Title

Examining the Influence of the Social Ecosystem on Mental Health Development during the Transition to Adulthood

Author

Rava, Julianna

Publication Date

2023

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA

Los Angeles

Examining the Influence of the Social Ecosystem on Mental Health Development during the Transition to Adulthood

A dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Health Policy and Management

by

Julianna Rava

2023

ABSTRACT OF THE DISSERTATION

Examining the Influence of the Social Ecosystem on Mental Health Development during the Transition to Adulthood

by

Julianna Rava

Doctor of Philosophy in Health Policy and Management

University of California, Los Angeles, 2023

Professor Daniel Eisenberg, Chair

This dissertation explores the complex connection between the social ecosystem and mental health development during the transition to adulthood. Utilizing a comprehensive approach, the social ecosystem is evaluated through three fundamental constructs: social support, social connectedness, and social capital. Mental health is assessed holistically, encompassing mental health conditions, well-being evaluations, and perceived mental health needs. Embracing an interdisciplinary perspective, the conceptual framework integrates population health strategies with a Life Course Health Development (LCHD) perspective grounded in developmental psychology principles. The primary objective is to advance our understanding of how youth's social ecosystem interacts with other developmental factors to shape mental health. The first paper examines factors within youth's social ecosystem fostering resilience amid adverse family environments. The second paper assesses the impact of social connectedness and social media on youth mental health. The third paper explores how youth social support influences mental health help-seeking behavior. In conclusion, this dissertation emphasizes the importance of promoting positive mental health strategies, advocating for relational agency, and considering the lasting effects of social factors on mental health. The insights gleaned from these papers are

instrumental in developing effective interventions and policies to support the mental well-being of young people. As the exploration of these dynamics continues, collaborative efforts across disciplines remain crucial for sustaining the mental well-being of youth and future generations.

The dissertation of Julianna Rava is approved.

Neal Halfon

Emily Rose Hotez

Alice Ann Kuo

Lauren Elisabeth Wisk

Daniel Eisenberg, Committee Chair

University of California, Los Angeles

2023

DEDICATION

This dissertation is dedicated to my family and friends, whose unwavering support has been my anchor throughout this academic journey. In special recognition, I extend my deepest appreciation to my parents and my beloved siblings, whose constant encouragement and love have been a profound source of inspiration and strength.

TABLE OF CONTENTS **PAGE**

FIGURES & TABLES **PAGE**

LIST OF ACRONYMS

MHCs	Mental health conditions
WHO	World health organization
APA	American Psychological Association
DSM	Diagnostic and Statistical Manual of Mental Disorders
ICD	International Classification of Diseases
NIH	National Institutes of Health
NCS	National Comorbidity Survey (NCS)
BRFSS	Behavioral Risk Factor Surveillance System (BRFSS)
MHC-SF	The Mental Health Continuum – Short Form (MHC-SF),
CWI	Child and Youth Well-being Index (CWI)
LCHD	life course health development (LCHD)
DST	Developmental Systems Theory (DST
PYD	positive youth development (PYD)
TAY	transition-age youth (TAY)
PSID	the Panel Study of Income Dynamics (PSID)
HMS	The Healthy Minds Study (HMS)
CDS	Child Development Supplement (CDS
TAS	the Transition into Adulthood Supplement
AFE	adverse family environments
ACE	Adverse Childhood Experiences

ACKNOWLEDGEMENTS

I express my sincere gratitude to my Committee for dedicating their invaluable time, effort, commitment, and thoughtful input throughout this process. Daniel, your consistent and insightful contributions played a pivotal role as I navigated the development and interpretations of each chapter. Alice, I am deeply thankful for your support during my time as a research assistant on the Autism Intervention Research Network on Physical Health (AIR-P). Neal, your mentorship and guidance were indispensable as I navigated my career path. Emily, your unwavering support and encouragement have been truly cherished; thank you for generously providing numerous learning opportunities during my time as a research assistant. Lauren, your wealth of knowledge has been a tremendous benefit, and I appreciate the considerable time and input you contributed throughout this dissertation process.

Chapter 2 is a version of "The Role of Social Capital in Resilience Among Adolescents with Adverse Family Environments" published in the journal, Current Problems in Pediatric and Adolescent Health Care. Authors include Julianna Rava, Emily Hotez, and Neal Halfon.

VITA

Julianna Rava holds a Master of Public Health (MPH) with a concentration in Epidemiology from Drexel University's Dornsife School of Public Health and a Bachelor of Arts in Health Sciences from Gettysburg College. From 2015 to 2020, she served as a Science Policy Analyst at the Office of Autism Research Coordination (OARC) within the National Institute of Mental Health (NIMH). During her tenure as a PhD student, Julianna contributed as a Research Assistant for the Autism Intervention Research Network on Physical Health within UCLA's Department of Internal Medicine-Pediatrics. Her research findings have been disseminated through publications in various academic journals, including the Journal of Autism and Developmental Disorders, Cureus, and Current Problems in Pediatric and Adolescent Health Care.

Chapter 1. Introduction

Problem & Significance

Population health priorities have undergone significant transformations throughout the past century. Early public health initiatives focused on infectious disease, which lead to standardized preventive practices and advancements in modern medicine. These efforts extended the population's life expectancy drastically. However, over the last 40 years mortality trends shifted towards chronic conditions, such as heart disease, cancer, and diabetes.[1] This epidemiological transition to chronic health conditions required a public health approach focused on promoting healthier behaviors, such as increased physical activity and improved dietary wellness. As a result, population life expectancy improved, particularly for individuals with comorbidities.

Today, we are experiencing a population-level mental health crisis. Individuals with severe mental illnesses face a life expectancy that is 20 years shorter than the average person.[2] Further, we are seeing mental health conditions (MHCs) rise among the younger U.S. population. Nearly one-third of adolescents are diagnosed with anxiety (32%),[3] and 17% grapple with depression.[4] MHCs constitute the leading cause of disability and adverse life outcomes among young people, accounting for 45% of the disease burden for individuals aged 10-24.[5] While youth MHC rates have been steadily climbing over the past decade, the COVID-19 pandemic exacerbated an already alarming situation.[6] We are currently witnessing a critical shift in the epidemiological landscape, with mental health issues demanding immediate, population-wide intervention. As these trends manifest during early life stages, it is paramount to address mental health well before individuals transition into adulthood. Unfortunately, our existing healthcare systems are ill-equipped to cope with the escalating rates of mental health challenges

among the U.S. population. The surging demand for mental health services has led to a shortage of qualified professionals.[7,8] It is imperative for health services researchers to delve into the factors contributing to mental health challenges among younger populations and explore avenues for improving their lifelong mental health and overall life expectancy.

Concurrently, the U.S. population is confronted with an epidemic of loneliness and a decline in social connections, which has been associated with poor health outcomes.[9] The COVID-19 pandemic imposed prolonged periods of social isolation and shifted everyday interactions to virtual platforms. However, social connection was in jeopardy before the pandemic, as societal reliance on technological advancements increased productivity at the cost of in-person social engagement. In May 2023, the U.S. Surgeon General released an advisory report cautioning the public about the detrimental effects of social isolation and the importance of social connections and community belongingness in fostering positive mental health and well-being.[9] As mental health challenges continue to manifest at increasingly younger ages, it becomes crucial to explore the role that social connection plays in nurturing lifelong mental health. The overarching goal of this dissertation is to investigate how youth's social ecosystem influence mental health and well-being. By leveraging data from population health surveys, we aim to gain a deeper understanding of how youth's environment fosters resilience, buffers against risk factors, and influences engagement with mental health services, ultimately paving the way for an optimal mental health trajectory.

Background

The Evolution of Mental Health

An evolving perspective on mental health recognizes that it encompasses more than just diagnosed mental health conditions (MHCs). The World Health Organization (WHO) defines

mental health as, “a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community.”[10] Positive mental health is integral to overall well-being and seen equally as important as optimal physical health; it is associated with better life course outcomes, such as satisfaction with one’s relationships, higher educational attainment, and employment.[11,12] However, mental health is dynamic and can be affected by an individual’s environment, relationships, and circumstances. Factors affect individuals differently – people may experience short-term or long-term poor mental health and the contributing factors may be persistent or due to a one-time traumatic experience. This broad definition of mental health can be difficult to measure and assess, therefore, it is often included in measurements of overall well-being.

MHCs (i.e., anxiety, depression, schizophrenia, bipolar disorder, etc.) are clinically observable variations of an individual’s mood, emotions, or behaviors due to biological adaptations in the brain. Specifically, the altered brain chemistry interferes with neurotransmitter communication, which clinically presents as changes in behavior and mood.[13] For example, clinical depression involves lower serotonin levels in the brain and the medical treatment includes selective serotonin reuptake inhibitors (SSRIs), which targets the brain chemical imbalance and aims to increase serotonin levels to improve symptoms of depression.

MHCs vary in occurrence, they may be chronic, episodic, or temporary (i.e., occur during a short time frame) and they may develop in childhood or adulthood. Further, MHCs differ in severity – some MHCs do not require healthcare interventions but rather some behavioral lifestyle changes, whereas some MHCs may be extremely debilitating and require intensive interventions or medication. In the United States, more than 50% of the population will be diagnosed with an MHC in their lifetime,[14] and roughly one in five individuals will experience a MHC each year.[15] However, these statistics are based on data prior to the COVID-19 pandemic,

which had a detrimental effect on the population's well-being, we can likely assume these statistics are underestimating current MHC rates.[16,17] Generally, MHCs are common and require population-level strategies to address increasing concerns.

There are multiple factors associated with the development of MHCs, such as adverse childhood experiences, chronic physical health conditions, biological and genetic factors, geopolitical and environmental crises (e.g., war, hurricanes), substance use, and a lack of social connection. Risk factors can work individually or be compounded to prompt a MHC. There are also protective factors that are associated with decreasing the risk of developing some MHCs, such as positive interpersonal relationships with family and friends, physical activity, and community engagement. To improve adverse mental health outcomes, it's important for us to understand the various influences involved.

Currently, there are over 200 types of MHCs. The identification of mental health diagnoses is relatively modern. The American Psychological Association (APA) developed the first Diagnostic and Statistical Manual of Mental Disorders (DSM) in 1952 in response to a lack of acceptance of the International Classification of Diseases (ICD)-6 MHCs' diagnostic criteria.[18] Around the same time, the National Institute of Mental Health (NIMH) was established as one of the first four institutes of the U.S.'s federal agency on health research, the National Institutes of Health (NIH). NIMH leads and funds research to understand the prevention, recovery, and treatment of MHCs.

The first U.S. national study of mental health was the National Comorbidity Survey (NCS) 1990-92. The survey administered mental health assessments to 8,000 respondents ages 15-54 across the U.S. The NCS provided our first look at the prevalence of MHCs and associated risk factors and life outcomes. Since the NCS study was conducted, the federal government has included mental health assessments (i.e., Kessler-6, PHQ-9) and self-reported diagnoses of

MHCs in national surveys such as the National Mental Health Services Survey, National Health Interview Survey, the National Survey on Drug Use and Health, and the Behavioral Risk Factor Surveillance System (BRFSS) survey, among others. There are also national surveys focused specifically on youth, which include mental health assessments, such as the National Survey of Children's Health, The National Longitudinal Study of Adolescent Health, the Monitoring the Future survey, and the National Longitudinal Transition Study, which focused on transition-age youth. It is important to note that these national surveys include numerous questions related to physical and mental health, as well as health behaviors, services use, and non-health questions. While mental health may be captured, it is not the focus of these national surveys. A mental health surveillance study comparable to the NCS has not been conducted in the U.S. since the NCS ended in 2002. However, the current cross-sectional, nationally representative surveys provide helpful information in assessing the state of mental health in our country, particularly as mental health relates to other aspects of daily life. Utilizing large, population-level surveys may be a crucial first step towards addressing the U.S. youth mental health crisis.

Well-being

Well-being is often intertwined with mental health; it is a multidimensional construct associated with positive life course outcomes that can be measured both objectively and subjectively. Objectively, well-being is often measured by health status and conditions, educational attainment, marital status, and economic status. Subjectively, well-being is assessed by an individual's perspective on their physical, mental, relational, and overall health. There is not one standard definition or set of measures to define well-being. Among youth development research, there are also several terms that are interchangeable with well-being, including flourishing, thriving and positive development.[19] Within youth positive development, the

conceptual areas of health, education, employment, family/relationships, and community have been used to assess multidimensional well-being.[20]

The lack of an operationalized term for well-being leads to the absence of a gold standard of measurement. Rather, there are several scales and indices to measure well-being, some assessments that are more often used in research include:

- The Mental Health Continuum – Short Form (MHC-SF), also known as a flourishing scale.[21] The MHC-SF includes measures on emotional well-being, social well-being, and psychological well-being. The MHC-SF is used in population-level surveys, including the Panel Study of Income Dynamics.
- The Child and Youth Well-being Index (CWI) is an evidence-based measure of quality of life among U.S. youth.[22] The CWI includes measurements in the following domains: family economic well-being, safe/risky behavior, social relationships, emotional/spiritual well-being, community engagement, educational attainment, and health.
- The Multidimensional Index of Positive Development in Emerging Adulthood considers five domains that are important to positive psychosocial development: social competence, life satisfaction, trust and tolerance of others, trust in authorities/institutions, and civic engagement.[20] Although a relatively new index, it identifies potential areas for youth intervention to promote positive development in emerging adulthood.

Although different assessments, the indices mentioned above include significant overlap in life course outcomes and health development areas that will be important to consider when assessing lifelong mental health and associated factors.

Youth Health Development

In order to develop interventions that promote lifelong mental health among youth, it is important to embrace an interdisciplinary approach that draws upon theories and frameworks from developmental science and public health, enabling a comprehensive assessment of youth health development. An overarching framework is the life course health development (LCHD) framework, a translational framework that draws on evidence from biology, sociology, epidemiology and psychology to explain health development across the lifespan.[23] LCHD models expand on the biological and medical system models and integrate theories from both systems of thinking to demonstrate a more modern understanding of health development. Specifically, LCHD models recognize that health development is complex, relational, adaptive, and dynamic.[24]

The LCHD framework acknowledges that within each life stage, there are sensitive periods during which various environmental and social factors can alter the health trajectory, which reveals the adaptive nature and plasticity of health development. Therefore, in attempting to understand mental health development, it's important to consider youth's developmental system and its influence across the lifespan. Further, the LCHD framework highlights the importance of the dynamic relational environment during the formative stages of childhood and adolescence. Similar to Bronfenbrenner's ecological systems theory[25], the LCHD framework stresses the profound impact of the child's environment, including family, friends, community, and society. It also recognizes the intricate interplay between these elements in shaping health development. Nevertheless, the LCHD framework expands on Bronfenbrenner's theory, suggesting the dynamic relational environment exerts a direct influence on the behavioral, physiological, and developmental processes within a child's biological systems, which leads them along distinctive, lifelong health trajectories. Further, across the life course there is an

ongoing interaction between the relational environment and the behavioral and biological systems that continually influences health outcomes, including mental health.

Additionally, LCHD models incorporate Developmental Systems Theory (DST), a theoretical framework which uses a holistic approach to highlight the interconnectedness of various factors and processes influencing an individual's growth and development.[26] The DST framework extends to the positive youth development (PYD) framework, which offers a strengths-based perspective on youth development.[27,28] Specifically, the PYD framework identifies potential pathways for positive growth, resilience, and thriving among youth through "5 Cs of Positive Youth Development", which are competence, confidence, character, connection, and caring.[27] Further, the PYD framework recognizes the significance of environmental influences, the development of identity and self-concept, and the role of relationships in shaping youth development.[27–29] In summary, the PYD and LCHD frameworks complement each other and can be used synergistically to create a comprehensive approach to promoting the health and development of individuals from adolescence into adulthood.

Youth's Social Ecosystem

Youth heath development is strongly dependent on relational agency, which refers to the idea that youth's growth and well-being are shaped by their capacity to act within the context of their relationships and social environments. Bronfenbrenner's ecological systems theory provides a comprehensive framework delineating how an individual's social environment operates at multiple levels, including the microsystem, mesosystem, exosystem, and macrosystem, all of which exert considerable influence on health outcomes.[25] Within this framework, the microsystem encompasses interpersonal interactions, encompassing familial and peer relationships, and school and community engagement. The mesosystem acknowledges the interconnectedness among the various components of the microsystem. Meanwhile, the

exosystem takes into account the broader societal forces, such as neighborhood characteristics, social services, and political structures, that impinge upon the individual. The macrosystem incorporates the cultural elements that shape not only the exosystem but also the groups and individuals within it. Overall, Bronfenbrenner's socioecological model underscores the centrality of social connections as a foundational element in individual development.

Further, the PYD and LCHD frameworks highlight that youth health development is not solely determined by external forces or circumstances but is the result of youths' active engagement within their relational networks. These frameworks promote the idea that youth have the capacity to make choices, set goals, and engage in actions that positively influence their development and well-being, especially when they are supported by positive relationships and environments.[24,27,29] Ultimately, recognizing the significance of relational agency within youth's social ecosystem encourages interventions and policies that foster supportive relationships, empower youth to make informed decisions, and create conditions that enable them to actively participate in their own health development.

Regarding mental health, the closest and most "intimate" circles (i.e., family, close peers, mentors) are likely to have a stronger influence on mental health outcomes during the formative years of youth. However, as youth transition from childhood to young adulthood, the dynamics of these interpersonal relationships undergo a shift in magnitude. While families continue to play a vital role, their influence gradually takes a backseat to that of peers as youth mature into adults. Moreover, youth's microsystem may promote positive mental health or heighten the risk of developing MHCs, depending on the intricacies of each relationship within the youth's environment.[30–33] Therefore, understanding how youth's microsystem interacts with different risk and protective factors will help inform interventions and policies that promote positive lifelong mental health.

There is a robust body of evidence underscoring the intricate connection between youth's social ecosystem and mental health, particularly during the formative and transitional years. This dissertation will assess three fundamental elements of youth's social ecosystem: social support, social connectedness, and social capital. Social support, from a relational perspective, explores how dynamic relationships characterized by low conflict, companionship, and security impact health outcomes.[34] Social connectedness refers to the internal sense of closeness in one's relationships with others.[35] Meanwhile, social capital encompasses the resources accrued through social support and social cohesion, resources that have been associated with enhanced health, reduced mortality, and greater resilience.[36,37] However, in order to inform interventions aimed at fostering lifelong mental health, it is imperative to develop a deeper understanding of how youth's social ecosystem interacts with other elements of youth development.

Lastly, beyond understanding the "why" of the youth mental health crisis, it is equally crucial to delve into "how" they currently seek mental health support and interventions. This concern becomes particularly salient as youth are under-utilizing mental health services.[38,39] Indeed, help-seeking behavior for mental health concerns does not only include formal services (e.g., psychotherapy and psychotropic medication) but involves informal supports, such as social support systems through parents, peers, and mentors.[40] Utilizing informal supports for mental health is a drastically different approach to care than is understood by our healthcare systems, as well as health services research. As stakeholders continue to examine youth mental health needs and strategies for intervention, one may need to rethink their conceptual understand of help-seeking behavior as it relates to mental health and mental healthcare.

Transition to Adulthood

An interdisciplinary approach to youth development underscores the significance of formative and transitional periods in fostering lifelong mental health. Within this context, the

transition to adulthood comprises two pivotal life stages: adolescence (ages 10-17) and emerging adulthood (ages 18-29). These phases are characterized by profound shifts in self-identity and the influential factors within one's social ecosystem.[28,41–44] Collectively, adolescence and emerging adulthood characterize the developmental period of transitioning to adulthood. For the purposes of this dissertation, the term transition-age youth (TAY) will encompass adolescents and emerging adults.

i. Adolescence

Adolescence is considered the second decade of life (ages 10-17) and established by the onset of puberty. During adolescence, an individual undergoes significant developmental changes, including cognitive, physiological, and relational changes.[45–47] As adolescents' brains develop, they have a greater capacity to develop agency in their decisions and values.[41,48,49] Erikson's psychosocial development theory identified adolescence as the pivotal time frame for identity formation.[50] Further, Erikson's theory of psychosocial development insists that identity formation is important in health development and continues across the lifespan. Adolescent identity formation includes the development of self and interpersonal relationships, which are marked by horizontal and vertical relationships. Vertical relationships typically have power over the adolescent and provide security while the adolescent tests levels of independence;[51] these relationships typically include parent and teacher relationships. Horizontal relationships are relationships of equal power and allow an adolescent to develop skills related to cooperation, competition, and intimacy[51]; these relationships are often with peers. Sibling relationships are often seen as vertical relationships rather than horizontal as older siblings often provide dependency and nurturance versus what is expected in horizontal relationships.[51] Research supports that strong, positive vertical and horizontal relationships support adolescents in achieving identity formation that promotes psychosocial development across the lifespan.[51–53]

Parenting plays a pivotal role in shaping the mental health of adolescents, both positively and negatively. Supportive and nurturing parenting practices, characterized by open communication, emotional warmth, and a secure attachment, tend to foster positive mental health outcomes.[54–57] Adolescents who experience such positive parenting environments are more likely to develop resilience, self-esteem, and effective coping mechanisms.[58] Conversely, negative parenting practices, such as harsh discipline, neglect, or inconsistent rules, can significantly increase the risk of mental health challenges among adolescents.[59,60] High levels of parental stress or conflicts within the family can also have detrimental effects on an adolescent's mental well-being.[61,62] Furthermore, parental modeling of healthy behaviors and attitudes for mental health can influence adolescents' perceptions and attitudes, shaping their willingness to seek help and engage in self-care practices. Ultimately, parenting styles, communication patterns, emotional support, and parental mental health all exert a substantial impact on the mental health trajectory of adolescents, highlighting the critical role parents play in their children's overall well-being during this crucial developmental stage.

