graduate Student Trainee, Supplemental Clinical Experience (in-person)**
Psychoeducational Evaluation Clinic/Child Neuropsychology Clinic
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisors: Bonnie Klein-Tasman, Ph.D., Kristin Smith, Ph.D., & Hanjoo Lee, Ph.D.
Responsibilities:

- Conducted psychodiagnostic and psychoeducational assessments with children, adolescents, and young adults (age 7 to 25 years) with a variety of academic, behavioral, and mood referral concerns
- Administered and scored intelligence, academic achievement, executive functioning, psychodiagnostic, and other assessment measures
- Wrote integrated psychodiagnostic and psychoeducational reports and conducted feedback sessions with patients and their families
- Provided in-house assessment services to a local elementary school for identification of intellectual disabilities and specific learning disorders and provided support to school staff and families in developing an Individualized Education Program (IEP) or 504 Plan

2018 – 2019 **Psychology Extern, Practicum in Therapy (in-person)**
Encopresis and Enuresis Vertical Team, Gastroenterology Clinic
Children's Wisconsin, Wauwatosa, WI
Supervisors: Alan Silverman, Ph.D. & W. Hobart Davies, Ph.D.
Responsibilities:

- Conducted psychodiagnostic intakes and psychotherapy with patients (age 3 to 18 years) with encopresis and related toileting problems, as well as comorbid behavioral, emotional, and/or medical concerns utilizing a protocolized behavioral approach

2017 – 2018 **Graduate Student Therapist, Practicum in Assessment (in-person)**
Departmental Psychology Clinic
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisors: Bonnie Klein-Tasman, Ph.D., Kristin Smith, Ph.D., Kyle Jennette, M.S., & Ashleigh Harvey, B.S.
Responsibilities:

- Conducted psychodiagnostics and psychoeducational assessments with children, adolescents, and young adults (age 7 to 20 years) with a variety of academic, behavioral, and emotional concerns
- Administered and scored psychodiagnostic, intelligence, academic achievement, executive functioning, and other assessment measures
- Wrote integrated psychodiagnostic and psychoeducational reports and conducted feedback sessions with clients and their families

2016 – 2018 **<u>First- and Second-Year Graduate Student Trainee</u>, Vertical Teams (in-person)**
Departmental Psychology Clinic
University of Wisconsin-Milwaukee, Milwaukee, WI
Supervisors (Year), Vertical Team:
Stacey Nye, Ph.D., FAED (2016), Eating Disorders Body Image, Anxiety, and Mood Difficulties
Alan Silverman, Ph.D., & W. Hobart Davies, Ph.D. (2016 – 2017), Encopresis and Enuresis
Shawn Cahill, Ph.D. (2018), Anxiety Disorders Vertical Team
Description: Vertical teams are the method by which students experience "hands on" therapy training beginning in their first year of the clinical psychology doctoral program at the University of Wisconsin-Milwaukee. Vertical teams consists of 1-2 first year students, 1-2 second year students, 2-3 third year students, and a supervising, licensed psychologist.
Responsibilities:

- Served as a therapist as a third year; administered and scores psychodiagnostics assessments as a second year; and observed therapy sessions to learn the empirical basis for intervention as a first year
- Met weekly with other students and supervising, licensed psychologist to discuss cases

RELEVANT TRAINING EXPERIENCE

2020 **The Virtual Comfort Ability Program Training (2 hours)**
Rachael Coakley, Ph.D., Simona Bujoreanu, Ph.D., Amy Hale, Ph.D., Janae Biggs, B.S., & Maureen Burns, B.S., B.A.
Boston Children's Hospital

2020 **Pain Education for Health Providers (9 hours)**
Rachel Zoffness, Ph.D.
Virtual Webinar Series

2020 **Tending to Racial Trauma During Crisis (4 hours)**
Sam Lee, LPC, & Melody Li, LMFT
Inclusive Therapists

2020 **Telepsychology Best Practices 101 (8 hours)**
Marlene Maheu, Ph.D.
American Psychological Association