Adolescence also marks a time of transition between the horizontal and vertical relationships. In childhood, youth rely on the parent-child relationship for psychosocial development; during adolescence, youth depend more on peer relationships.[63,64] Although the parent-child relationship continues to be a significant influence during adolescence, youth spend more time with their peers and place more value on their peer relationships, which further influences identity formation and health behaviors. Peer relationships hold a profound sway over the mental health of adolescents, exerting both positive and negative influences. Positive peer relationships – characterized by quality social support, strong friendship networks, and a sense of belonging – can be a robust protective factor against mental health challenges.[65,66] Adolescents who forge meaningful connections with peers often experience increased self-esteem and emotional

resilience, which can buffer the impact of stressors. Conversely, negative peer dynamics, such as bullying or social isolation, can significantly increase the risk of adverse mental health outcomes.[67,68] Negative peer experiences may lead to feelings of anxiety, depression, or low self-worth among adolescents. Additionally, the pressure to conform to peer norms and engage in risky behaviors can further exacerbate mental health concerns or lead to negative life course outcomes in the future. It is essential to recognize that the quality of peer relationships, the presence of peer support networks, and the nature of peer interactions all contribute to the mental health of adolescents.

As previously highlighted, the state of youth mental health is becoming increasingly alarming. Specifically, the adolescent population has been grappling with a concerning surge in mental health challenges, prominently anxiety and depression.[69,70] Over the span of the last decade, there has been a significant increase in persistent feelings of sadness or hopelessness among high school students (26.1% to 42%).[6,71] Moreover, high school students have seen an increase in suicide ideation, with numbers surging from 13.8% to 22%.[71,72] Recent CDC estimates reveal suicide as the second leading cause of mortality within this age group.[73] Given that the social ecosystem plays a pivotal role in shaping youth mental health, both positively and negatively, it is imperative to investigate how their social ecosystem can be leveraged to mitigate the long-term consequences of these distressing mental health trends.

ii. Emerging Adulthood

Emerging adulthood is characterized by greater independence as youth transition to full adulthood. Over the past few decades, Western cultures have experienced a shift marked by a delay in the onset of adulthood. Specifically, we are seeing youth in their late teens and early twenties continue the exploratory phase (i.e., the psychosocial moratorium) of identity formation.[50,74] This has led to the recognition of emerging adulthood as a unique development

period that is often indicated by instability.[74] In the U.S., we saw after the 2007 stock market crash, many emerging adults return from college and move back into their family homes rather than pursue independent living situations. Fifteen years later, the practice of moving back home after college has become a norm among society. The delay in establishing independence influences the biological and behavioral development of emerging adults – a lack of independence from one's parents/caregivers hinders an emerging adults' ability to develop an identity and pursue experiences that require emerging adults to take full responsibility for oneself.

Another aspect of emerging adulthood is the prevalence of major life transitions. During this time frame, emerging adults are pursuing postsecondary and professional education, entering the workforce, getting married, and having children. Some emerging adults may experience all of these life experiences, while others may only pursue one or two of them. The life changes in emerging adulthood are also complemented by relational changes – by the time an emerging adult is entering full adulthood, the relational dynamics are more dependent on the self and workplace than their family and peers.[63,75] The volatile nature of emerging adulthood can have significant effects on emerging adult health, particularly their mental health and well-being.

Among emerging adults, mental health has become a major concern, with alarming rates of depression, anxiety, and suicide risk [76]. From 2007-2017, MHCs among college students increased from 22% to 36%.[71] Unfortunately, the recent COVID-19 pandemic only amplified mental health challenges for emerging adults [77]. Indeed, addressing mental health concerns among emerging adults is crucial for improving lifelong mental health. It I particularly important due to the biological nature of MHCs, as brain maturation ends in one's mid-20s.[13] Further, evidence supports that most people will have a MHC in their lifetime and onset will occur before

age 25.[78] Therefore, any proactive measures that can occur in emerging adulthood should be considered.

Furthermore, it is important to recognize that many emerging adults who grappled with poor mental health during the unprecedented challenges of the 2020 COVID-19 pandemic also reported heightened feelings of social isolation.[79–81] Notably, previous research has shed light on the critical role of social support during emerging adulthood, in that, robust social support networks can act as safeguards against adverse mental health outcomes.[82] Supportive relationships with family members, peer groups, and mentors can serve as invaluable buffers, helping individuals navigate the challenges and uncertainties that often accompany the transition to adulthood. Similarly, community engagement has been identified as a potent contributor to positive mental health and overall well-being among emerging adults.[83,84] Active participation in community activities, volunteerism, and social networks not only provide a sense of belonging and purpose but also foster the development of social connections that can mitigate the adverse effects of isolation and promote mental well-being.

Given the evidence, utilizing the social ecosystem of emerging adults may be a critical juncture in developing effective interventions to support their mental health trajectory. Such interventions should not only aim to strengthen existing support systems but also encourage active participation in communities, ultimately bolstering resilience and well-being in this critical phase of life.

Dissertation: Aims & Objectives

This dissertation aims to investigate the role of the social ecosystem in mental health development during the transition to adulthood. The quality of TAY's social ecosystem will be assessed through three social constructs: social support, social connectedness, and social capital.

Mental health will be viewed holistically and assessed through MHCs, well-being assessments, and perceived mental health needs. Adopting an interdisciplinary perspective, our conceptual framework draws from population health strategies, infused with a LCHD perspective, and rooted in the foundational principles of developmental psychology. Table 1-1 provides a list of terminology and operational definitions that will be used throughout the three-paper dissertation.

The primary objective of this dissertation is to advance our comprehension of how TAY's social ecosystem interacts with other factors within youth's environment to influence mental health. The first paper aims to understand the factors within TAY's social ecosystem that foster resilience when they experience adverse family environments. The second paper explores the impact of social connectedness and social media on TAY mental health. The third paper examines the effect of TAY social support in mental health help-seeking behavior. All three papers use population-level survey data to illuminate how TAY's social ecosystem may be harnessed to promote lifelong mental health.

Table 1-1. Terminology and Operational Definitions
Table 1-1 provides common terms and their operational definitions that will be referenced throughout this dissertation.

Term	Definition
Mental Health	"A state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community."[10]
Mental Health Conditions (MHCs)	MHCs (i.e., anxiety, depression, schizophrenia, bipolar disorder, etc.) are clinically observable variations of an individual's mood, emotions, or behaviors due to biological adaptations in the brain.
Well-being	Well-being is a multidimensional construct associated with positive life course outcomes that can be measured across the domains of health, educational attainment, marital status, and economic status.
Transition to Adulthood	Includes the life stages of emerging adulthood and late adolescence, as an individual matures and learns skills for independence. Individuals during this time frame are known as transition-age youth (TAY).
Emerging Adulthood	Young adults between the ages of 18-30 years old. A life stage commonly understood as transitory in nature.

Adolescence	Traditionally known as the ages of 10-17 years old and is signified by entering puberty.
Social Ecosystem	The interconnected relational network that includes an individual's family, peers, and community, and societal norms.[25]
Social Capital	Social capital encompasses the resources accrued through social support and social cohesion.[37]
Social Support	Social support refers to the provision of emotional, informational, and tangible assistance from others to an individual who is facing a stressor or a challenging situation.
Social Connectedness	Social connectedness refers to the sense of connectedness to a person, a group of people, or community.

Conceptual Model

The theoretical basis of this dissertation's conceptual model (depicted in Figure 1-A) draws from the LCHD framework, the PYD framework, and the socioecological model.[23,25,27] This model illustrates how, during a sensitive phase of development (i.e., the transition to adulthood), the dynamics of the social ecosystem interact with the biological and behavioral regulatory processes to shape the mental health trajectory. Each paper within this dissertation explores a distinct facet of the social ecosystem (social support, social connectedness, and social capital) and assesses their influence on mental health outcomes or mental health services utilization. The overarching objective of this research is to identify specific areas within the transition to adulthood where interventions can be employed to promote lifelong mental health.

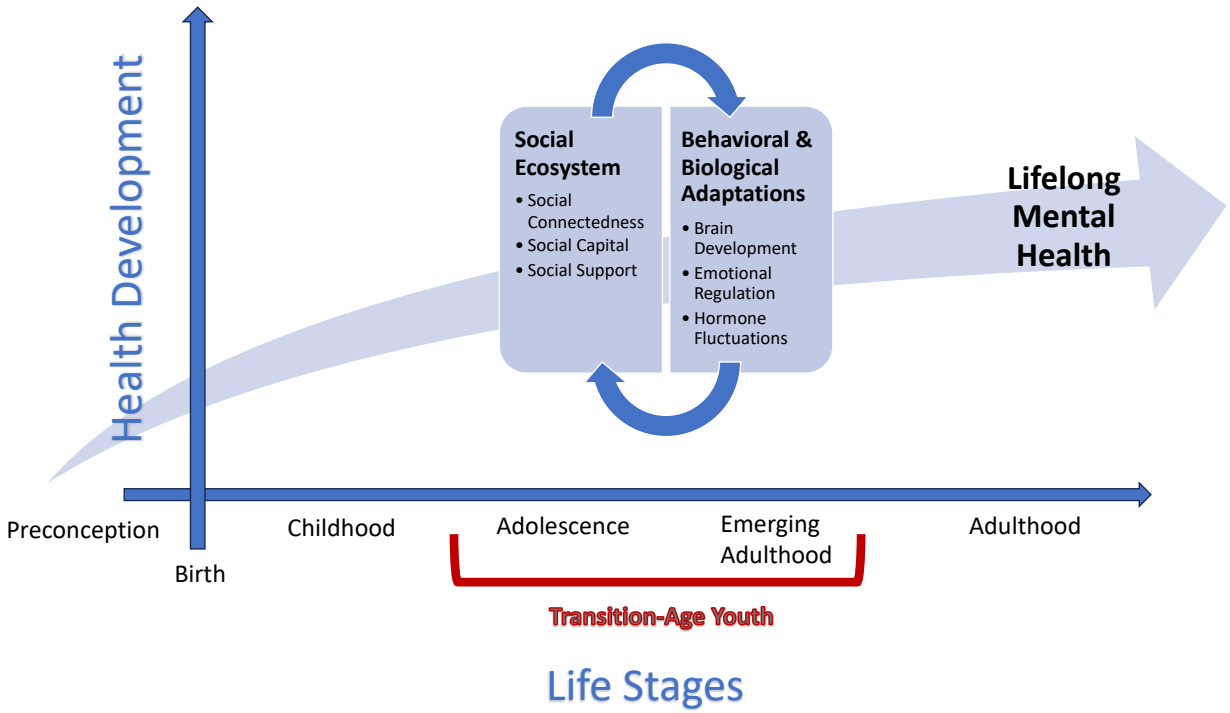

Figure 1-A. Conceptual Model: Youth Health Development & Lifelong Mental Health
This dissertation's conceptual model is based on the PYD and LCHD frameworks, as well as the socioecological model. Comprising three distinct papers, this dissertation examines factors within transition-age youth's social ecosystem that influences lifelong mental health outcomes.

Study Design

Two publicly accessible population-level surveys will be used for this dissertation. Two papers use the Panel Study of Income Dynamics (PSID) and one paper uses The Healthy Minds Study (HMS). The UCLA Office of the Human Research Protection Program has determined that IRB #23-000362 does not meet the definition of human subject's research and the UCLA IRB Review is not required.

The PSID is a publicly accessible dataset (https://psidonline.isr.umich.edu) conducted by the University of Michigan. It is the longest panel study in the world; the PSID has collected data from a nationally representative sample of U.S. families since 1968. In the last two decades, the PSID added several supplemental studies that branch from their main interview study design.

The first additional study, the Child Development Supplement (CDS), began with children 0-12 years of age and followed them across three waves (their parents/caregivers were part of the main PSID). Since 2014, the CDS includes all children (ages 0-17) of adults included in the main PSID survey. The CDS is an ongoing study that is conducted via telephone and in-person interviews roughly every 5 years. The most recent year of publicly accessible data is from 2019. The second study to branch from the main PSID is the Transition into Adulthood Supplement (TAS). It began in 2005 and collected data annually from the original CDS child sample. The TAS followed the emerging adults over six waves (through 2015), once they reached 28 years old they were eligible to transition into the main PSID. In 2017 the TAS was relaunched to follow all children from the CDS from age 18 to age 28. The TAS is ongoing and collected annually; 2019 is the most recent year of publicly accessible data.

The Healthy Minds Network conducts the Healthy Minds Study (HMS), an annual cross-sectional survey administered to postsecondary students at hundreds of U.S. colleges and universities. The survey collects data on mental health, substance use, victimization, social supports, and mental health services utilization. The Network includes a public data interface on their website (https://healthymindsnetwork.org). This dissertation used the 2021-2022 academic year dataset.

It's crucial to recognize the inherent population differences between the two, large studies. The PSID cohort comprises a nationally representative sample, designed to include an oversample of low-income families. Also, the PSID sample encompasses a sizable representation of immigrants, as well as individuals from Black/African American and other racial and ethnic minority backgrounds. Moreover, approximately one-third of PSID emerging adults indicated they have never attended or do not plan to attend college. The diversity of the PSID sample is unique and provides an opportunity to examine population-level associations between social,

economic, and health factors. However, given the PSID demographic characteristics, there may exist significant disparities in health outcomes and access to social resources compared to the HMS study. Existing research indicates that pursuing higher education after high school is linked to enhanced health outcomes and improved quality of life.[85,86] Moreover, the college environment provides a supportive infrastructure conducive to fostering social connections and support systems. Hence, the conclusions drawn from the three papers will encompass the diverse access to social support and connections within each study's population. This approach takes into consideration elements from both populations, thereby ensuring a comprehensive and widely applicable understanding of the findings.

Chapter 2. Building Resilience through Social Capital for Youth from Adverse Family Environments

Introduction

Problem & Significance

Many emerging adults in the U.S. are languishing, meaning they are experiencing poor general well-being.[87,88] Languishing is a state of diathesis – it is not the clinical manifestation of depression but rather a lack of emotion and purpose that leads to a feeling of emptiness. Research supports that languishing is often a precursor for depression.[89] Since the COVID-19 pandemic, there has been an increase in languishing among adults.[87,88,90] This is concerning as languishing may be an early indicator of worse things to come, signaling a predisposition to severe psychological distress and poor mental health and well-being. To effectively address concerns of languishing among young adults, it is important to consider opportunities for upstream intervention efforts to prevent future adverse mental health outcomes.

Assessing risk and promotive factors in earlier life stages may illuminate opportunities to promote lifelong mental health and well-being. The family environment emerges as a pivotal factor influencing youth health outcomes, capable of either fostering positive mental health or exposing youth to risks of suboptimal well-being. A positive family environment characteristically includes household financial stability, trusting caregiver-youth relationships, low family conflict, and the provision of emotional support and cognitive stimulation to youth.[91–95] On the other hand, adolescents from adverse family environments (AFEs) – those experiencing one or more adverse family factors (e.g., family conflict, financial instability, lack of emotional support) – face an increased likelihood of encountering less favorable outcomes.[91] Youth who experience AFEs often have increased rates of depression, anxiety, and negative physical health

outcomes in adulthood.[91,96,97] Nonetheless, some youth from AFEs manage to transcend these adverse circumstances and experience positive mental health and well-being in adulthood. This may be partially explained by promotive factors (i.e., factors that actively enhance an individual's well-being) or protective factors (i.e., buffers against risk factors) which optimize a positive health trajectory. Consequently, it's critical to assess which aspects of youth's ecosystem (i.e., the interconnected network of relationships, interactions, and institutions within a community) foster resilience for youth from AFEs and ultimately promote lifelong mental health & well-being.

Background

Youth Resilience

Cultivating resilience is a crucial aspect of lifelong development. Resilience is the capacity of an individual to adapt to adversity without developing negative health outcomes.[98,99] For individuals at heightened risk of adverse outcomes (e.g., those in AFEs), resilience is paramount for enhancing their well-being. Youth resilience research emphasizes the importance of having a positive family environment in attaining an optimal health outcomes.[92] A positive family environment refers to family functioning, including communication patterns, parental involvement, and familial support.[58] Additionally, the family's socioeconomic status is an important factor in fostering youth resilience; households that experience economic instability contribute to youth negative health outcomes.[58] For youth in AFEs, relying on resources from their broader social ecosystem (i.e., extending beyond the family setting) may foster resilience during development. For example, positive peer relationships (e.g., social support, non-risky behaviors),[100] school connectedness,[67,101,102] and community participation are known resilience

promoters for youth.[92,103] These factors have been determined through longitudinal and retrospective studies, including national studies. Several longitudinal studies have examined the relationship between adolescent risk and promotive factors, as well as health outcomes in emerging adulthood, shaping the evidence base for youth resilience research. longitudinal studies.[104–107] These studies reveal that, for youth facing adversity, positive parenting,[104,107–109] quality interpersonal relationships with both peers and non-relative adults,[107,109] and neighborhood cohesiveness[107] significantly contribute to youth resilience.

Understanding the impact of AFEs on health outcomes in youth is intricately connected to the literature on Adverse Childhood Experiences (ACEs) and their influence on overall well-being. The concept of ACEs encompasses a range of traumatic events and harmful incidents during childhood, including dysfunctional family dynamics. By delving into the specifics of adverse family environments, researchers and practitioners can deepen their understanding of the complex ways in which family-related stressors contribute to the accumulation of ACEs. This knowledge is vital for understanding the pathways through which childhood adversity influences resilience and long-term health outcomes. Recognizing and addressing these dynamics early in life is critical for developing targeted interventions and preventive measures, aligning with the broader public health goal of breaking the intergenerational cycle of adversity and fostering healthier communities.

Furthermore, the National Longitudinal Study of Adolescent Health (Add Health) has yielded significant findings concerning youth resilience and positive life outcomes in emerging adulthood. Add Health comprises a U.S. nationally representative sample of nearly 20,000 individuals initially surveyed as adolescents (Grades 7-12) in 1994.[110] Research stemming from this longitudinal study delves into both main and interactive effects pertaining to familial and

community factors during the transition to adulthood.[111] The findings underscore that community poverty and parental rejection had independent, negative effects on emerging adult outcomes, including the depressive symptoms. Additionally, a lack of quality peer and parent relationships during adolescence was associated with deviant behaviors in emerging adulthood;[112] conversely, quality relationships with peers and parents during adolescence were linked to reduced metabolic risks in adulthood.[113]

While there has been research dedicated to understanding resilience in adolescence, it is important to consider the limitations of applying these findings to contemporary youth. The early work of these longitudinal studies provides the foundation for this paper's conceptual framework and interest in understanding the role of social ecosystem as a tool for resilience in adolescence. Previous childhood longitudinal cohorts focused on understanding youth resilience included study cohorts of children living in poverty, foster care, or the juvenile criminal justice system, limiting the generalizability of findings to those subgroups.[92] Therefore, the goal of this study is to build upon the current evidence base and identify resilience promoters among youth from AFEs.

Other longitudinal studies focused on the transition to adulthood include the U.S. Department of Education's National Longitudinal Transition Study (NLTS), which follows adolescents receiving special education services in high school as they transition to emerging adulthood. The study includes three iterations – the initial NLTS occurred in 1985, the NLTS-2 was 2000 to 2010, and the NLTS-2012 started in 2012 and had a second wave in 2014. However, the Panel Study of Income Dynamics (PSID) is the only active longitudinal study in the U.S. that includes the transition to adulthood. There has not been a longitudinal assessment of youth resilience using the PSID Childhood Development Study (CDS) and Transition to Adulthood

Study (TAS) supplements. The PSID conducted a one-time supplement, the Childhood Retrospective Circumstances Study (CRCS), in 2014 that asked the main PSID participants to retrospectively assess childhood experiences. Findings from this supplement add to the growing evidence that adverse childhood experiences (ACEs) and early life adversity are associated with poor health and psychological distress in adulthood.[97,114,115] However, this study provides is an opportunity to update the literature with a longitudinal assessment of contemporary youth, so that it aligns with current health development frameworks and better informs policies and intervention strategies to improve life course health outcomes.

A Life Course Health Development (LCHD) Approach to Mental Health & Well-being

The life course health development (LCHD) framework is a transdisciplinary approach to understanding health across the lifespan.[23] This framework demonstrates the importance of stressors and promotive factors during key developmental transitions influencing health outcomes in later life stages. The LCHD framework incorporates the socioecological model, which recognizes that an individual's well-being is dependent on the proximity to factors within the individual, family, peer relationships, and community.[25] Moreover, it synthesizes concepts from developmental science on positive youth development (PYD) with our understanding of biological and behavioral adaptations that span across the lifespan.[27] In essence, the LCHD framework flexibly integrates and applies the socioecological model and PYD framework to health development across the lifespan. It is useful to apply the LCHD principles of plasticity, complexity, and timing towards adolescent resilience and lifelong mental health & well-being to elucidate gaps in the field and identify opportunities for intervention.

Plasticity of Biological and Behavioral Adaptations

LCHD underscores the well-established developmental principle of plasticity, which emphasizes that our bodies and brains are not fixed entities but are dynamic and responsive systems that can adapt to changes in their surroundings.[23] Plasticity serves as the cornerstone of resilience, in that, plasticity in human development unlocks the potential to resilience-promoting factors. The implementation of evidence-based promotive health initiatives during adolescence, a sensitive developmental phase marked by heightened plasticity, has the potential to significantly amplify lifelong mental health.

Complexity of Health Development

Adolescents experience multiple risk and protective factors simultaneously, leading to complex behavioral and biological adaptations (i.e., the physiological, genetic, and behavioral changes in response to influences and stressors). Further, the magnitude of effect of each factor differs by an individual's response (i.e., a factor may cause a large or small effect, depending on the individual's biological and behavioral adaptivity). The intricate, multilevel nature of health development leads to our limited understanding of why some individuals achieve optimal health trajectories while facing specific risk factors (e.g., AFEs) compared to others. It is not enough to examine risk and promotive factors individually, rather, research efforts need to collectively examine the multitude of influences in the adolescent's ecosystem. As resilience-promoting factors are established for youth from AFEs, these factors may be utilized as the basis for developing potential multi-level intervention strategies to foster positive outcomes.

Timing of Risk and Promotive Factors

The LCHD framework not only emphasizes the varying impact of health risk and promotive factors, but also how exposure to these factors differentially affects development at

certain life stages or transitions. In particular, adolescence emerges as a pivotal developmental phase wherein the influence of interpersonal factors evolves as individuals move through distinct life stages.[63] Specifically, the family environment has a substantial impact on adolescent health development. However, as individuals transition from adolescence to adulthood, other interpersonal relationships, including peer, school, and community, assume a more prominent role in shaping health trajectories.

While the timing of exposure to risk and protective factors has a more pronounced effect at specific life stages (e.g., adolescence), the duration of exposure also shapes their impact on health development. For instance, family environments that consistently lack positive emotional well-being and cognitive stimulation are more likely to lead to youth's suboptimal well-being in adulthood compared to youth from families that experience temporary hardships and lack the capacity for emotional support at a certain time point.[116,117] Similarly, the consistent availability of health-promoting resources within a youth's sociocultural environment correlates with positive long-term health outcomes.[36] Although youth from AFEs may continually experience familial risk-enhancing factors, there may be opportunities to facilitate access to promotive social influences that might mitigate long-term adverse mental health outcomes.

The Role of Adolescent Social Capital in Promoting Resilience & Well-being

An individual's sociocultural environment comprises social capital resources that can be harnessed to fortify resilience and ensure lifelong mental health. Social capital – resources that individuals and communities gain through their social networks and interactions[9,118] – is linked to better health, mortality, and resilience.[36] Additionally, social capital is often characterized as encompassing social support and social cohesion.[9] Research on social capital and health is

limited, with most findings linking social capital and health to outcomes in adulthood.[119] Ferguson et al (2006) was the first to conceptualized the role of social capital in youth well-being, which considered social capital within the domains of family and community resources and social connections.[120] Family social capital was represented by (1) the number of caregivers in the household, (2) caregiver-child communication, (3) caregiver involvement, (4) caregiver monitoring, and (5) extended family support. While community social capital was considered through (1) peer support, (2) civic engagement, (3) trust in others, (4) religiosity, (5) school cohesion, and (6) neighborhood cohesion.[121] Youth with access to both family and community social capital are better equipped to cultivate positive health development. However, in instances where family social capital is lacking, the onus intensifies to provide accessible community social capital resources that foster optimal health outcomes. By tapping into the strengths and opportunities present within the community, we can create a comprehensive and encompassing approach to promoting the mental health and resilience of the younger population.

For adolescents from AFEs, research has yet to determine which community social capital resources are effective in promoting positive, lifelong mental health and well-being. Moreover, youth from AFEs haven't been recognized as a segment of youth mental health crisis most requiring social capital resources for enhancing mental health outcomes. Therefore, its crucial to investigate community-based social capital resources within peer, school, and community settings, to see which could prove valuable for developing interventions aimed at addressing mental health concerns.

Study Aims

This study aims to examine social capital as a tool for resilience in the context of adolescents from AFEs. Using a longitudinal dataset, this study will examine how adolescent social capital at the peer, school, and community levels influenced health outcomes in emerging adulthood. This will be assessed using the following research question and study aims:

Research Question 1: How does social capital in adolescence moderate the relationship between AFEs and well-being in emerging adulthood?

- *Aim #1*: To assess the magnitude of effect of each social capital resource moderating the relationship between AFEs and achieving optimal health outcomes in emerging adulthood.
    - *Hypothesis*: Of the social capital resources assessed in this study, adolescent peer influences will have a greater moderating effect on health outcomes in emerging adulthood than school and community social capital among youth from AFEs.
- *Aim #2*: To assess combined social capital as a moderator in the relationship of adolescent AFEs and measures of well-being in emerging adulthood.
    - *Hypothesis*: Adolescents from AFEs who accessed combined social capital resources are more likely to achieve optimal health outcomes in emerging adulthood than adolescents from AFEs with less combined social capital.

Analytic Model

The foundational components of this paper's analytic model (Figure 2-A) integrate principles and theories from the LCHD and PYD frameworks[23,27] and the socioecological

model.[23,25] The variable constructs and measures are influenced by Ferguson's (2006) and Alemedon's (2005) theories of social capital influences on youth development.[120,121]

Utilizing the socioecological model, this study examines two independent variables during adolescence: the family environment and social capital outside of the family. As family environment is strongly associated with an adolescent's health outcomes across the lifespan,[91–95] we have isolated this variable for the study purposes. The family environment is defined as the child's home with their primary caregiver and encompasses the household's economic well-being and opportunity to support child nurturing and development. Social capital includes social resources (i.e., social cohesion and social support) within the other sectors of the socioecological model (i.e., peers, school, community). The influence of the adolescent family environment and social capital will be assessed on well-being measures in emerging adulthood. We will examine well-being through psychological distress, self-reported health status, and a flourishing measure. Additionally, the analytic model accounts for sociodemographic variables (age, gender, race) that may influence the overall relationship between the family environment, social capital, and well-being.

Based on prior evidence, we expect adolescent social capital to moderate adolescent AFEs and well-being in emerging adulthood, Such that those with higher social capital have more positive well-being outcomes and fewer negative outcomes.[122–124] Different types of social capital are associated with both positive and negative health outcomes. For example, adolescents who engage with peers participating in risky behaviors are more likely to engage in risky behaviors and have poorer health and well-being outcomes.[67] Also, adolescents who are socially isolated or lack school cohesion in school or the community are more likely to experience negative mental health outcomes.[125] Whereas, adolescents surrounded by promotive peer

influences, school connectedness, and civic engagement experience positive health outcomes.[126] Therefore, we aim to examine how positive social capital resources interact with AFEs to promote resilience in health outcomes in emerging adulthood.

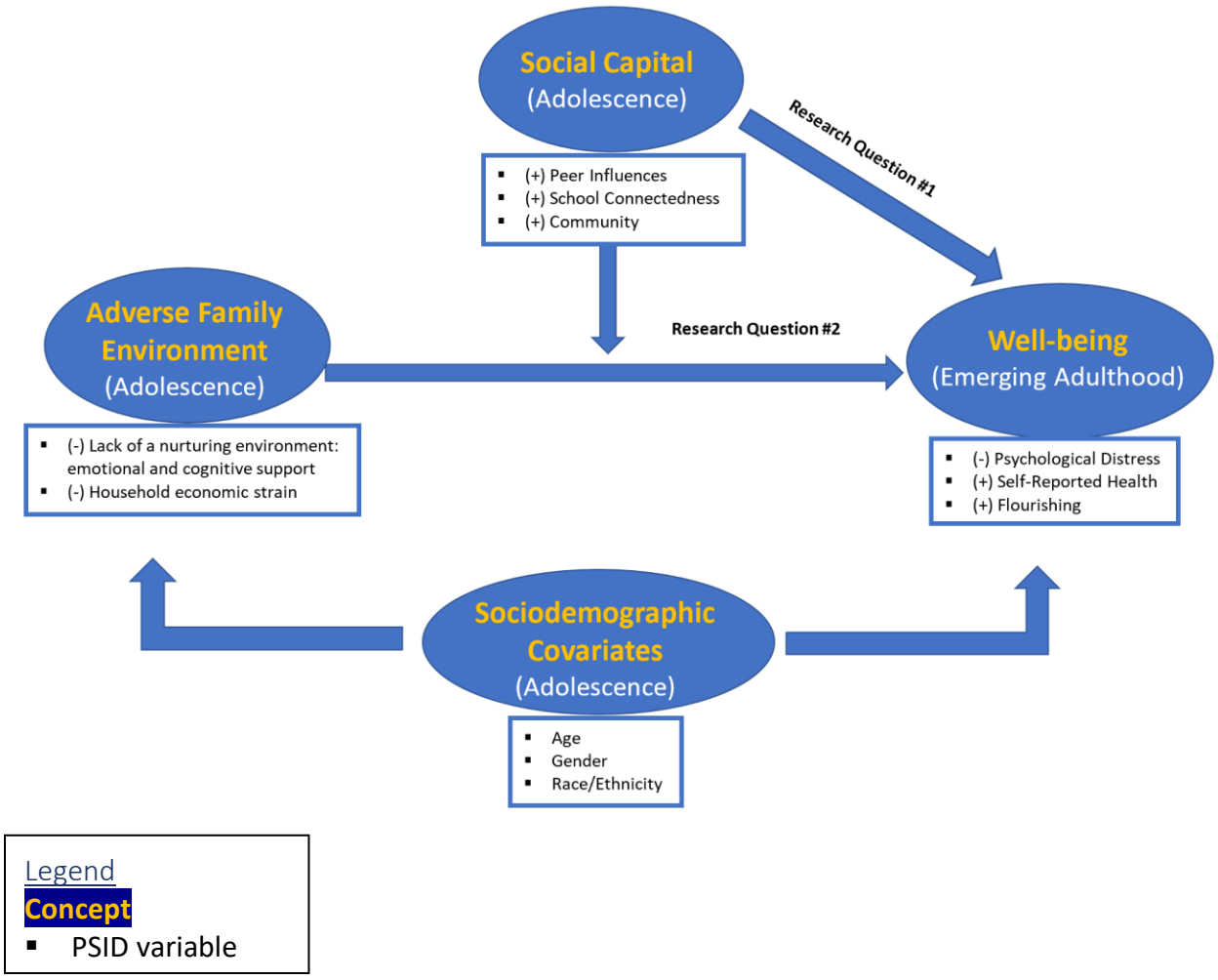

Figure 2-A. Analytic model: The influence of adolescent adverse family environments and social capital on well-being measures in emerging adulthood.
Adolescents from adverse family environments may be at increased risk of languishing in emerging adulthood. Promotive social capital factors in adolescence may moderate the relationship between an adverse family environment and health outcomes in emerging adulthood.

Methods

Study Design

This study employs a longitudinal approach using both the Panel Study of Income Dynamic's (PSID) Childhood Development Supplement (CDS) and the Transition to Adulthood Supplement (TAS). The PSID is the longest running longitudinal study in the U.S. and includes data on intergenerational families since 1968. The PSID CDS and TAS are relatively new supplements that branch from the main PSID study; the CDS occurs every five years and the TAS occurs bi-annually. The CDS and TAS samples are nationally representative of U.S. children (ages 0-17) and emerging adults (ages 18-29), respectively. For the purposes of this paper, adverse family environment and social capital are examined among adolescents ages 10-16 from the CDS-III (2007) and health outcomes will be assessed among emerging adults ages 22-28 from the 2019 TAS.

Sample

PSID CDS-III completed interviews for 1,506 of the 1,676 eligible children in 2007, resulting in a response rate of 90% (Institute for Social Research, 2012). The CDS-III is the third wave following the same cohort of children since 1997 (every five years). In 2007, the sample's age ranged from 10-17 years old.

The 2019 TAS included 2,595 emerging adults. The TAS is a bi-annual survey of 18–29-year-olds. Prior to 2014, the TAS supplement focused solely on the CDS cohort. In 2014, the TAS expanded to include family members of the main PSID survey within that age range that were not part of the original CDS cohort. Consequently, the 2019 TAS sample includes respondents from the original CDS cohort, new CDS cohorts, and neither CDS cohort. Based on the 2019 TAS eligibility, there was an 86% response rate.[127]

This study focuses on CDS-III respondents who also participated in the 2019 TAS survey. The final study sample resulted in 967 respondents that were ages 10-16 in 2007 and ages 22-28 in 2019 (64.2% of original CDS-III sample). Nearly 11% (n=163) of CDS-III respondents aged out of the TAS and started participating in the main PSID survey in 2019.[128] The main PSID survey does not include the variables of interest for this study, therefore, this group will be excluded from this study's analyses; there were no significant characteristic differences among participants that aged out from those that remained in the 2019 TAS.

Table 2-1 describes the study's sociodemographic characteristics based on data from the CDS-III (2007) and the 2019 TAS. Sample distributions include weighted and unweighted percentages. Emerging adults were evenly distributed across the sample age range. Roughly half the sample identified as female. Based on the weighted sample distributions, 68.3% of the sample identified as white, 13.7% as Black/African-American and 12.3% as Hispanic, Latino, or Spanish. The unweighted distribution shows 41.2% of the sample identify as Black/African American; the initial design of the PSID oversampled from the Black/African-American population which explains a larger sample of this subpopulation compared to the U.S. Census. Majority of the study's sample have attended college or are currently attending college in 2019 (74.1%). Roughly a fifth of the sample have a high school diploma or GED and never attended college. Nearly 70% are working, including the military.

Table 2-1. Characteristics of Emerging Adults (Source: CDS-III, 2019 TAS).

	Sample N=967		
Characteristics	**n**	**%**	**weighted %**
Age (CDS-III / TAS 2019)			
10 / 22	127	13.13%	11.45%
11 / 23	157	16.24%	13.54%
12 / 24	157	16.24%	12.46%
13 / 25	144	14.89%	12.52%

14 / 26	174	17.99%	22.75%
15 / 27	142	14.68%	17.84%
16 / 28	66	6.83%	9.44%
Gender			
Male	457	47.26	51.20%
Female	510	52.74	48.80%
Race & Ethnicity			
White	456	47.16%	68.28%
Hispanic, Latino, or Spanish	69	7.14%	12.26%
Black or African American	398	41.16%	13.69%
Asian	21	2.17%	4.11%
American Indian or Alaskan Native	5	0.52%	0.25%
Native Hawaiian or Other Pacific Island	2	0.21%	0.12%
Some other race, ethnicity, or origin	2	0.21%	0.11%
DK	14	1.45%	0.23%
NA; refused	11	1.14%	0.93%
Postsecondary Education Status			
In college	141	14.6%	16.76%
Attending college	529	54.7%	57.31%
Never attended college	297	30.7%	25.92%
Educational Achievement			
Less than high school diploma	36	3.7%	3.32%
GED/HS Graduate, no college	245	25.3%	20.88%
Some College	373	38.6%	34.51%
Associates	50	5.2%	5.01%
Bachelors	223	23.1%	3.06%
Masters or Professional Degree	40	4.1%	5.68%
Employment Status			
Working now, including Military	670	69.3%	69.96%
Temporarily unemployed	156	16.1%	14.15%
Not working or looking for work	60	6.2%	6.48%
Student	73	7.5%	8.84%
NA; refused	8	0.8%	0.57%

The study cohort includes all adolescents in CDS-III (ages 10-16) that are also included in the TAS 2019. Age and gender are extracted from the CDS-III (2007) and race, postsecondary education status, educational achievement, and employment status are from the 2019 TAS.

Measures

All study variables underwent a comprehensive assessment for missing data, with the observed missingness ranging from 0% to 13%. The PSID variables' survey questions and responses are provided in Appendix A.

Adverse Family Environment (AFE)

An adverse family environment during adolescence is a latent construct that includes two observable measures from the CDS-III: the Home Observation for Measurement of the Environment-Short Form (HOME-SF) and a summary of responses describing household economic strain.

Nurturing Environment: The HOME-SF measures adolescent cognitive stimulation and emotional support provided by parents/caregivers in the household.[129] The CDS-III's HOME-SF variable is based on the National Longitudinal Survey of Youth's (1979) HOME Inventory, it has demonstrated robust reliability with estimates of 0.70–0.80 among the adolescents.[130] The HOME-SF includes primary care giver (PCG) reported items and interviewer observations of the home and neighborhood environment.[131] The PSID researchers constructed a total score by recoding the individual survey items into binary variables with values of zero and one. The HOME-SF uses a sum of the binary variables, in which the binary variables represent one assigned decimal place. The scale ranges from 0-1.5 (mean = 1.1). Higher scores signify a more enriched environment. In order to combine observable measures within the latent construct, adverse family environment, HOME-SF was reconfigured so each decimal place equals one

integer. Additionally, the scale was reconstructed to be reverse coded to assess a lack of a supportive family environment, per the study aims (i.e., higher scores signify a lack of an enriched environment). The HOME-SF variable had less than 2% missing.

Household economic strain is based on 16 items asked of the PCG. Questions included a variety of scenarios to assess financial distress (e.g., applied for government assistance, behind on bills, filed bankruptcy, etc.). Responses included yes, no, don't know, or refused to answer. All 16 items were constructed into binary variables and summed (Cronbach's alpha = 0.75); those that answered "don't know" or refused were included as a "no" response. The constructed household economic strain had less than 2% missing.

Social Capital

Social capital is assessed using several variables from the CDS-III data and constructed in a format that aligns with the socioecological framework.

Peer influence: Adolescents were asked 15 questions on the relative distribution of their friend group who participate in risky and promotive activities. Responses ranged across five items: none (1), a few (2), some (3), many (4), almost all (5). The responses were summed across the 15 questions, items that were considered risky factors are reverse coded (Cronbach's alpha = 0.84). A higher sum relates to promotive peer influence. The constructed peer influence variable had 13% missingness.

School connectedness was assessed using four self-reported items by adolescents. Students were asked if they felt close to classmates, happy at school, part of school, and safe at school. Item responses included three categories: never (1), rarely (2), most of the time (3). Responses to the four questions were summed (Cronbach's alpha = 0.69), a higher sum is

associated with positive feelings of school connectedness. The constructed school connectedness variable had less than 7% missingness.

Community Engagement is based on several structured activities for adolescents. All variables were asked directly to the adolescent. Structured activities included participation in the last 12 months on: a sports team, after school clubs or activities, a community group, or volunteering. Each of these activities (4) included binary responses of yes or no. Responses were summed across activities, a higher sum is associated with more active community engagement. The constructed community engagement variable had less than 7% missingness.

Well-being

Well-being is a latent construct that encompasses optimal health development, it will be assessed using several widely used assessments that were also included in the 2019 TAS. For the purposes of this study, we will measure well-being through psychological distress, and self-reported health and flourishing.