Spring 2020 **Educational Psychology 832: Theory of Hierarchical Linear Modeling (elective; 3 credits)**
Razia Azen, Ph.D.
University of Wisconsin-Milwaukee

Fall 2019 **Educational Psychology 820: Multiple Regression (elective; 3 credits)**
Razia Azen, Ph.D.
University of Wisconsin-Milwaukee

2019 – 2021 **Pediatric Psychology & Clinical Psychology Externship Didactics (50 hours)**
Kim Anderson Khan, Psy.D., Jaquelyn Smith, Ph.D., & Alan Silverman, Ph.D.
Children's Wisconsin & the Medical College of Wisconsin

2017 – 2018 **Leadership Education in Neurodevelopmental and Related Disabilities (LEND; 200 hours)**
Bonnie Klein-Tasman, Ph.D., & Kris Pizur-Barnekow, Ph.D., OTR/L
University of Wisconsin-Madison, Madison, WI
Description: LEND is an interdisciplinary leadership training program federally funded through the Maternal and Child Health Bureau.
Responsibilities*:*

- Worked alongside graduate students, post-graduates, family member advocates, self-advocates, and community professionals with the goal of improving care systems that ensure access to family-centered, community-based services and supports for children with neurodevelopmental and related disabilities and their families
- Observed, administered, and scored assessment measures in an interdisciplinary autism spectrum disorder diagnostic clinic
- Developed and enhanced clinical, research, and advocacy leadership skills
- Conducted research evaluating the utility of an assessment tool designed to assist families of children with autism spectrum disorder in navigating a new diagnosis

2016 – 2021 **Professional Development in Psychology (PDP; 100 hours)**
Chris Larson, Ph.D., Bonnie Klein-Tasman, Ph.D., & Stacey Nye, Ph.D., FAED
Clinical Psychology Program, Psychology Department, University of Wisconsin-Milwaukee

LEADERSHIP AND SERVICE EXPERIENCES

2022 **Ad-Hoc Reviewer under the supervision of Avani C. Modi, PhD**
Epilepsy and Behavior

2021 **Ad-Hoc Reviewer under the supervision of Avani C. Modi, PhD**
Epilepsia

2020 – Present **Communications Chair**
Adolescent and Young Adult Special Interest Group (SIG) Leadership Board, APA Division 54 (Society of Pediatric Psychology)

2020 – Present **Student Journal Club Member**
Journal of Pediatric Psychology, APA Division 54 (Society of Pediatric Psychology)

2020 – 2021 **Student Co-Chair**
Clinical Psychology Program Diversity Committee, University of Wisconsin-Milwaukee

2020 – 2021 **Student Co-Chair & Member**
Psychology Department Diversity Committee, University of Wisconsin-Milwaukee

2020 – 2021 **Secretary**
Health Psychology Graduate Students Club, University of Wisconsin-Milwaukee

2019 – 2021 **President & Co-Founder**
Clinical Child/Pediatric Psychology Association, University of Wisconsin-Milwaukee

2019 – 2020 **Student Member**
Clinical Psychology Program Diversity Committee, University of Wisconsin-Milwaukee

2019 – 2020 **Hospitality Volunteer**
Ronald McDonald House Charities, Wauwatosa, WI

2018 – 2020 **Policy Co-Chair**
Adolescent and Young Adult SIG Leadership Board, APA Division 54 (Society of Pediatric Psychology)

2017 **Ad-Hoc Reviewer under the supervision of W. Hobart Davies, Ph.D.**
Pediatrics

PROFESSIONAL ASSOCIATION MEMBERSHIP

- American Psychological Association
  - American Psychological Association of Graduate Students
  - Society of Clinical Psychology (Division 12)
  - Society of Clinical Child and Adolescent Psychology (Division 53)
  - Society of Pediatric Psychology (Division 54)
    - Pain Special Interest Group (SIG)
    - Adolescent and Young Adult SIG
    - Adherence and Self-Management SIG
- Association for Psychological Science
- Midwestern Psychological Association
- Wisconsin Psychological Association