Psychological Distress: The Kessler-6 psychological Distress Scale (K6) is a widely used psychological assessment tool that measures self-reported, non-specific psychological distress over the last 30 days.[132] It is extensively employed in both research and clinical settings, making it one of the most commonly used instruments for assessing mental well-being. The K6 has shown robust reliability, is predictive of key mental health outcomes, and is frequently utilized in population-based surveys and epidemiological studies to identify individuals at risk and assess the prevalence of psychological distress.[132,133] Responses to the six items were on a five-point Likert scale, scores are summed across a range of 0-24. A score of 13 or greater has been established as a cutoff point, indicating a clinically significant degree of psychological

distress.[134] The mean K6 score for this sample was 6.0 and scores ranged from 0-24. Missingness was less than 2% for the K6 variable.

Self-Reported Health: Emerging adult general health is measured by a commonly used self-reported measure of overall health status. Self-reported health status has been consistently used as a validated and reliable measure to understand one's general health and is often employed in population health and epidemiological studies.[135] PSID TAS Respondents were asked to rate their health using a 5-point Likert scale (excellent, very good, good, fair, poor). General health status is measured using an ordinal categorical variable, 5 representing excellent health and 1 representing poor health. Missingness was less than 1%.

Flourishing: The Mental Health Continuum-Short Form (MHC-SF) – also known as the flourishing scale – measures positive psychological, social, and emotional well-being.[136] The MHC-SF has been used to assess positive mental health and well-being in population health surveys; the assessment tool has demonstrated reliability and good convergent and discriminant validity.[21,136] The MHC-SF includes 14 items asking respondents to rate the frequency of each feeling in the past month on a six-point Likert scale. The 14 items are constructed into three subscales (emotional well-being, social well-being, and psychological well-being); Flourishing is the average scores from the three subscales summed (0-18). A greater score indicates higher levels of flourishing. The flourishing variable had less than 2% of responses missing.

Covariates

Sensitivity analyses demonstrated there were sample differences across outcome measures by age, gender, and race & ethnicity (Appendix B). Thus, age, gender, and race & ethnicity are included as covariate controls in the statistical analyses to reduce bias related to demographic characteristics.

Statistical Analyses

This study uses observable measures and latent constructs to determine the relationship between adolescent adverse family environments, social capital, and health outcomes in emerging adulthood. Independent ordinary least squares (OLS) regressions were conducted to assess peer, school, and community-level adolescent social capital on well-being measures in emerging adulthood. Factor analysis was used to examine AFEs and combined social capital latent constructs. Factor analysis combined measures into one-item for AFEs (HOME-SF, household economic strain) and one-item for combined social capital (peer relationships, school connectedness, community engagement). OLS regression with an interaction term for AFE and social capital was used to assess well-being measures in emerging adulthood. All statistical analyses were weighted using the 2019 TAS longitudinal weight for the CDS-I cohort (1997) to mitigate the effects of sample imbalance. Statistical analyses were done using STATA 16.1.

Results

Tables 2-2, 2-3, and 2-4 assess the impact of AFE during adolescence and the mitigating influence of adolescent social capital on well-being in emerging adulthood. Social capital was investigated across individual domains (peer, school, community) and collectively as a unified factor, referred to as combined social capital. Each of these three social capital domains, along with combined social capital, was examined for both main and joint effects on measures of well-being, including psychological distress, self-reported health, and flourishing.

Psychological Distress

Table 2-2 evaluates the impact of adolescent social capital on psychological distress during emerging adulthood. Individual OLS regression models were employed to examine both

main and joint effects for each social capital domain, as well as the combined social capital measure. When reviewing the regression model focusing solely on peer relationships, it was observed that adolescents facing compounded family adversity experienced, on average, a 10.6-unit increase in psychological distress along the Kessler-6 scale as emerging adults (p=0.02). Notably, there was no main effect for peer relationships on psychological distress. However, the joint effects of prosocial peer relationships and AFE were associated with a moderate decrease in the risk of psychological distress (β=-0.25, p=0.04). This interaction implies that positive peer relationships during adolescence may serve as a buffer, mitigating the impact of AFEs on long-term mental health outcomes.

In the context of the regression model focusing exclusively on school connectedness, adolescents reporting feelings of school connectedness experienced a moderate decrease in the risk of psychological distress in emerging adulthood (β= -0.14, p=0.000). No main effects were observed between AFE and psychological distress. Furthermore, there was no association among the joint effects of AFE, school connectedness, and psychological distress. Similarly, the regression model for community engagement did not reveal any main or joint effects between AFE, community engagement, and psychological distress.

When assessing adolescent combined social capital, youth with access to resources across peers, school, and the community experienced, on average, a 1.1-point decrease in psychological distress along the Kessler-6 scale in emerging adulthood (p=0.005). Although AFE main effects were null, joint effects were associated with a significant decrease in psychological distress among emerging adults. Therefore, our findings suggest that adolescents experiencing increasing AFE but also having enhanced access to multiple social capital resources are at a reduced risk of psychological distress as emerging adults.

Table 2-2. OLS Regression Interaction Effects of Adverse Family Environment & Combined Social Capital on Psychological Distress in Emerging Adulthood.

	Psychological Distress in Emerging Adulthood				
Adolescent Social Capital	**β**	**SE**	**P>t**	**95%**	**CI**
Peer Influence[+]					
AFE	10.561*	4.261	0.017	1.955	19.167
Peer	-0.028	0.044	0.525	-0.117	0.060
Peer x AFE	-0.248*	0.115	0.036	-0.480	-0.017
School Connectedness[+]					
AFE	3.405	2.360	0.157	-1.361	8.170
School	-0.136*	0.058	0.024	-0.253	-0.019
School x AFE	-0.163	0.156	0.302	-0.478	0.152
Community Engagement[+]					
AFE	1.550	1.124	0.175	-0.719	3.820
Community	-0.120	0.210	0.570	-0.544	0.304
Community x AFE	-0.365	0.583	0.535	-1.541	0.812
Combined[+]					
AFE	0.926	0.692	0.188	-0.471	2.323
Combined	-1.090*	0.363	0.005	-1.823	-0.356
AFE x Combined	-2.363*	1.193	0.054	-4.773	0.047

P-value: * 0.05, **0.01, ***0.001

[+] Individual OLS regression model, controlling for age, gender, and race/ethnicity; for individual social capital resources, the other social capital measures are included as measures (i.e., the peer relationships model controls for school connectedness and community engagement).

Adverse Family Environment (AFE) is a factor variable that includes the HOME-SF scale and household economic stability. Combined Social Capital is a factor variable that includes Peer Relationships, School Connectedness, and Community Engagement.

Self-Reported Health

Table 2-3 explores the impact of adolescent AFE and social capital on self-reported health in emerging adulthood. In the context of the peer-only regression model, adolescents from AFE reported significantly poorer general health in emerging adulthood (β=-2.44, p=0.03). However, no main effects were observed between peer relationships and self-reported health, nor were there joint effects with AFE. The absence of significant associations may suggest either no substantial link between the two variables (AFE and peer relationships) concerning self-reported health or may be attributed to a lack of adequate statistical power.

Analyzing the school connectedness regression model, no main or joint effects were identified between adolescent AFE, social capital, and emerging adult self-reported health. Contrarily, in the community engagement regression model, the main effects of AFE were associated with a reduced risk of positive self-reported health (β=-0.58, p=0.03), while the main effects of community engagement were linked to a moderate increase in positive self-reported health (β=0.09, p=0.04). Nevertheless, the joint effects of AFE and community engagement did not exert an influence on self-reported health among emerging adults. Similar to the peer regression model, the lack of associations may suggest no significant connection between AFE and social capital influencing health outcomes or may be attributed to insufficient statistical power.

Lastly, the main effects of combined social capital were correlated with moderately positive indicators of self-reported health (β=0.15, p=0.04). The main effects of adolescent AFE were associated with a relative decreased risk of 0.38 in self-reported health among emerging adults. However, the joint effects of AFE and social capital did not reveal a significant association with self-reported health—this pattern is likely related to trends observed within the individual social capital domains.

Table 2-3. OLS Regression Interaction Effects of Adverse Family Environment & Combined Social Capital on Self-Reported Health in Emerging Adulthood.

	Self-Reported Health in Emerging Adulthood				
Adolescent Social Capital	**β**	**SE**	**P>t**	**95%**	**CI**
Peer Influence[+]					
AFE	-2.444*	1.104	0.033	-4.674	-0.213
Peers	-0.006	0.010	0.575	-0.025	0.014
Peers x AFE	0.054	0.028	0.064	-0.003	0.111
School Connectedness[+]					
AFE	-0.655	0.449	0.152	-1.563	0.252
School	0.017	0.010	0.101	-0.003	0.037
School x AFE	0.019	0.030	0.524	-0.041	0.079

Community Engagement[+]					
AFE	-0.580*	0.264	0.033	-1.113	-0.047
Community	0.086*	0.041	0.041	0.004	0.169
Community x AFE	0.140	0.128	0.279	-0.118	0.399
Combined[+]					
AFE	-0.378**	0.144	0.012	-0.669	-0.086
Combined	0.147*	0.069	0.040	0.007	0.287
AFE x Combined	0.467	0.250	0.069	-0.038	0.971

P-value: * 0.05, **0.01, ***0.001

[+]Individual OLS regression model, controlling for age, gender, and race/ethnicity; for individual social capital resources, the other social capital measures are included as measures (i.e., the peer relationships model controls for school connectedness and community engagement).

Adverse Family Environment is a factor variable that includes the HOME-SF scale and household economic stability. Combined Social Capital is a factor variable that combines Peer Relationships, School Connectedness, and Community Engagement.

Flourishing

Table 2-4 displays the impact of adolescent AFE and social capital on flourishing in emerging adulthood. In the peer regression model, neither the main nor joint effects of adolescent AFE and peer relationships exhibited any associations with flourishing in emerging adulthood. In the school-only regression model, the main effects of AFE were associated with a significant decrease in flourishing (β=-1.9, p=0.05), while the main effects of school connectedness were linked to a small increase in flourishing (β=0.12, p=0.000). However, the joint effects of AFE and school connectedness did not reveal a significant association with flourishing in emerging adulthood.

When examining the community-only regression model, both the main effects and joint effects of AFE and community engagement failed to show significant associations with flourishing in emerging adulthood. Similarly, the combined social capital model did not demonstrate main effects between AFE and flourishing or joint effects of AFE and combined social capital on flourishing outcomes. However, a moderately strong main effect was observed

between combined adolescent social capital and flourishing in emerging adulthood (β=0.8, p=0.001).

Overall, the results across the social capital domains and the combined social capital measure were mostly null. While this may suggest that AFE and social capital are not interacting to influence well-being measures in emerging adulthood, it is important to consider the possibility of a type-II error due to insufficient statistical power.

Table 2-4. OLS Regression Models of Adverse Family Environment & Combined Social Capital on Flourishing in Emerging Adulthood.

	Flourishing in Emerging Adulthood				
Adolescent Social Capital	**β**	**SE**	**P>t**	**95%**	**CI**
Peer Influence[+]					
AFE	-2.409	2.212	0.283	-6.877	2.060
Peer	0.002	0.024	0.943	-0.463	0.050
Peer x AFE	0.050	0.060	0.415	-0.072	0.171
School Connectedness[+]					
AFE	-1.900*	0.940	0.050	-3.800	-0.002
School	0.115*	0.027	0.000	0.061	0.170
School x AFE	0.096	0.072	0.194	-0.051	0.242
Community Engagement[+]					
AFE	-1.238	0.698	0.084	-2.65	0.172
Community	0.187	0.110	0.095	-0.034	0.408
Community x AFE	0.505	0.347	0.152	-0.195	1.205
Combined[+]					
AFE	-0.499	0.480	0.304	-1.468	0.469
Combined	0.798*	0.233	0.001	0.329	1.268
AFE x Combined	1.065	0.582	0.075	-0.111	2.241

P-value: * 0.05, **0.01, ***0.001

[+]Individual OLS regression model, controlling for age, gender, and race/ethnicity; for individual social capital domains, the other social capital measures are included as measures (i.e., the peer relationships model controls for school connectedness and community engagement).

Adverse Family Environment is a factor variable that includes the HOME-SF scale and household economic stability. Combined Social Capital is a factor variable that combines Peer Relationships, School Connectedness, and Community Engagement.

Discussion

This study explored the role of social capital in fostering resilience for adolescents from adverse family environments (AFEs). Using a longitudinal approach, we examined the influence of social capital in adolescence (ages 10-16) on well-being measures twelve years later in emerging adulthood (ages 22-28). Overall, our findings suggest that cultivating social capital within youth's environment may be beneficial for lifelong health development, particularly for youth at risk of adverse health outcomes. Additionally, this study's longitudinal design is a novel contribution to the evidence base; this is the first study to longitudinally assess the influence of adolescents' social capital on emerging adults' mental health outcomes.

Adolescent Social Capital, AFEs, & Well-being in Emerging Adulthood

A substantial body of research in youth health development underscores the importance of nurturing family environments in fostering positive health outcomes. Further, it is well-documented that ACEs (with most stemming from the family environment) are linked to negative health outcomes in adulthood.[91,96] Hence, this study sought to investigate whether adolescent social capital moderates the relationship between AFEs and health outcomes in emerging adulthood.

First, we examined the interaction between AFEs and social capital domains (e.g., peer, school, community) in relation to well-being measures, including psychological distress, self-reported health, and flourishing. Although no significant joint effects were observed for self-reported health and flourishing, a noteworthy finding emerged regarding the significant association between peer relationships and psychological distress. Our findings indicated that adolescents at risk of AFEs, yet surrounded by friends engaged in prosocial behaviors, exhibited a reduced risk of psychological distress in emerging adulthood. Specifically, the joint effects

demonstrated an inverse relationship to the AFE main effects, aligning more closely with the impact of peer relationships and implying a buffering effect provided by a prosocial peer environment. While no significant associations were found between school connectedness and community engagement with well-being measures, and no detected associations between peer relationships and self-reported health/flourishing, our findings revealed significant main effects or alterations in directionality from AFE main effects to joint effects in these regression models, suggesting potential protective associations, though not statistically significant. It is essential to note that the absence of significance may be attributed to measurement error (type II error) rather than an actual lack of association. Although our sample was relatively large, it might have been underpowered for statistically significant interaction effects. Consequently, caution is warranted in interpreting null findings and further research is needed to provide greater understanding to this complex topic.

Subsequently, we examined the cumulative impact of adolescent social capital as a moderator in the association between AFEs and well-being outcomes. Our results indicate that adolescents facing the risk of AFEs, yet equipped with more social capital, experience a substantial reduction in the risk of psychological distress in emerging adulthood. This may suggest that youth from AFE backgrounds require a multifaceted web of social support resources within their ecosystem to counterbalance the absence of a nurturing family environment. However, we did not uncover a significant association between the interaction effects of combined social capital and AFEs on self-reported health and flourishing in emerging adulthood. Despite the lack of statistical significance in these findings, it is crucial to acknowledge that the inclusion of the interaction term in our regression models resulted in a noticeable shift in direction from the main effects of AFEs on well-being measures. The absence of statistical

significance may be attributed to the intricate interaction patterns (i.e., factor analysis), leading to a type II error. Existing research corroborates that youth who utilize social capital resources are more likely to excel both academically and in physical health outcomes.[146] Our study contributes an additional dimension to this body of evidence, emphasizing the significance of social capital resources for vulnerable youth; underscoring the need for structured social capital in nurturing resilience and cultivating positive mental health outcomes into adulthood.

Moreover, in understanding the importance of social capital in life course of health development, the emphasis on relational agency for at-risk youth becomes apparent. Relational agency equips youth in AFEs to actively shape their social experiences, even amidst challenging circumstances. In environments where stressors may dominate the family setting, relational agency empowers youth to establish meaningful connections, seek support, and make decisions that positively influence their lives through their peers, school, and community networks. Social capital play a pivotal role in supporting this agency by providing resources for emotional, informational, and instrumental support. Serving as a buffer against the negative effects of AFEs, these resources grant youth access to positive role models, opportunities for prosocial engagement, and a sense of belonging. Overall, the combination of relational agency and social capital resources empowers youth to navigate their social contexts, fostering resilience and positive health development in the face of adversity.

Study Strengths & Limitations

This study includes several notable strengths that contribute to the robustness of its findings. Foremost among these is the utilization of a U.S. nationally representative dataset, which significantly enhances the generalizability of the study's conclusions. By design, the PSID is a diverse sample, which includes an oversampling of Black, African American, and immigrant

families and there is sample variation across educational status. Consequently, our findings provide a comprehensive picture of emerging adult outcomes across diverse backgrounds. Moreover, the richness of the PSID dataset enables our study the unique advantage of assessing the multifaceted social ecosystem (family, peers, schools, and communities). Further, our investigation into the dynamic relationship between social capital and AFEs provides new evidence in resilience research and health development; by shedding light on how these elements interact, we offer valuable insights into potential strategies to support vulnerable youth and project them towards positive health outcomes. Lastly, a pivotal contribution of this study lies is the incorporation of the Life Course Health Development (LCHD) framework into a longitudinal assessment of resilience during the transition to adulthood – an important contribution to interdisciplinary research and knowledge on health development.

However, it is necessary to acknowledge several limitations in our study design and findings. Firstly, the concept of social capital in the realm of health services research remains in its infancy, particularly within the context of mental health and well-being. Researchers still need to examine how social capital can be effectively quantified and examined within the context of adolescent health development. Additionally, our study faces constraints linked to the PSID dataset, including the absence of certain variables deemed pertinent to the analysis. Notably, childhood mental and physical health conditions are not integrated into our assessment, and the inclusion of additional categories of social capital resources, such as parent/caregiver composition, was limited by dataset constraints. These inherent restrictions are commonplace in secondary data analyses, warranting caution in the interpretation of results. Lastly, several null findings were observed, and it is crucial to acknowledge the possibility of type-II measurement

errors. Further investigation into these study objectives in larger datasets is essential to determine whether the absence of association is true or a result of insufficient statistical power.

Overall, our study exhibits several strengths and offers innovative insights, it also underscores the need for ongoing research to further elucidate the complex interplay of social capital, adversity, and resilience on health development during the transition to adulthood. By navigating these challenges and building upon the foundations we've laid, future studies can continue to advance our understanding of how to best support youth across diverse backgrounds in achieving positive health outcomes.

Study Implications

Youth from AFEs are at increased risk of severe mental health outcomes, including depression and suicide ideation in adulthood.[91,96,97] Consequently, upstream intervention efforts introduced early in the developmental trajectory hold potential for enhancing adult health outcomes. Considering the substantial body of literature underscoring the significance of resilience in shaping adult health outcomes, we propose a set of recommendations focused on improving social capital for adolescents growing up in AFEs. It is critical for researchers, physicians, educators, and policymakers to explore intervention strategies that can nurture resilience from early childhood and adolescence, with the goal of establishing a foundation for lifelong mental well-being. These targeted intervention initiatives have the potential to create a unified and cohesive approach that not only addresses immediate mental health concerns but also nurtures enduring resilience, forming a foundation for a healthier future for our young population. Further, these strategies are important for youth from AFEs, but can be universally applied to improve lifelong mental health for a population of youth that are experiencing a mental health crisis.

i. Recommendation: Healthcare provider relationship building with adolescent patients and their families

Healthcare providers assume a pivotal role in establishing trust and providing valuable support to both adolescent patients and their families during medical appointments. These interactions present opportunities for healthcare providers to initiate targeted discussions with adolescents about their social capital assets within both their family and community spheres. Establishing a secure environment for adolescents to openly converse about their overall health and well-being is crucial, as it enables comprehensive care that encompasses not only physical health but also the emotional dimensions of their well-being. To better support adolescents from AFEs, opportunities to have one-on-one interactions with their healthcare providers is critical to building rapport.[147] This dedicated time allows youth to build trust and comfortably share sensitive information. Beyond providing a private space for discussion, healthcare providers must also prioritize and assure confidentiality to adolescents.[148] This is especially critical for at-risk youth, as they often cite concerns about confidentiality as the primary reason for avoiding healthcare services.[149]

Moreover, healthcare providers have a unique opportunity to directly engage with caregivers of adolescents. Healthcare visits serve as pivotal moments for providers to conduct screenings for AFEs. In cases where AFEs are present, providers can collaborate closely with family members to explore ways to foster positive mental health and overall well-being. This may involve providing guidance on how to improve the home environment or connecting caregivers with community resources, such as youth organizations that offer youth structured developmental activities outside of the home.[150] Additionally, providers can deliver guidance on

how to improve the home environment through caregiver interventions. Among younger children, pediatric primary care efforts include caregiver interventions to improve child well-being and to promote healthy outcomes. Adapting some of those strategies for adolescent health could be beneficial. Specifically, caregiver training groups for families in AFEs are effective in improving caregiver behavior and children's behavior.[151] To reduce demand directly on physicians, caregiver training programs can be delivered by clinical psychologists or social workers with expertise in promoting positive social well-being for families in adverse home environments. Additionally, concepts from pediatric programs like the Triple P: Positive Parenting Program, can be integrated into adolescent health interventions. Specifically, complementing provider advice and recommendations with video modeling and feedback of parent-child interactions.[152] Lastly, low-effort strategies, such as the Building Blocks program, are as simple as providers and their offices distributing caregiver pamphlets and learning materials to caregivers of adolescents in adverse home environments, which has been shown to improve caregiver-child interactions and cognitive stimulation at home.[153]

ii. Recommendation: Improve adolescent social capital screening tools & access to screeners in healthcare and education settings

In addition to screening for developmental milestones and risk factors, the American Academy of Pediatrics (AAP) recommends clinical visits be enriched by incorporating checklists focused on social determinants, which are instrumental in fostering a positive health trajectory.[154] While providers are already tasked with implementing many screeners, incorporating social screeners within electronic health records (EHR) can reduce the burden on providers to perform screeners at each visit and increase rates of screening, reaching more youth and families in need.[155] After screening for social determinants of health, it is important for providers to offer

tailored, relevant resources and referrals in response. If providers are unfamiliar with the resources in their community, they can visit the Maternal and Child Health Digital Library, which catalogs family and child services within local communities (www.MCHLibrary.org).

While a social determinants of health screener may uncover certain social capital needs, it cannot fully substitute the need for a specialized screener focused on adolescent social capital. Currently, there are no screeners focused specifically on social capital. There are existing resilience screeners that include questions related to social capital, however these assessments tend to be too lengthy or limited in scope (i.e., childhood not adolescence).[99] A screening measure widely used in resilience research, the Child and Youth Resilience Measure (CYRM), assesses youth's socioecological environment; there is the potential to adapt this measure for clinical use.[156] Research efforts should concentrate on developing a concise, universal, and user-friendly screener that places emphasis on the adolescent's sociocultural environment and lifelong health promotive factors. As more tailored screening strategies are developed, researchers and healthcare providers should contemplate effective means of seamlessly integrating them into the medical visit. Addressing this gap will directly enhance healthcare providers' capacities to support their adolescent patients.

Additionally, the education setting is an opportune place to incorporate screening tools. School counselors in primary education settings play a vital role in identifying and intervening on behalf of youth in AFEs.[157,158] These trained professionals serve as valuable resources for recognizing signs of distress, behavioral changes, or academic struggles that may indicate a challenging home environment. Through regular interactions with students, counselors can establish trust and a safe space for children to share their concerns. In addition, school counselors can implement social capital screeners as part of their assessment toolkit to systematically

identify students in need of these resources.[159] This approach empowers counselors to tailor their interventions and support strategies effectively, ensuring that vulnerable students receive targeted assistance to overcome the challenges they face at home.

Further, a validated screener tailored for healthcare providers and educators can significantly enhance upstream intervention efforts by identifying areas of need in terms of emotional and social development among at-risk adolescents. Identifying familial stressors enables healthcare professionals and educators to connect at-risk youth with appropriate support services, fostering resilience and coping mechanisms. Moreover, screening facilitates the creation of tailored educational strategies that accommodate the unique needs of these individuals. If there is widespread uptake of social capital assessments, this may lead to the development of large databases of social capital resources and interventions that can inform child health policy on a national level.

iii. Recommendation: Establish multidisciplinary community groups dedicated to improving adolescent resources

Lifelong mental health hinges on the adolescent's social ecosystem – caregivers, healthcare providers, peers, community leaders, educators – working in harmony to provide structured resources that promote healthy behaviors and foster resilience. The AAP Mental Health Task Force encourages healthcare providers to develop and strengthen relationships with community partners by joining multidisciplinary community groups to address gaps in adolescent services, inventory the community's current resources, and organize strategies to promote positive youth health development.[160] By fostering collaboration between health providers and community leaders, valuable knowledge about youth risk and promotive factors can be shared, enabling stakeholders to create a consistent message for the youth they serve.

Additionally, the involvement of physicians in developing effective intervention strategies within school settings can greatly amplify the impact on adolescent health. There are three key areas within the school system that stand to benefit from physician collaboration: universal school policies, teacher development, and school-based clinics. Through close collaboration of healthcare providers, educators, and school administrators, universal school policies can be developed and implemented to prioritize student safety, embrace diversity, and foster a culture of acceptance. Successful models of these collaborations to inform school policies have been used to enhance adolescent physical health outcomes, including reducing teen pregnancy and smoking. Thus, utilizing this approach for mental health promotion may foster resilience for adolescents from AFEs and promote overall well-being for all students.[142] Another opportunity for healthcare provider collaboration in schools is through teacher development. Healthcare providers can equip educators with evidence-based tools to screen for potential risk factors, leading to the early identification of vulnerable children and facilitating timely interventions.[161] Lastly, incorporating a clinic for youth within community physical structures, such as schools, libraries or community centers, offers a particularly promising approach to assist at-risk youth. Research shows that at-risk youth are more likely to utilize mental health services provided by school-based health clinics than other options.[162] By enhancing access to mental health services like counseling and social work within school-based clinics, a critical resource becomes easily accessible. Additionally, community spaces serve as safe havens for adolescents experiencing AFEs, providing a sanctuary after school hours and facilitating meaningful relationships with peers and community leaders. By embedding essential healthcare services within familiar and accessible settings, we create a seamless and supportive ecosystem that nurtures positive youth development.[160]

Conclusion

Adolescence marks a crucial phase in the formation of an individual's mental health trajectory and overall well-being. This transitional period involves young people exploring their independence and developing an identity while navigating various sectors of their social ecosystem. While the family environment significantly influences youth health outcomes during childhood, adolescence represents a critical crossroad where various dynamics within youth's social ecosystem come into play, both positively and negatively affecting their health development.

For youth with AFEs, optimizing social resources beyond the home becomes essential in fostering resilience and ensuring a positive health trajectory. To promote positive mental health and well-being among youth, schools and communities play a vital role in cultivating resilience. Collaborative efforts involving caregivers, educators, healthcare providers, and community leaders can be effective in building adolescent social capital and promoting positive well-being. By fostering interdisciplinary collaborations and integrating structured social capital resources across various sectors, youth social support networks are strengthened, and they are equipped with the skills needed to navigate challenges effectively. Ultimately, investing in the promotion of adolescent social capital creates the foundation for a healthier and more resilient generation, capable of positive well-being not only during adolescence but well into adulthood.

Chapter 3. Assessing the Interplay Between Social Media and Social Connections in Shaping the Mental Health of U.S. Youth

Introduction

Problem & Significance

Social media – virtual platforms that enable people to share thoughts, pictures, and videos and engage with one another – captured the public's attention in the early 2000s. Between 2005-2009, roughly half of U.S. youth in 8th to 12th grade used social media almost every day.[163] By 2016, 80% of youth were using social media almost every day.[163] In 2022, nearly all youth report using social media (97%).[17] With the number of social media platforms growing over the last decade, some platforms are more used by teens. Specifically, over half of teens use YouTube several times a day and nearly 20% are on it almost constantly (Pew Research Center, 2022). Majority of teens also reportedly using TikTok, Snapchat, and Instagram at least once a day. For youth today, social media use (SMU) is far more ubiquitous in their lives relative to previous generations.[163] Recently, a sample of teens were asked how social media affects their lives – the majority said they did not believe it has a negative or positive impact (45%), a third stated it has a positive impact (31%), and nearly 25% stated it has a negative impact.[164] This information suggest that social media has a diverse array of impacts and that the context of its use may led to both opportunities and risks.

Concurrently with the rise of social media, we have seen an increase in diagnosed mental health conditions (MHCs) among youth. Over the last decade, depression, anxiety, suicide and suicide ideation have increased among the U.S. youth population.[70,165] In 2020, we saw a 30% increase in mental health-related emergency department visits among adolescents age 12-17.[166] All of these mental health challenges are particularly concerning given the lack of a robust

mental health system and low mental health treatment & service utilization among this population.[8,167]

In response, there have been several calls to action by federal policymakers and national medical organizations. The U.S. Surgeon General stated this was the worst youth mental health crisis in recent memory and issued an advisory, *Protecting Youth Mental Health*, which called to action institutions, communities, families, and individuals to address the widespread crisis.[168] The advisory directly addressed the need to investigate the potential adverse effects of technology platforms. In May 2023, the U.S. Surgeon General issued a follow-up advisory, targeting social media in the fight to protect youth mental health.[169] Alongside the Surgeon General's advisory, the American Psychological Association issued a health advisory on SMU in adolescence.[170] While these advisories have called attention to recent research correlating social media use with negative mental health outcomes, the reports also cite that the evidence is not conclusive and request more research to fully understand the impact of social media on adolescent health.

Background

Current Social Media Policies

Currently, there is little oversight of social media policies and regulation on a national and state level, although there is a growing demand for more oversight. The Children's Online Privacy Protection Act is a federal law that prohibits companies from collecting data on children under 13 without parental consent (15 U.S.C. §§ 6501–6506). Due to this federal law, social media companies either don't allow children under 13 years old to sign up for their platform, they require parents or guardians to manage the accounts for children under 13, or they allow

children under 13 to sign up with parental consent and youth can only passively view content – youth cannot post their own content or comment on other's content. While these regulations do help curb children social media engagement, it is very easy for children to gain access to these sites regardless of the law. Research shows that 49% of 11-year-olds had a social media account in 2017[171]; and some social media platforms are publicly available to view without an account (i.e., YouTube).

In 2021, a Facebook whistleblower provided Congress documents of an internal Facebook study that found teen girls reporting increased suicidal thoughts after joining Instagram.[172] Prior to the whistleblower's release of the documents, the results were never shared with the public and Facebook did not initiate any intervention strategies after receiving the study results. In response to the revelation of these documents, the U.S. Senate's Committee on Commerce, Science, and Transportation began an inquiry into major social media platforms by hosting "hearings to examine protecting kids online". As a result of those hearings, social media platforms implemented new guidelines and policies, including more parental control options. Specifically, Meta (which owns Facebook and Instagram), created a Transparency Center, that includes guidelines on bullying, harassment, and misinformation.

On a state-level, California Governor Gavin Newsom signed the first legislation in the U.S. requiring social media companies to protect children's mental and physical health among those who are using their platforms.[173] However, the California law does little to address engagement by children on their platforms – rather, it improves privacy protections of minors and tackles the spread of misinformation. In March 2023, Utah was the first state to enact laws limiting how children can use social media. Utah's Social Media Regulations Act requires children to gain parental consent prior to signing up for social media sites and prohibits children

under 18 years old from using social media after 10:30 pm and until 6:30 am.[174] In May 2023, Montana was the first state to ban the use of social media platform TikTok entirely from use within the state.[175] It is important to note, some of these bans intertwine international politics (i.e., Chinese-owned TikTok) with addressing youth mental health. As we attempt to address the escalating youth mental health crisis, it is likely that both state and federal authorities will increasingly focus their attention on regulating and addressing issues related to social media platforms.

Social Media and Youth Mental Health Research Landscape

In response to the explosion of social media platforms and evolving options for engagement, researchers have sought to understand youth's frequency and motivation of social media use and its impact on their health development. While most of the literature emphasizes a negative association between SMU and youth mental health, a deeper look at the evidence demonstrates an inconclusive relationship.[176] Research suggests increased frequency is linked to negative mental health outcomes.[177–181] Indeed, youth who demonstrate addictive behavior of SMU (i.e., nearly constant use) are at increased risk of depression and reduced well-being.[182–184] Further, social comparison,[185–187] passive use (i.e., viewing content only, not posting on social media),[188] and following more strangers on social media are associated to with depressive symptoms and anxiety.[185]

However, much of the research identifying a negative relationship is based on small, restricted studies rather than nationally representative studies. Also, most previous research only has sufficient power to test a small group of adolescents, with limited abilities to control for other variables, which leads to a lack of generalizability.[176] Lastly, much of the initial research linking mental health concerns with SMU are from nearly a decade ago; social media has

evolved so drastically since then, as well as youth today are the first generation growing up with these platforms already in existence, it's unclear if earlier findings can be so discretely applied to our current youth. Therefore, it will be important to understand if there are other factors that better explain associations between social media use and mental health outcomes.

For example, there has been notable gender-based differences in youth social media research. Particularly, females often engage more actively and extensively in social media platforms compared to their male counterparts and it has been linked to mental health concerns among female youth.[189–192] Also, female youth are more inclined to share personal experiences, feelings, and photos, creating an environment conducive to bonding and emotional support.[193,194] In contrast, males often employ social media for entertainment and information-seeking purposes, gravitating towards video-sharing platforms, gaming communities, and news-related content.[17,183] These gender disparities are reflective of varying preferences and interests, as well as societal expectations. However, it is essential to note that these patterns can be influenced by individual differences and cultural factors, resulting in a diverse spectrum of SMU behaviors among youth of different genders.

Additionally, there have been differences linked with the stage of adolescent development. Younger adolescents, typically aged 10 to 14, are only beginning to explore social media, whereas older adolescents (ages 15-17) are consistently engaging with social media daily. When teens were asked about the amount of time they spend on social media, teens ages 13-14 mostly reported the time they spend on social media is "about right" (63%) with nearly a quarter stating they spend too much time on social media (28%).[17] Similarly, majority of younger teens believed that it would be easy to give up social media.[17] Conversely, almost half of older teens (ages 15-17) believe they are spending too much time on social media (42%) and majority

believe it would be hard to give up social media (52%).[17] In relation to mental health concerns, there is limited evidence on the impact of SMU on mental health outcomes for younger adolescents, most findings do not establish a strong link between SMU and adverse mental health outcomes in this age group.[176] In contrast, high SMU in older adolescence has been associated with issues such as increased loneliness, cyberbullying, and poor sleep patterns.[195,196] The dynamic nature of adolescent development, encompassing aspects such as identity formation, brain maturation and socioemotional regulation, is likely to play a crucial role on the potential connections between SMU and the stages of adolescence. Consequently, it is imperative to undertake further research to explore potential disparities in mental health outcomes associated with different developmental stages (i.e., younger adolescence, ages 10-14, and older adolescence, ages 15-17).

There has also been conflicting evidence, with some studies showing null and positive associations between SMU and youth mental health.[176,197] Depending on how often social media is used and the way youth interact on social media, SMU can have a positive influence on health. For instance, evidence suggests that social media can serve as a valuable tool for fostering social connections, especially for individuals who may face challenges with in-person interactions, such as those who identify as neurodivergent, LGBTQ+, or have limited social support.[198,199] Given the inconclusive nature of current research findings, it is imperative to explore whether specific facets of adolescent development could be influencing outcomes among these mentioned subgroups. Specifically, it is worthwhile to investigate how youth's social ecosystem, encompassing factors like family dynamics, friendships, school environment, and community interactions, might play a pivotal role in shaping the complex relationship between SMU and youth mental health. To gain a more comprehensive understanding of the context in which SMU

operates and its impact on development, further research is warranted. This, in turn, will aid in the development of targeted intervention strategies aimed at addressing the underlying issues contributing to this complex interplay.

Adolescent Health Development

To investigate other factors influencing youth mental health, it's important to incorporate the conceptual frameworks involved in adolescent health. The life course health development (LCHD) framework is a transdisciplinary approach to understanding health across the lifespan.[23] This framework demonstrates the importance of stressors and promotive factors during key developmental transitions that influence health outcomes. The LCHD framework incorporates the socioecological model, which recognizes that an individual's well-being is dependent on the proximity to factors within the individual, family, peer relationships, and community.[25] Moreover, it synthesizes concepts from developmental science on positive youth development (PYD) with our understanding of biological and behavioral adaptations (Lerner et al, 2002). In essence, the LCHD framework flexibly integrates and applies the socioecological model and PYD framework to health development across the lifespan.

In the context of adolescent development, these frameworks underscore the critical role of youth's relational environment in fostering positive health outcomes, particularly in terms of lifelong mental well-being. Social connectedness emerges as a key factor linked to positive mental health among youth,[27,200–202] while its absence (i.e., social isolation), is associated with mental health challenges.[203–206] Social connectedness is defined as a sense of belonging or subjective psychological bond that a person feels to others.[207] For youth, a sense of connection within their horizontal (peers) and vertical (caregivers, siblings, and teachers) relationships provides stability as they navigate the process of identity exploration and formation.[51,208]

Specifically, caregiver and peer relationships exert strong influences over adolescent health outcomes, given their pivotal roles in shaping various facets of adolescent life.[200–202,204,205] Parents provide essential emotional support, guidance, and a secure attachment that fosters healthy emotional and psychological development. Their influence in imparting values, beliefs, and coping strategies contributes significantly to an adolescent's overall well-being. Peer relationships, on the other hand, offer adolescents a vital social context for identity exploration, emotional expression, and the development of interpersonal skills. Positive peer interactions can enhance self-esteem and provide valuable social support, while negative peer influences may lead to risky behaviors. Both parent and peer relationships serve as critical foundations for an adolescent's mental and emotional growth, impacting their long-term health outcomes and overall development.

In today's digital landscape, social media introduces a new layer of complexity to the process of youth identity formation. It represents a virtual realm that adolescents must navigate as they embark on their journey of self-discovery.[209] There is evidence to support the connection between SMU and a diffuse-avoidant pattern of identity development, where adolescents are more susceptible to internalizing and externalizing behavioral issues as SMU increases.[210] Thus, when adolescents lack a solid foundation of social connectedness within their interpersonal relationships, SMU can potentially disrupt their identity formation and socioemotional development, leading to adverse mental health outcomes. Moreover, it's crucial to acknowledge that social media is constantly evolving and intertwining with not just our personal connections but also serving as a platform for youth engagement in politics, current events, entertainment, pop culture, and marketing. While some evidence suggests that political engagement through social media may increase civic participation, it has also been associated with heightened

psychiatric distress.[211,212] Conversely, interacting with funny content on social media has been linked to a reduced risk of negative mental health outcomes.[213] Overall, there has been limited exploration into how various types of social media content influence youth mental health. Therefore, it is essential to examine the types of social media content that may leave youth vulnerable to adverse mental health outcomes. Given the existing gaps in social media research, it is worthwhile for the field to align its studies with theoretical and conceptual frameworks that facilitate a holistic understanding of the role of social connectedness in adolescent health development.

Study Aims

The aim of this study is to describe the relationship of SMU and social connectedness on youth mental health using a large, nationally representative dataset. Due to the dynamic nature of SMU, it will be assessed in two different ways: the frequency of SMU and engagement in different types of social media content. These factors will be assessed through the following research questions:

1) *Social Media Use - Frequency*
    a. **Research Question #1**: Are different types of social media frequency (i.e., time spent on social media) associated with an increased risk of depression among youth?

        Hypothesis: Youth who use social media nearly constantly are at increased risk of depression.

    b. **Research Question #2**: Does the association of social media frequency and youth depression risk vary by youth's social connectedness to friends and caregivers?

i. Hypothesis: Social connectedness to parents and friends will reduce the adverse effects of constant SMU on youth mental health.

2) *Social Media Use - Content*

a. **Research Question #3:** Are different types of social media content associated with an increased risk of depression among youth?

i. This exploratory research question seeks to enhance our understanding of how various types of social media engagement may influence mental health outcomes.

Also, secondary analyses related to each research question will be done with youth subgroups. We aim to examine how gender (male and female) and stage of adolescence (i.e., early adolescence, ages 12-14 or late adolescence, ages 15-17) may influence the relationship of social connectedness, SMU, and mental health.

Analytic Model

This study's analytic model is represented by Figure 3-A. The two independent variables of interest are SMU and social connectedness. SMU is examined through frequency of social media use and the different types of social media content youth may engagement with. Social connectedness includes youth's relationships with their caregivers and friends. Mental health is the dependent outcome of interest, and it is measured by depression risk. The study aims are examined through the yellow and blue pathways. Additionally, a blue arrow demonstrating the relationship between social connectedness and mental health is included and will be assessed for analytic comparisons.

The model includes several covariates that will be controlled for in the statistical analyses. Demographic characteristics, such as age, gender, race/ethnicity, and family income likely confound the relationship between social connectedness, SMU, and mental health.[214,215] Additionally, parental rules on social media use directly impact SMU and may influence social connectedness to parents and friends, therefore, this will also be controlled for in the analytic models.

Although not included in the analytic model, there are a few social connectedness variables mentioned in the literature that will be utilized in sensitivity analyses. First, there are two additional interpersonal relationships that are often mentioned in the literature as having a protective effect in youth health development: siblings and teachers.[51,92,94] However, these two relationships are not always correlated and considered as supplementary relationships that may support positive mental health outcomes among youth. Also, research supports that parenting styles (e.g., discipline, aggravation, praise, affection) can play a role in youth mental health outcomes.[216,217] In alignment with our interest in social connectedness as a promotive factor, we examine parental praise and affection in sensitivity analyses.

Lastly, there are also several factors to consider that were not included in the analytic model either due to variable collinearity with included variables or due to a lack of inclusion in the PSID survey. After school activities may affect both social connectedness and SMU. After school activities provide an opportunity to develop strong relationships with friends and teachers – leading to a direct pathway to social connectedness. Also, youth that participate in after school activities have less time to engage in SMU, therefore, directly impacting this pathway. Additionally, the model excludes health behaviors such as sleep, exercise, and diet. Research shows that sleep has a direct effect on mental health outcomes and acts as a mediator between

SMU and mental health outcomes (i.e., high SMU can lead to poor sleep behaviors which impacts mental health).[218,219] Exercise and a healthy diet are also correlated with positive mental health outcomes.[220–222] While these variables are not investigated within this study, it is important to consider their influence on the relationship of social connectedness, SMU, and mental health when interpreting the findings.

Figure 3-A: Analytic Model of Youth Social Connectedness, Social Media Use (SMU), and Mental Health.

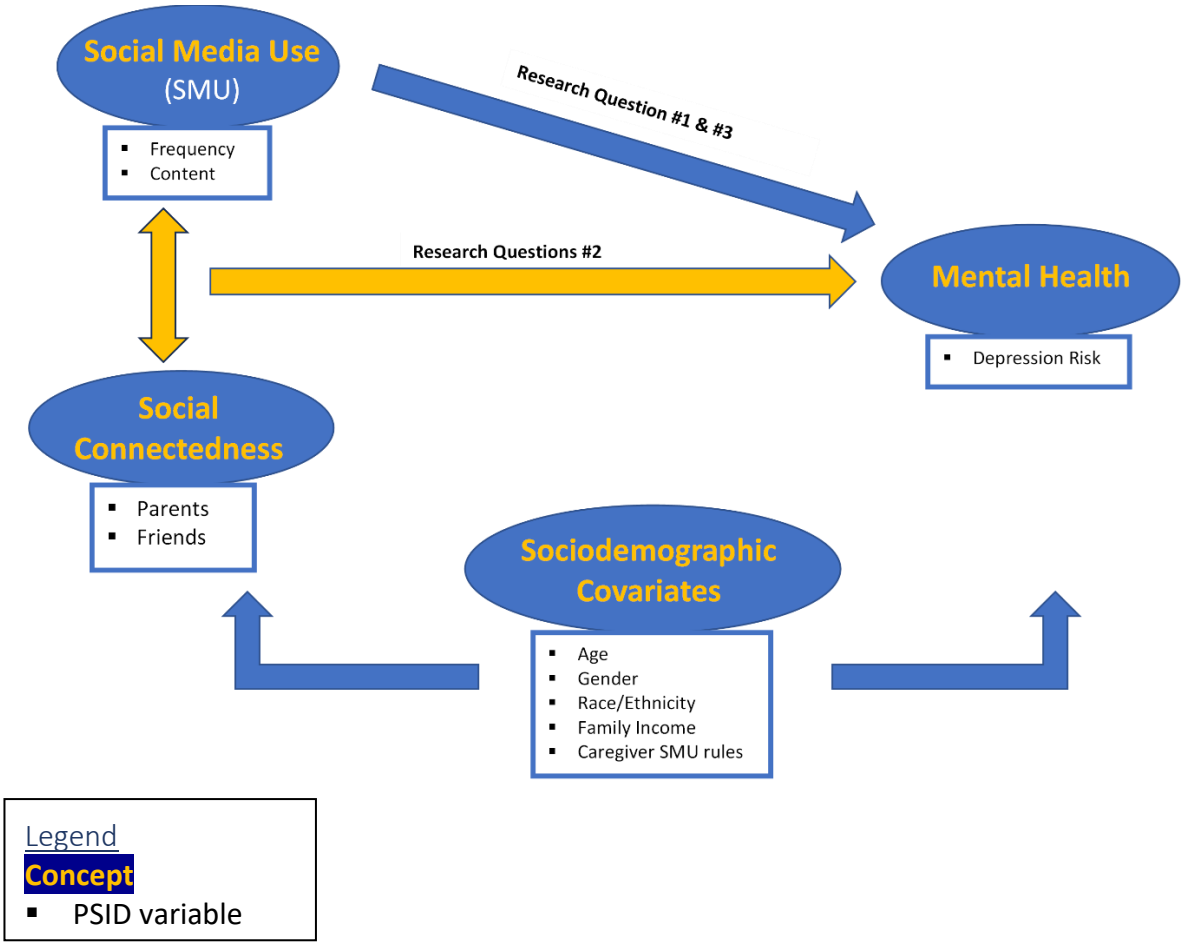

Figure 3-A. Analytic model of social connectedness, social media use, and mental health outcomes among youth. The yellow arrows portray the main pathway of interest, the interaction between social connectedness and SMU (frequency) on youth mental health (Research Questions #2). The blue arrow portrays research questions #1 and #3, which assess the relationship between SMU (frequency and content) and mental health.

Methods

Study Design

This study uses the 2019 Child Development Survey (CDS) of the Panel Study of Income Dynamics (PSID).[223] The PSID began in 1968 with a nationally representative sample of over 18,000 individuals living in 5,000 families in the United States. Information on these individuals and their descendants has been collected continuously since the PSID's inception. The CDS began in 1997 with children of the main PSID participants followed them across three waves (5-year increments). Since 2014, the CDS includes all children (ages 0-17) of parents included in the main PSID. The CDS is conducted via telephone and in-person interviews. The CDS is ongoing and collected roughly every 5 years; the most current year of data is from 2019. The CDS includes a child-reported survey, caregiver reported surveys, and PSID researchers' observations of the family and home. Research shows adolescents can reliably self-report on their cognitive competencies, interpersonal relationships, and health.[224,225] The main analyses will use the child-reported survey; several parent-reported measures are included in the sensitivity analyses. Due to the evolving nature of the SMU variables, this study utilizes a cross-sectional approach of the 2019 CDS survey sample.

Sample

The 2019 PSID CDS sample includes 4,629 children between the ages of 0-17 from an eligible sample of 6,435 children. The sample's response rate was 72%. The main study variables came from the child file (i.e., child-only responses, not caregivers) – the child file includes a total sample of 1,569 children. Since the focus of this study is on adolescence, the final sample for this study includes 852 youth ages 12-17 who responded to questions on social connection, SMU, and mental health. As seen in Table 2-1, only 6% of the sample were age 17,

this was due to a significant portion of the sample aging out of the CDS and into the PSID's Transition to Adulthood Supplement.

Table 3-1 provides demographic characteristics of the study sample. Youth were evenly distributed between ages 12-16, with a small group of youth aged 17. Approximately half of the sample were female (52.4%). It was a diverse sample, with 44% White, 38.8% Black or African American, 14.8% Hispanic, Latino, or Spanish, 1% Asian, 1% American Indian or Alaskan Native. The median household income was $67,025. And the majority of youth had some degree of rules related to their SMU (76.2%).

Table 3-1. Descriptive Statistics of Sample Distribution in 2019 (N=852)

Demographic Characteristics	**N**	**%**
Age		
12	168	19.72
13	170	19.95
14	156	18.31
15	179	21.01
16	134	15.73
17	45	5.28
Gender		
Male	377	44.25
Female	475	55.75
Race/Ethnicity		
White	370	43.43
Hispanic, Latino, or Spanish	130	15.26
Black or African American	332	38.97
Asian	9	1.06
American Indian/Alaskan Native	10	1.17
Household Income		

Median (IQR)	$64,340	($35,000; $110,550)
Caregiver Social Media Rules		
Yes, any rules	662	77.70
No, no rules	184	21.60
Missing	6	0.70

Measures

All study variables underwent a comprehensive assessment for missing data, with the observed missingness ranging from 0% to 3%. A codebook is provided in Appendix A.

Mental Health

Depression

The primary outcome of interest is youth mental health. For the CDS sample, mental health is assessed using the Childhood Depression Inventory (CDI) short form scale.[226] The CDI is a validated, self-report screener of depressive symptoms in children ages 8-17.[227–229] The scale is composed of ten 3-point Likert scale survey questions asked directly to the child (see codebook for complete set of questions). The CDI is measured from 1-20; rather than use a clinical cutoff, we refer to higher scores as indicative of greater risk of depressive symptoms.

Unfortunately, the PSID CDS does not have additional variables related to mental health. However, depressive and anxiety symptoms often co-occur in adolescents[230] and research suggests the CDI does not discern differences in depressive and anxiety symptoms, therefore, the scale is often utilized as a measure of general distress.[231] Additionally, the assessment has established robust construct validity, demonstrating concordance with clinical diagnoses of depression at roughly 70%.[232]

Social Connectedness

Interpersonal relationships with friends and family

Social connectedness will be assessed through a series of survey questions asking youth about their interpersonal relationships with their mother, father, and friends. Youth were asked, "How close do you feel towards your [friends]?", in which responses ranged: Not Very Close, Fairly Close, Quite Close, or Very Close (measured 1-4). To understand the cumulative effect of having multiple very close relationships on youth mental health, we created a Social Connectedness Count (SCC) variable that sums youth's relationship with their mother, father, and friends. The variable ranges from 0-3, with 1 recognizing that one of the three relationships is very close, 2 represents two of the three relationships are very close, and 3 signifies that youth believes all three relationships with parents and friends are very close. Missingness was less than 3% for the SCC variable.

Social Media Use (SMU)

SMU is measured through two independent mechanisms, *frequency* of SMU and the type of social media *content* youth engage with.

SMU frequency is measured using two survey questions. The first question asks, "In the past 30 days, how often did you use a computer or other electronic device (such as tablet or smartphone) to interact with friends or family on a social media site (like Facebook, Instagram, or Snapchat)?". Responses ranged from: **every day, a few times a week, once a week, less than once a week, never.** For those that responded every day, a follow up question was asked, "On an average day in the past 30 days, how often did you use a computer or other electronic device (such as a tablet or smartphone) to interact with friends or family on a social media site?"; in which they responded from "**almost all the time", "several times a day", and "about once a day**". One ordinal categorical variable was constructed to account for the two SMU frequency questions. Less than 1% of the sample was missing from this variable.

A collapsed frequency variable (3 categories) is included to assess the interaction effects of SMU and social connectedness (SMU-Frequency). **The three categories are (3) Constant** (responded "Almost all the time"), **(2) Occasional** (responded "several times a day", "once a day", "A few times a week", "once a week", "less than once a week"), and **(1) Never** (responded "Never"). Constant users were isolated in an effort to assess adolescents demonstrating addictive behavior. Previous research has suggested that SMU addiction may lead to more adverse outcomes than general use.[183,184,233] Therefore, we isolated this category in an attempt to understand the comparison to occasional, or general users, and to adolescents who do not use social media.

Social media content is based on the following question, "Which types of content have you shared in the past 30 days?". Responses included:

- information about your everyday life,
- videos, pictures, or games you created,
- entertainment and celebrity news,
- political opinion, current events, or social causes you believe in,
- jokes or funny content

Responses were not mutually exclusive. Each type of social media content (SMU-Content) is measured as an independent, binary variable. To account for passive social media use, a binary variable is included for youth who stated they do not post anything online but use social media. For each type of social media content, there was less than 1% missing from the study sample.

Demographic Covariates

Covariates such as *age*, *gender*, *race*, *ethnicity*, and *family income* will be incorporated as control variables, consistent with previous studies on youth mental health and SMU.[214]

Additionally, to enhance the precision of statistical analyses, we will use a binary variable to account for parental SMU rules. Comprehensive information about each variable is available in the codebook for reference (Appendix A).

Statistical Analyses

Ordinary least squares (OLS) regression was used to assess the study aims. An interaction term of SMU-Frequency and SCC is included to examine the relationship of SMU and social connectedness on youth mental health. Stratification based on stage of adolescence (early adolescence: ages 12-14, late adolescence: ages 15-17) and gender were performed for each study aim. The CDS 2019 cross-sectional child survey weight was included for all regression analyses to mitigate the effects of sample imbalance.

Sensitivity Analyses

We conducted sensitivity analyses to evaluate additional measures of social connectedness and mental health in relation to our study aims; specifically, we examined if positive parenting behaviors (in substitute of connectedness) and parent-reported measures of adolescent mental health demonstrated similar trends to our measures utilized in the current study. In an effort to assess mental health beyond the CDI scale, we utilized the parent-reported Behaviors Problem Index (BPI), which measures the incidence and severity of child behavior problems.[234] The BPI includes an externalizing score and an internalizing score; the internalizing score encompasses depressive and anxiety symptoms and withdrawn behavior. In addition to using the BPI internalized score, we pulled out the one BPI anxiety survey question to serve as an anxiety-only outcome. Additionally, to expand on the adolescent-parent relationship, we investigated parental praise and affection as independent variables influencing youth mental health. Appendix B includes results and findings from the sensitivity analyses.

Results

The following results aim to describe the relationship between social connectedness, SMU, and mental health. Also, we include subgroup analyses based on gender and stage of adolescence.

SMU-Frequency, Social Connectedness & Mental Health

To understand the dynamic relationship between frequency of SMU, social connectedness, and mental health, we investigated main and joint effects (Table 3-2). First, we examined the main effects of Social Connectedness Count (SCC) and SMU-frequency on youth depression risk. Youth who were socially connected to their mother, father, and friends were at considerable decreased risk of depressive symptoms compared to youth with no close relationships (β= -0.411, p=0.002). While youth who used social media "almost all the time" were linked to, on average, a 1.9-point increased risk in depressive symptoms along the CDI scale.

Additionally, joint effects of SCC and SMU-frequency on the risk of depression were assessed among youth. As the SCC increases, youth who engage in near-constant SMU, on average, experience a decreased risk of depressive symptoms by 0.8 points on the CDI Scale. Given the significance of both the main effects for SMU Frequency and SCC, it is likely that both factors contribute to the observed joint effects. However, the joint effects exhibit a similar pattern to the SCC main effects, indicating a reduced risk of depressive symptoms, which contrasts with the main effects of SMU Frequency. This suggests that social connectedness to friends and family may mitigate the risks associated with high-frequency SMU. Notably, there was no significant joint effect observed between youth who were occassional social media users and SCC concerning depression risk.

Table 3-2. OLS Regression Model of Social Connectedness and Frequency of Social Media Use (SMU) on Youth's Depression Risk – PSID CDS: 2019; Ages 12-17.

	Depression Risk (CDI)				
	β	**SE**	**P>t**	**95%**	**CI**
Social Connectedness					
SCC[+]	-0.411*	0.192	0.037	-0.796	-0.026
SMU-Frequency					
Never	REF				
Occassional	0.312	0.481	0.519	-0.653	1.278
Constant	1.911**	0.699	0.009	0.506	3.317
SCC x SMU-Frequency					
SCC x Occassional	-0.196	0.237	0.413	-0.672	0.280
SCC x Constant	-0.829*	0.363	0.027	-1.559	-0.098

P-value: * 0.05, **0.01, ***0.001
Controlling for: Youth's age, gender, race, ethnicity, family income, and parental SMU rules
[+]SCC is the Social Connectedness Count, which ranges from 0-3 close relationships

Subgroup Analyses

i. Gender

Social connectedness, frequency of SMU, and depressive symptoms were assessed among youth, stratified by gender (Table 3-3). First, the main effects of SCC and SMU-Frequency were examined among female youth. For female youth, an increase in social connectedness was associated with a moderate decrease in depressive symptoms (β= -0.66, p= 0.5). Conversely, female youth who engaged in near-constant social media use experienced, on average, a 2.2-point increase in depressive symptoms along the CDI scale (p=0.007). Notably, the joint effects of SCC and SMU Frequency were not linked to any significant increase or decrease in depression risk. This may indicate the variables are not interacting in a way that significantly influences the outcome or that the sample size may not be sufficient to detect a significant interaction if one existed. It's also possible that the interaction effect is truly not present in the population. In the case of male youth, there were no significant main or joint effects observed in the two-way interaction between social connectedness and SMU-Frequency concerning

depression risk. The gender-based variations in findings suggest that the impact of SMU and social connections with friends and family on mental health outcomes may differ between male and female youth.

Table 3-3. Stratified OLS Regression Models by Gender of Social Connectedness and Frequency of Social Media Use (SMU) on Youth's Depression Risk – PSID CDS: 2019; Ages 12-17.

	Depression Risk (CDI)									
	Female+					Male+				
	β	SE	P>t	95%	CI	β	SE	P>t	95%	CI
Social Connectedness										
SCC	-0.662*	0.327	0.049	-1.322	-0.002	-0.329	0.226	0.154	-0.788	0.130
SMU-Frequency										
Never	REF					REF				
Occasional	0.860	0.637	0.184	-0.423	2.144	-0.455	0.448	0.317	-1.363	0.454
Constant	2.283*	0.811	0.007	0.648	3.917	1.308	0.960	0.181	-0.636	3.252
SCS x SMU-Frequency										
Never	REF					REF				
SCC x Occasional	-0.335	0.355	0.351	-1.051	0.381	0.158	0.281	0.577	-0.412	0.728
SCC x Constant	-0.838	0.467	0.080	-1.780	0.104	-0.600	0.509	0.246	-1.630	0.431

P-value: * 0.05, **0.01, ***0.001; Controlling for: Youth's age, gender, race, ethnicity, family income, and parental SMU rules

[+]Independent regression models: The regression output for female youth is an independent OLS regression from the regression output for male youth.

ii. Stage of Adolescence

Additionally, social connection, SMU-Frequency, and depression risk were examined by stage of adolescence (Table 3-4). For youth in early adolescence (ages 12-14), the main effects of SMU-Frequency were linked to an average 2.1-point increase in depressive symptoms on the CDI scale (p=0.02). There were no main effects for SCC or joint effects between SMU-Frequency and SCC among youth in early adolescence. For youth in late adolescence (ages 15-17), there were no significant main or joint effects observed in the two-way interaction between

social connectedness and SMU Frequency concerning depression risk. Similar to the gender subgroup analyses, disparities in findings between early and late adolescence may indicate variations in mental health outcomes based on developmental stages or could be associated with insufficient statistical power.

Table 3-4. Stratified OLS Regression Models by Stage of Adolescence of Social Connectedness and Frequency of Social Media Use (SMU) on Youth's Depression Risk – PSID CDS: 2019; Ages 12-17.

	Depression Risk (CDI)									
	Ages 12-14+					Age 15-17+				
	β	SE	P>t	95%	CI	β	SE	P>t	95%	CI
Social Connectedness										
SCC	-0.355	0.194	0.075	-0.746	0.037	-0.094	1.666	0.955	-3.462	3.274
SMU-Frequency										
Never										
Occasional	0.446	0.544	0.417	-0.653	1.546	-0.105	1.258	0.934	-2.648	2.437
Constant	2.053*	0.857	0.021	0.322	3.784	1.659	1.556	0.293	-1.487	4.804
SCS x SMU-Frequency										
Never										
Occasional	-0.142	0.248	0.571	-0.643	0.360	-0.663	1.672	0.694	-4.042	2.717
Constant	-0.670	0.420	0.119	-1.519	0.179	-1.394	1.766	0.434	-4.962	2.174

P-value: * 0.05, **0.01, ***0.001; Controlling for: Youth's age, gender, race, ethnicity, family income, and parental SMU rules

[+]Independent regression models: The regression output for early adolescence are an independent OLS regression from the regression output for late adolescence.

Social Media Content & Youth Mental Health

We investigated the relationship between engaging in different types of social media content (SMU-Content) and depression risk among youth (Table 3-5). For each SMU-Content measure, an independent OLS regression was used and controlled for youth's age, gender, race, family income, and parental social media rules. Among the types of social media content, youth who engaged in funny content on social media had a mean 0.46-point increase in depressive symptoms along the CDI scale compared to those that did not engage in this type of content on

social media. All other types of social media content did not have a significant association with depression risk. Similarly, youth who were passive users (i.e., they viewed social media content but did not post or engage with it) did not have a significant association with depression risk.

Table 3-5. OLS Regression Models of Engagement of Social Media Content (SMU-Content) on Youth's Depression Risk – PSID CDS: 2019; Ages 12-17.

SMU-Content[+]	***Depression Risk (CDI)***				
	β	**SE**	**p**	**95%**	**CI**
Jokes or funny content	0.463*	0.217	0.038	0.027	0.899
Information about youth's everyday life	-0.025	0.285	0.931	-0.599	0.549
Videos, pictures, or games youth created	0.078	0.243	0.749	-0.411	0.567
Political opinion, current events, or social causes youth believes in	0.838	0.469	0.080	-0.104	1.780
Entertainment and celebrity news	0.112	0.252	0.660	-0.395	0.619
Does not post online (passive user)	-0.367	0.257	0.160	-0.884	0.150

P-value: * 0.05, **0.01, ***0.001

[+] Each type of social media content used an independent, separate OLS regression on depression risk

Controlling for: Youth's age, gender, race, ethnicity, family income, and parental SMU rules

Subgroup Analyses

i. Gender

Table 3-6 presents a gender-stratified analysis for SMU-Content and depression risk. On average, female youth who participated in jokes and funny content exhibited a 1.09-point higher risk of depressive symptoms along the CDI scale compared to female youth who did not engage in such content. Similarly, female youth engaging in political, current events, or social causes on social media showed a mean 1.59-point increased risk of depressive symptoms along the CDI scale compared to those who did not partake in such content. Furthermore, female youth who were passive users of social media demonstrated a mean depression scale score 0.96 points lower than female youth engaging in any types of social media content.

In contrast, for male youth, there were no significant associations between engaging in different types of social media content and the risk of depression, even when accounting for

other covariates. Overall, the gender subgroup results suggest that female youth may face an elevated risk of depression when engaging in specific types of social media content.

Table 3-6. Engagement of Social Media Content (SMU-Content) on Youth's Depression Risk by Gender – PSID CDS: 2019; Ages 12-17.

	Depression Risk (CDI)									
Gender	***Female*⁺**					***Male*⁺**				
	β	**SE**	**p**	**95% CI**		**β**	**SE**	**p**	**95%**	**CI**
Jokes or funny content	1.089**	0.353	0.003	0.378	1.800	-0.303	0.268	0.265	-0.845	0.239
Information about youth's everyday life	-0.201	0.397	0.616	-1.001	0.599	0.206	0.274	0.458	-0.349	0.760
Videos, pictures, or games youth created	-0.242	0.342	0.484	-0.931	0.447	0.431	0.279	0.131	-0.134	0.996
Political opinion, current events, or social causes youth believes in	1.615*	0.702	0.026	0.200	3.030	-0.247	0.469	0.602	-1.196	0.702
Entertainment and celebrity news	0.703	0.396	0.083	-0.095	1.502	-0.496	0.292	0.098	-1.087	0.095
Does not post online (passive user)	-0.961*	0.466	0.045	-1.899	-0.023	0.087	0.300	0.774	-0.520	0.694

⁺Independent regression models: The regression output for female youth are an independent regression from the regression output for male youth.
P-value: * 0.05, **0.01, ***0.001
Controlling for: Youth's age, gender, race, ethnicity, family income, and parental SMU rules

ii. Stage of Adolescence

Table 3-7 examines youth engagement in social media content and depression risk by youth's stage of adolescence. For youth in early adolescence (ages 12-14), there were no significant relationships between the various types of social media content and youth depression risk. For youth in late adolescence (ages 15-17), there was a 1.08 increase in average risk of depressive symptoms for youth that engaged in jokes or funny content on social media, compared to those that did not. Also, older youth who engaged in entertainment and celebrity news had, on average, a 1.01-point increase in depressive symptoms along the CDI scale compared to those that did not engage in that content. Overall, the age group analyses suggest

stage of adolescence may play a role in the relationship between depression risk and engagement in certain types of social media content.

Table 3-7. Engagement of Social Media Content (SMU-Content) on Youth's Depression Risk by Stage of Adolescence – PSID CDS: 2019; Ages 12-17.

	Depression Risk (CDI)									
SMU Content	***Early Adolescence (ages 12-14)***[+]					***Late Adolescence (ages 15-17)***[+]				
	Coef.	**SE**	**p**	**95% CI**		**Coef.**	**SE**	**p**	**95%**	**CI**
Jokes or funny content	0.055	0.263	0.837	-0.477	0.587	1.085***	0.302	0.001	0.475	1.696
Information about youth's everyday life	-0.431	0.290	0.145	-1.017	0.154	0.568	0.404	0.167	-0.248	1.385
Videos, pictures, or games youth created	0.070	0.330	0.832	-0.597	0.738	0.114	0.346	0.744	-0.586	0.814
Political opinion, current events, or social causes youth believes in	0.983	0.658	0.143	-0.347	2.312	0.878	0.498	0.085	-0.127	1.883
Entertainment and celebrity news	-0.471	0.287	0.108	-1.051	0.109	1.007*	0.430	0.024	0.139	1.876
Does not post online (passive user)	-0.403	0.311	0.203	-1.032	0.226	-0.563	0.505	0.271	-1.583	0.456

[+]Independent regression models: The regression output for youth in early adolescence are an independent regression from the regression output for late adolescence.
P-value: * 0.05, **0.01, ***0.001
Controlling for: Youth's age, gender, race, ethnicity, family income, and parental SMU rules

Discussion

This study investigates the intricate relationship between social connectedness, social media use (SMU), and the risk of depression among a nationally representative sample of adolescents drawn from the 2019 Panel Study of Income Dynamics (PSID). There remains a notable gap in understanding how social media intersects with social connections to impact mental health outcomes, particularly among at-risk youth subgroups. Given the lack of conclusive findings in the existing literature, this study delves into the quality of adolescents' interpersonal relationships with both parents and friends, as well as the collective influence of these close relationships on youth mental well-being. Additionally, we explore the associations between SMU, including both the frequency of time spent on social media and the nature of the content engaged with, and

mental health outcomes. Lastly, this study provides novel insights into the complex interplay of social connectedness and SMU and their impact on the youth mental health, demonstrating social media research and adolescent mental health may need to consider external social influences when investigating the associations between these two factors.

Frequency of SMU, Social Connection, and Youth Mental health

Our research findings underscore the advantages associated with cultivating multiple close relationships, both with parents and friends, when it comes to mitigating the risk of depression. These results align with existing research, affirming the direct impact of parent and peer closeness on the mental health outcomes of youth.[30–33,51] When we examined the frequency of social media usage (SMU), we observed significant associated risks for depressive symptoms among youth who were nearly constantly on social media. These finding relate to prior research that suggests youth who demonstrate addictive behavior of SMU (i.e., nearly constant use) are at increased risk of depression and reduced well-being.[182–184]

In the study sample, examination of the combined effects of social connectedness and the frequency of SMU revealed a decrease in the risk of depressive symptoms. This reduction was noted with an increase in social connectedness with friends and parents, indicating a protective influence against the adverse effects of addictive SMU. Although research on the interacting effects of SMU and in-person social connections is limited, one study focusing on undergraduate students yielded similar results, underscoring the potential buffering effects of social connection to problematic SMU.[235] Relational agency is integral to understanding how youth navigate their social media use in conjunction with in-person connections. It acknowledges that young individuals actively shape their online experiences within the broader context of their relationships and social environments. Peer influence significantly impacts social media

engagement, as youth seek to fit into their peer groups and maintain connections when they are not together. Family dynamics play a crucial role, with parental guidance and established guidelines influencing a young person's decisions regarding digital interactions. Relational agency emphasizes the integration of online and offline identities, recognizing that youth intentionally shape their digital personas while balancing the impact on their physical relationships. Consequently, social media serves as a tool for connection, enabling youth to stay in touch with friends and family, express identity, and seek support. Navigating social pressures, both online and offline, requires active agency as young individuals make choices that align with their social approval, acceptance, and personal values. Overall, utilizing a holistic approach of relational agency in understanding youth SMU highlights the dynamic nature of their digital and real-world relationships. However, more rigorous research is needed to investigate the dynamic relationship between in-person social connection and SMU concerning mental health outcomes.

Moreover, this study delved into subgroup distinctions. When exploring gender differences, it was evident that female youth fostering close relationships with friends and family experienced a reduced risk of depressive symptoms. Conversely, female youth engaged in problematic SMU faced a significant risk of depressive symptoms. Surprisingly, the interaction of social connection and the frequency of SMU did not reveal any significant associations. This may imply that in-person social connections and the frequency of SMU are not interacting in a manner that influences depressive symptoms in this sample, or the stratification of the sample into subgroups may have underpowered our statistical analyses, resulting in null results. On the contrary, there were no significant associations among social connection, the frequency of SMU, and depressive symptoms among male youth. This finding aligns with prior research suggesting that social connections may not uniformly exert the same magnitude of effect in mitigating mental health

challenges for male youth compared to their female peers.[189–192] Specifically, for male youth, social connections may manifest differently, characterized by interactions that prioritize group social gatherings and shared interests and activities, potentially offering less depth of emotional support required to address mental health challenges. Future research efforts should consider utilizing a variety of social connection measures when assessing gender differences in social connection and its impact on mental health. Consequently, it remains crucial for researchers and stakeholders to continue to examine the relationship between SMU frequency and mental health while also investigating potential underlying factors or behaviors that may drive any correlations.

When examining the different stages of adolescence, it was revealed that youth in early adolescence (ages 12-14) who constantly used social media experienced a considerable increased risk of depressive symptoms. However, younger individuals did not exhibit a significant association between the main effects of social connection with friends and family or the joint effects of social connectedness, frequency of SMU, and depressive symptoms. Similar to the gender subgroup analyses, it is crucial to consider whether the null associations stem from insufficient statistical power or reflect influences related to youth development. Conversely, youth in late adolescence (ages 15-17) did not experience any significant associations between the main or joint effects of social connectedness, frequency of SMU, and the risk of depression. It is noteworthy that within the late adolescence group, most youth were social media users, leaving a limited number of non-users for comparison. Future research endeavors should account for the fundamental differences in collecting SMU data across the ages of 12-17. SMU behavior patterns vary significantly throughout this age range, necessitating independent analyses to better comprehend their unique effects on mental health.

Social Media Content and Mental Health

While associations have been established between certain types of SMU behavior and mental health outcomes (e.g., high frequency, passive use), less is known about whether engaging in specific types of social media content—such as funny, political, or pop culture—influences these mental health outcomes. Social media content, in general, did not pose a significant risk for depressive symptoms among the sample's youth, except for engagement with funny content, which was linked to an increased risk of depression. Noteworthy distinctions were observed among female youth; those who engaged in funny content or consumed political and current events were at an elevated risk of depressive symptoms, while passive female users exhibited a reduced risk of depression. Furthermore, youth in late adolescence faced a heightened risk of depressive symptoms when engaging with funny content or entertainment and pop culture. These observations suggest that youth development factors likely influence the relationship between engagement in social media content and mental health.

To our knowledge, this study is the first to examine various types of social media content engagement on youth mental health, including when stratified by gender or stage of adolescence. The association between funny content and an increased risk of depression is somewhat surprising, as we initially anticipated that engaging with more positive-like content would foster positive feelings and emotions. Similarly, the finding that passive SMU among female youth was associated with a decrease in depression risk contradicts existing evidence, which suggests that passive use is linked to increased social comparison and mental health risks.[185–188] Lastly, the increase in depression risk associated with political engagement is not unexpected, given the current events and political turmoil unfolding across the U.S. in 2019.

Overall, this study's investigation into engagement with different types of social media content was exploratory with no clear directionality. Our findings did not reveal distinct patterns in the relationship between social media content engagement and youth mental health risks. While considerable speculation exists that SMU and certain types of engagement may lead to adverse mental health outcomes, it should be considered that any effects found may exert a temporary toll on youth mental health rather than prompt clinical manifestations. Further research is necessary to explore the types of content that youth engage with and how such engagement may impact their mental health. Moreover, the absence of an association between several types of social media content and depressive symptoms bolsters the notion that underlying factors may influence this relationship.

Study Strengths and Limitations

While this study primarily pursued an exploratory approach, it boasts several notable strengths in its design. Firstly, a key asset lies in its utilization of population-level data, which offers representation of U.S. youth aged 12-17. Unlike many studies on SMU that often rely on small, non-generalizable populations, such as those within academic institutions, this study benefits from a broader scope. Consequently, the findings contribute significantly to our understanding of the current landscape concerning SMU, social connectedness, and mental health among youth. Moreover, the inclusion of sociodemographic variables within the PSID dataset, a departure from the norm in studies using health assessments like the CDI, enhances the study's comprehensiveness. By incorporating these "real-world" variables, this research equips researchers, policy makers, and healthcare professionals with a more precise understanding of the risk and protective factors influencing youth, facilitating the development of effective interventions.

Several limitations must be acknowledged in this study. Firstly, it's essential to recognize that this analysis adopts a cross-sectional approach, indicating the results reveal associations rather than causal relationships. Additionally, it's important to consider the possibility of reverse causality concerning the primary outcome—mental health—and the exposure variables, social connectedness and SMU. It's plausible that youth experiencing mental health challenges might be more inclined to either socially isolate themselves or engage in unhealthy SMU behaviors. Ideally, future iterations of the PSID surveys will maintain consistent measures, enabling a longitudinal analysis. Additionally, despite the relatively ample sample size, the incorporation of interaction terms and stratification analyses may have diminished the statistical power, thereby contributing to the emergence of null findings. Conducting comparable analyses in larger samples will offer more substantive interpretations for subgroup populations. Another aspect of the data that merits consideration is the relatively limited number of mental health assessments within the dataset, coupled with the fact that these assessments relied on self-report rather than clinical evaluation. Future studies investigating the relationship between SMU and mental health outcomes should contemplate encompassing a broader spectrum of mental health conditions beyond just the risk of depression. For instance, it's worth noting that anxiety has increased nearly 40% among youth in the past decade.[6] The clinical distinctions between anxiety and depression could have influenced our findings, potentially contributing to the observed lack of significance. Consequently, integrating anxiety assessments into population health studies may serve to enhance our comprehension of psychosocial outcomes.

Study Implications

As we continue to investigate the effects of SMU on youth mental health, there are some considerations we should make moving forward. Below are our recommendations for a research

agenda that considers the role of social media use in the context of adolescent health development and the promotion of lifelong mental health.

i. Recommendation: Implement large, longitudinal studies that include mental health assessments and social determinants of health.

This study utilized an existing nationally representative study of U.S. youth and assessed the frequency of SMU and content engagement of SMU through a cross-sectional lens. This study's findings on frequency of SMU adds to the current social media research landscape that predominantly centers around investigating the impact of two key factors on youth mental health outcomes: the frequency of social media use (SMU) and the occurrence of cyberbullying.[176,237,238] With youth now using social media daily, if not nearly constantly, it becomes essential to shift our focus towards exploring other SMU behaviors and their potential influence on the development of youth mental health, such as the content they engage with. Thus, this study provides novel insights into the relationship of youth engagement with various types of social media content and its association to mental health and social connection.

However, it's worth noting that robust longitudinal assessments of SMU are still needed, as current longitudinal assessments are somewhat limited in scope, often spanning just one or two years.[239–241] Therefore, it is necessary to initiate large-scale, longitudinal studies that follow adolescent samples during the transition to adulthood. Based on our current evidence, it is not clear if dosage affects youth mental health. However, longitudinal assessments are important for understanding if a consistently high dosage over this sensitive period leads to long-term adverse mental health outcomes. Therefore, these studies should encompass comprehensive mental health assessments and measures of social determinants of health. By doing so, we can more

effectively disentangle the intricate web of potential causal factors contributing to the clinical manifestations of adverse mental health outcomes among youth.

ii. Recommendation: Study designs should incorporate a variety of measures when assessing social connection, social media, and mental health.

This study was the first to assess the role of social connection in the relationship between SMU and mental health outcomes among youth. From a population health approach, it becomes evident that we have yet to attain a comprehensive understanding of social media's intricate role in youth mental health. It is increasingly apparent that the relationship between SMU and mental health is far more complex than initial conceptualizations may have suggested. Researchers must broaden their perspective to encompass a multitude of other risk and protective factors that come into play during adolescent development, factors that may interact with SMU to shape the outcomes of mental health. Adolescence itself represents a sensitive phase characterized by crucial processes such as brain maturation, socioemotional regulation, and identity formation. These processes rely heavily on youth's relational environment, which in turn plays a pivotal role in nurturing interpersonal skills and providing cognitive stimulation essential for fostering an optimal mental health trajectory. Consequently, it is imperative that we adapt and develop measures to gauge social connection and SMU behaviors that align more effectively with the unique developmental phase of adolescence. For example, our study did not yield significant results for male youth, possibly due to the manner in which we assessed social connection, which might have been better suited for measuring female youth's social connectedness. Similarly, we may need to refine our measures concerning the types of social media content youth engage with and the way they interact with it. The current measures within the PSID dataset primarily inquired about posting on various types of content, yet youth (and adults) may actively view and

search specific content without necessarily posting themselves. Delving into passive viewing patterns according to the specific types of content may offer another avenue for assessing SMU behavior and its potential impact on mental health outcomes. Overall, as we continue our exploration into the potential effects of SMU, it is essential to contextualize our findings within an adolescent health development framework. This multifaceted perspective will allow us to make more informed and relevant contributions to the ongoing dialogue surrounding SMU and youth mental health.

iii. Recommendation: Adolescents' SMU behaviors and social connections are not all the same, subgroup analyses are necessary.

Our findings suggest there are differences in SMU, social connectedness, and mental health based on gender and stage of adolescence. The absence of a conclusive association between SMU and mental health across a broad spectrum of adolescent studies suggests that the relationship between SMU and mental health may not impact adolescents uniformly. Instead, it appears that there are underlying factors within subgroups of adolescents that contribute significantly to the association between SMU and mental health outcomes. Furthermore, its important to assess based on current understandings of adolescent health development what characteristics of gender and early vs. later adolescence may be influencing this relationship. Similarly, youth who identify as LGBTQ+ or have disabilities may have their unique reasons for exhibiting certain SMU behaviors. Consequently, it is imperative that future studies prioritize the recruitment of robust sample sizes to facilitate meaningful subgroup analyses. Such research can delve into the relationships between SMU and mental health separately within groups that share identifiable characteristics, ultimately enabling us to formulate specific recommendations aimed at improving outcomes within these diverse subpopulations.

iv. Recommendation: Qualitative data is needed to complement quantitative assessments.

This study used quantitative assessments to assess the relationship between SMU, social connection, and mental health outcomes. One of the most significant findings of this study was the lack of an independent relationship between SMU frequency and content with mental health outcomes among youth. Recent social media research is increasingly indicating that social media should be viewed as a tool rather than an inherent risk, with potential risks associated with specific behaviors exhibited by youth. While high-quality quantitative assessments and longitudinal studies remain imperative, it is equally crucial to complement these approaches with qualitative data. Qualitative research can provide invaluable insights into the underlying motivations driving various social media behaviors and associated mental health concerns. In contrast to potentially viewing SMU as a direct cause of adverse mental health outcomes, it is plausible that SMU is correlated with youth experiencing heightened feelings of anxiety and loneliness. However, these feelings may be fleeting rather than exerting a lasting impact on an individual's mental health trajectory. Additionally, qualitative analyses have the potential to unveil vital connections between SMU, youth behaviors, and mental health outcomes that may not be adequately represented in our survey-based assessments.

Lastly, qualitative assessments can illuminate areas for intervention that might remain undiscovered through quantitative data alone. By embracing both quantitative and qualitative research methodologies, we can develop a more comprehensive understanding of the complex interplay between social media, youth behaviors, and mental health, ultimately enabling more targeted and effective interventions.

Conclusion

In summary, we are still in the midst of a youth mental health crisis. There is likely not one factor driving this issue but a compilation of factors influencing youth mental health. Virtual spaces, like social media, are here to stay and it is crucial that we continue to investigate how the adolescent social environment interacts with social media to influence mental health outcomes. Utilizing the protective effects of close interpersonal relationships with parents and friends may be a possible intervention route. Considering a life course health development approach, early adolescence is a sensitive time period of health development; this life stage may be a favorable time to initiate promotive mental health strategies to improve outcomes later in life. Also, we know for certain populations, social media does have benefits. Researchers should aim to identify the positive aspects of social media so it can be used as an intervention tool to improve mental health outcomes.[242] Lastly, as research continues to examine the role of SMU in youth mental health outcomes, it's important for social media companies to engage with researchers, clinicians, policymakers, and educators to assist in the development of policies that support positive engagement across their platforms.

Chapter 4. Examining the Association Between Social Support and Mental Health Service Use Among Postsecondary Students with Mental Health Concerns

Introduction

Postsecondary Students' Mental Health Status & Services Utilization

In the United States, nearly 40% of emerging adults (ages 18-28) attend postsecondary education.[243] For many students, postsecondary education is their first, major life transition and an opportunity to explore new levels of independence. However, the demands of postsecondary education – both academic and social – can take a toll on the mental health of students. Prior to the COVID-19 pandemic, mental health diagnoses in postsecondary students (e.g., depression, anxiety, suicidal ideation) significantly increased from 2009 to 2017.[71] When the COVID-19 pandemic transitioned postsecondary campuses to virtual platforms, isolating students, this led to a significant rise in mental health diagnoses.[244] During the 2021-2022, roughly 41% of U.S. postsecondary students in the Healthy Minds Study (HMS) screened positive for depression, 36% for anxiety disorder, 14% for eating disorder (ED), 29% for non-suicidal self-injury (NSSI), and 14% for suicide ideation.[245] Mental health challenges among postsecondary students can lead to poor physical health and academic performance, as well as increased risk of suicide. Indeed, students with anxiety, depression, or ED symptoms are at an increased risk of suicidality.[246,247] Therefore, it's important for healthcare providers and postsecondary campuses to work together to create policies and programs that promote positive mental health and incorporate responsive treatment strategies for those in need of services.

Mental health services (MHS) are vital resources for students with a diagnosed mental health condition (MHC) and for students that may not have a diagnosed MHC but have a perceived mental health concern. A mental health diagnosis signifies access to care; however, many individuals lack access to care or avoid mental health care due to stigma or the belief they can deal with their symptoms on their own. In order to truly understand mental health needs, we must consider individuals that lack a formal diagnosis but screen positive for MHCs or report a perceived need for care. The most common sources of MHS are psychotherapy (i.e., counseling) and/or psychotropic medication (e.g., psychostimulants, anti-depressants, mood stabilizers, etc.). Postsecondary students may access MHS at postsecondary campus health centers, health facilities in the community or other location, or through emergency services.[39,248] While postsecondary institutions remain the primary access point for students seeking MHS,[71] the increase in demand has placed a substantial burden on campus counseling centers, resulting in a shortage of resources and stretched-out waitlists for many of these centers.[249,250] Of students who screened positive for depression or anxiety during the 2021-2022 academic year, only 40% utilized psychotropic medications in the past year and 65% used psychotherapy.[245] Additionally, of students who screened positive for ED symptoms, only 20% received treatment for ED.[251] While demand for counseling services is one challenge to accessing services, there are additional factors that influence students receiving needed mental health care.

The Andersen Behavioral Model can be applied to understand MHS utilization among postsecondary students. The Andersen Behavioral Model of Health Services Use is a theoretical framework that suggests that an individual's use of healthcare services is determined by predisposing factors, enabling factors, and need factors.[252] Within the context of college campuses, students cite several reasons influencing MHS utilization, including stigma,

skepticism of treatment effectiveness, belief that stress is normal in college, and logistical constraints (e.g., time, finances, insurance coverage).[39,253,254] Although mental health stigma still persists, there has been an evolution of destigmatizing MHS use among young people,[71] which may be associated with the increased utilization of MHS over the last decade. Overall, mental health awareness and education programs on postsecondary campuses, visibility, and access to campus counseling services, and promoting positive mental health and well-being across campuses are associated with reducing mental health stigma on postsecondary campuses.[255,256] A complex barrier to MHS utilization among postsecondary students is health insurance. The majority of postsecondary students are under age 26, enabling them to remain on their parents' private health insurance plans. However, many health insurance plans lack quality MHS coverage. Yet, for students that attend large campuses, there is often the option of student healthcare plans. Some of these student plans include a certain amount of free MHS each year. However, as mentioned previously, many postsecondary campuses have been overwhelmed with the recent increase in demand for MHS and not able to meet student demand. It's not entirely clear how health insurance plays a role in students' MHS utilization, this requires further investigation and consideration for the nuances between private health insurance coverage and access & coverage of student plans. Although postsecondary institutions are becoming more friendly to mental health awareness, the majority (65%) of students question how serious their needs are.[254] This may lead students to depend on informal support from non-clinical sources, such as friends and family, which may or may not effectively address their mental health needs.

The Role of Informal Social Support in Addressing Mental Health Needs

Among postsecondary students, social support is associated with a lower likelihood of depression, anxiety, suicidality, NSSI, and ED.[257] Social support refers to the perceived or actual

availability of informative, physical, and emotional resources from one's social network.[9] Perceived social support (i.e., an individual's subjective perspective of the support received from their network) and the quality of perceived social support (i.e., the perceived helpfulness of their social support) have been strongly linked to reduced mental health concerns.[257,258] Additionally, a lack of social support (i.e., social isolation) is associated with a greater risk of mental health challenges.[259,260] Overall, there is significant evidence to support that social support plays a crucial role in mental health outcomes; when social support is present, it may act as a protective agent against poor mental health outcomes but when it is absent, it may be a risk factor for adverse mental health outcomes.

While there is an association between social support and mental health, it is less clear the relationship between social support and MHS utilization. Study findings have been mixed.[261–263] Generally, evidence demonstrates that social support reduces the likelihood of MHS utilization; however, in the context of more severe MHCs, social support is more likely to increase the likelihood of MHS utilization.[264] Yet, none of these studies focused specifically on postsecondary students, which are a particular population at increased risk of mental health concerns and in a setting strongly dependent on social support. To our knowledge, there has yet to be a study investigating the role of social support in MHS utilization among postsecondary students. A potential reason for lower MHS utilization rates than mental health need may be due to students seeking support from non-clinical sources, such as friends and family (i.e., informal supports). As the mental health needs of postsecondary students continues to overwhelm counseling centers, it would be useful for postsecondary institutions to understand how social support may promote positive mental health among students.

The Importance of Promoting Lifelong Mental Health during Emerging Adulthood

Most U.S. postsecondary students are considered emerging adults, between the ages of 18 and 30. Emerging adulthood is a sensitive developmental stage for the promotion of positive mental health. Brain development does not end until one's mid-20s. The prefrontal cortex is one of the last parts to mature and is responsible for our executive functioning, which regulates our thoughts, actions and emotions.[13] Many emerging adults find themselves navigating significant life transitions and newfound levels of independence, potentially carrying implications for their long-term health and overall well-being. For emerging adults pursuing postsecondary education, it marks the first time leaving their parent's or guardian's home and embarking on a path towards complete self-reliance. Within the postsecondary environment, students assume new responsibilities with their academics, relationships, finances, and health. The transitory nature of the postsecondary experience, often marked by instability across various facets of life, can exact a toll on their mental health. However, while emerging adulthood and the postsecondary experience represents a time of risk, there are also opportunities for interventions that are critical to lifelong mental health development.

Further, social support plays a critical role in health development of emerging adults. Emerging adulthood represents the transition from the family environment being the main source of relational influence on one's health and development to peer support and community belongingness having a more proximal influence on one's health.[63,74] During this life stage, peer relationships can either encourage or discourage healthy behaviors, such as promoting activities to foster positive mental health or enable risky behaviors like substance misuse.[67] Further, emerging adulthood is an important time to develop social skills, such as communication and conflict resolution that build healthy relationships in all areas of life, including school and work

environments. In conclusion, social support is vital in emerging adulthood from a life course health development perspective because it impacts various aspects of mental well-being, influences health behaviors, and contribute to personal growth during this critical life stage. Building and maintaining healthy social connections can have long-lasting effects on an individual's health and overall quality of life.

Study Aims

This study aims to explore the role of social support in the mental health and the utilization of MHS of U.S. postsecondary students. The present study is the first, to our knowledge, to examine the influence of social support in MHS utilization among a large, random sample of postsecondary students. We plan to investigate the relationship between social support, mental health, and MHS utilization through the following research questions:

1. How is social support associated with mental health services (MHS) utilization among postsecondary students with mental health concerns (MHCs)?
    a. Hypothesis: Students with MHCs with perceived social support are less likely to utilize MHS than students with MHCs without social support.
    b. Hypothesis: Students with MHCs experiencing social isolation are more likely to utilize MHS than students with MHCs who are not experiencing social isolation.
2. How does the quality of social support lead to differences in association with MHS utilization for students with mental health concerns?
    a. Hypothesis: Students with mental health concerns that perceive to have higher quality social support are less likely to utilize MHS than students with lower quality social support.

b. Hypothesis: Students with MHCs that perceive to have higher quality social support are less likely to utilize MHS than students with lower quality social support.

Analytic Model

The conceptual model for this paper is adapted from the Andersen health behavioral model,[252] and influenced by previous studies that utilized the Andersen model in understanding factors effecting MHS utilization rates.[265,266] Utilizing Andersen's model, we aim to explain how mental health need and social support influence an individual's health-related behaviors and use of MHS.

The study's target population is postsecondary students with mental health needs, which includes students perceived mental health and validated screeners of MHC (e.g., anxiety, depression, ED, NSSI, suicide ideation). The outcome of interest is MHS utilization, which includes psychotherapy and psychotropic medication.[39] Social support is considered an enabling factor within the model, as it may facilitate or hinder an individual's ability to access MHS. Social support will be measured through perceived social support, quality of the perceived social support, and social isolation. Within the present study, we aim to assess the direct relationship between social support and MHS utilization, in the context of mental health need. Based on prior evidence, we hypothesize an inverse relationship between social support and MHS utilization, such that those who have social support are less likely to utilize MHS. Also, it's important to recognize there are predisposing factors that influence an individual's inclination to seek MHS. Predisposing factors of interest include students' race and/or ethnicity, gender identity, age, sexual orientation, nationality (i.e., international student or U.S.), financial situation, and living

situation; these factors will be controlled for in the study's analyses. Lastly, there are unmeasurable, predisposing factors that influence students MHS utilization. While these factors may not be included in the statistical analyses, they will be considered in the interpretation of findings.

Additionally, it's important to note that there is the potential for reverse causality between the main variables of interest – MHS utilization can influence social support. For example, a therapist may emphasize the need for a social support system to maintain positive mental health. Therefore, it's important to acknowledge the study aims are exploratory in nature and aim to provide insight for future studies assessing potential causal relationships.

Figure 4-A. Analytic Model of Postsecondary Student Mental Health, Social Support, and MHS Utilization

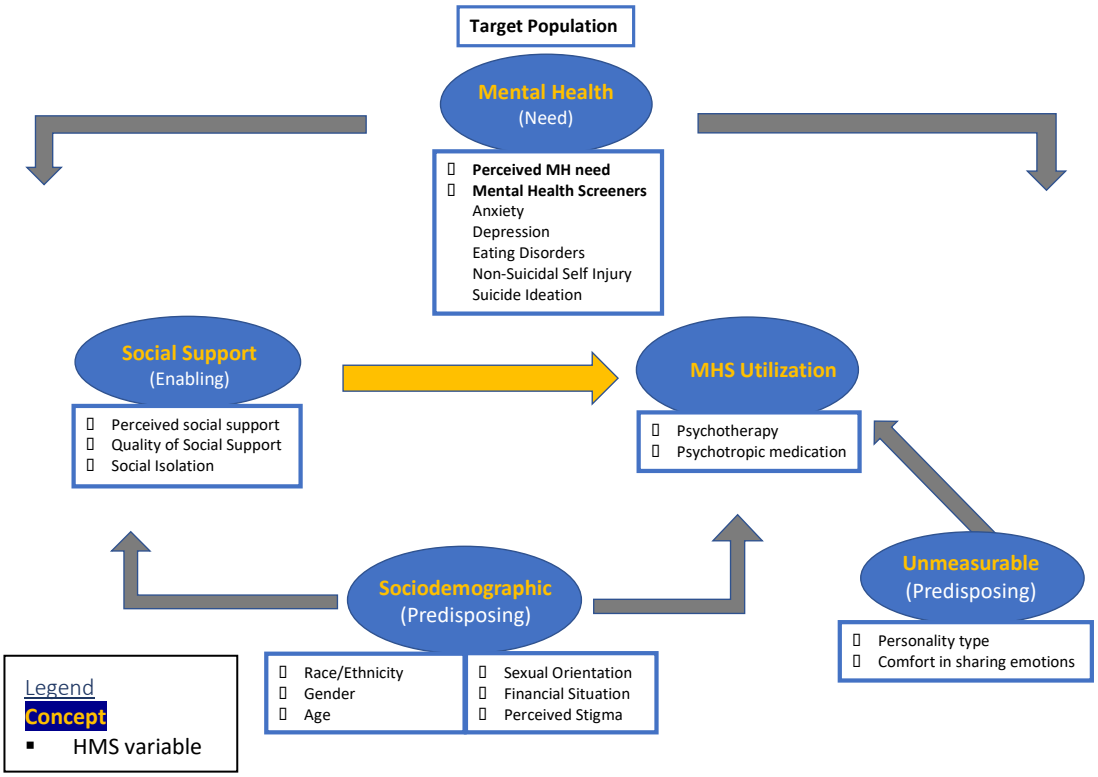

Figure 4-A. Analytic model of mental health, social support, and mental health services (MHS) utilization among U.S. postsecondary students in the Healthy Minds Study 2021-2022 sample. The target population is students who experienced a mental health concern through perceived need or screeners. The yellow arrows portray the main pathway of interest, the influence of social support on MHS utilization.

Methods

Study Design

This study uses the 2021-2022 academic year data from the Healthy Minds Study (HMS). The HMS is an annual cross-sectional study that collects data from a large, random sample of U.S. postsecondary students. Data includes self-reported responses by students using a web-based survey on their mental health, service utilization, and related factors. For the 2021-2022 study sample, student participants came from 140 U.S. postsecondary institutions. Institutions elect to participate in the HMS; study sites are diverse with varying institutional type (i.e., associates, bachelors, and professional program participants), enrollment size, and geographic location. The HMS is a multi-institution collaboration, it was developed and is implemented by education and health services & policy researchers from the University of California-Los Angeles, the University of Michigan, Wayne State University, and Boston University. More information on the HMS can be found online at the Healthy Minds Study website (https://healthymindsnetwork.org/).

Sample

The 2021-2022 HMS survey included 100,176 undergraduate students. For this study, our target population focuses on postsecondary students in the HMS sample who identify as having a mental health concern (operationalized in the *Measures* subsection), which includes 70,139 students from the total sample. Table 4-1 includes demographic characteristics of the HMS study sample and students who identify with a mental health concern (MHC). Student mean age was 21.95 for the HMS study and 21.75 for students with a mental health concern. Majority of students identified as female (69.24% HMS; 22.73% MHC) and heterosexual (73.73% HMS; 70.58% MHC). Most students identified as white (63.88% HMS; 65.01% MHC) and roughly

11% reported Hispanic ethnicity (11.97% MHC). Of students participating in the HMS, majority of students (84.36%) were enrolled in a bachelor's degree program (64.98% MHC). When students were asked about their current financial situation, 37.24% reported it was always or mostly stressful (42.55% MHC) while 33.51% stated it was sometimes or rarely stressful (32.29% MHC). Overall, there sample demographic characteristics were relatively similar among the total HMS undergraduate population and students exhibiting a MHC.

Table 4-1. Demographic Characteristics of Undergraduate Students who Participated in the 2021-2022 Healthy Minds Study (N= 100,176)

	Total Population *N = 100,176*		**Target Population (MHC)** *N= 70,139*	
Characteristics	**N / Mean**	**% / SD**	**N / Mean**	**% / SD**
Age (Mean, SD)	21.95	5.94	21.75	5.34
Gender Identity				
Male/Transmale	27,096	27.05	15,946	22.73
Female/Transfemale	69,544	69.42	50,851	72.69
GQ/NB/SelfID	3,407	3.40	3,120	4.45
Missing	129	0.13	90	0.13
Sexual Orientation				
Heterosexual	75,860	75.73	49,506	70.58
LGBTQ+	23,451	23.41	20,195	28.79
Missing	865	0.86	438	0.62
Race				
White	63,990	63.88	45,595	65.01
Black	11,815	11.79	7,610	10.85
Asian	11,508	11.49	7,774	11.08
Other or Multiracial	5,461	5.45	3,986	5.68
Missing	7,402	7.39	5,174	7.38
Ethnicity				
Hispanic	11,629	11.61	8,394	11.97
Not Hispanic	88,435	88.28	61,681	87.94
Missing	112	0.11	64	0.09
Postsecondary Degree Enrolled				
Associates	15,668	15.64	10,510	14.98
Bachelors	84,508	84.36	59,629	85.02

Current Financial Situation				
Always/often stressful	37,307	37.24	29,841	42.55
Sometimes/Rarely Stressful	33,565	33.51	22,650	32.29
Never Stressful	26,310	26.26	15,599	22.24
Missing	2,994	2.99	2,049	2.92

Measures

All study variables underwent a comprehensive assessment for missing data, with the observed missingness less than 8% across all variables in the target population. A codebook is provided in Appendix A.

Mental Health Concerns

Perceived Need of MHS

Perceived need of MHS is measured by student's agreement (6-point Likert scale) with the following statement: "In the past 12 months, I needed help for emotional or mental health problems such as feeling sad, blue, anxious, or nervous." HMS adapted this question from the Healthcare for Communities study, which was a large, national study of mental health service use.[267] The survey responses were constructed into a binary variable, students who responded Somewhat, very, and strongly agree will be categorized as in need of MHS.

MHC Screeners

For the purposes of this study, all MHC screeners were constructed as binary variables to compare positive cases to students who did not screen positive in the assessments. Missingness did not significantly differ by MHC.

i. Anxiety

Students completed the General Anxiety Disorder 7-item assessment (GAD-7),[268] which asks respondents to reflect on anxiety-related symptoms over the last two weeks. The GAD-7 is considered an acceptable assessment for identifying generalized anxiety disorder. [269]

Respondents chose from four options: not at all, several days, over half the days, nearly every day. The 7-item scale has a Cronbach's alpha = 0.8. Responses range from 0-21; a response greater than 10 is considered a cut-off for Generalized Anxiety Disorder. Often, a score 10-15 is considered to be a moderate level of anxiety and 15-21 is considered a severe level of anxiety. Similar cut-off scores have been assessed and validated in postsecondary student samples.[270] Responses are operationalized as 10-21 considered a positive case, which is consistent with previous research.[268]

ii. Depression

The Patient Health Questionnaire-9 (PHQ-9) assesses the severity of depression.[271] The PHQ-9 has demonstrated strong concordance with clinical depression and major depressive disorder.[272–274] Students were asked nine questions that asked them to rate their symptoms of depression over the last two weeks. Responses included: not at all, several days, more than half the days, nearly every day. The 9-item scale has a Cronbach's alpha = 0.9. Responses range from 0-27 with scores of 5, 10, 15, and 20 representing mild, moderate, moderately severe, and severe depression, respectively. The PHQ-9 has been validated in diverse postsecondary student samples.[275] Responses are operationalized as 10-27 representing a positive case, which is consistent with previous research.[271]

iii. Eating Disorders (ED)

The SCOFF questionnaire is a screening tool for eating disorders.[276] It has been shown to detect commonly occurring eating disorders with sensitivity and specificity above 70%, including anorexia, bulimia nervosa, and binge eating disorder.[276–279] Students responded yes or no to five questions designed to suspect the existence of an eating disorder before clinical assessment. A positive case is considered when at least three of the five questions are answered

affirmatively. A binary variable was used to assess students who screened positive. The SCOFF has been validated in diverse postsecondary student samples.[280,281]

iv. Non-suicidal Self-Injury (NSSI)

HMS developed the non-suicidal self-injury survey question in accordance with prior research in postsecondary student populations.[282,283] Students were asked if they intentionally hurt themselves without intending to kill themselves in the past year and to identify the type of injury. This question was converted into a binary variable in which a positive case was considered if the student reported any type of non-suicidal self-injury. Assessing NSSI in this structure is consistent with prior HMS research.[71,284]

v. Suicide Ideation

Suicide ideation is assessed through a binary variable that has been used in the National Comorbidity Survey.[3] Students were asked to disclose if they seriously considered attempting suicide in the past year. A positive case was considered if the student responded yes to the question.

MHS Utilization

MHS Utilization was measured through several survey questions related to receiving counseling or therapy or use of prescription medications. The operating definition of MHS utilization follows the same format as previous HMS research.[39,71] Therefore, MHS utilization will include students that responded yes to receiving counseling/therapy or using prescription medications for mental or emotional health needs in the past 12 months.

Counseling/Therapy in last 12 months

Students were asked if they have ever received counseling or therapy for mental health concerns in the last 12 months. A binary variable was constructed based on their response, which I consistent with other HMS research studies.[71,285,286]

Use of Prescription Medications

The HMS survey also includes questions about students' use of prescription medications for health conditions; these questions were adapted from the HCC study.[267] Students are asked if they have taken any medications from a list of prescription medications in the past 12 months. A follow-up question asks students the purpose of taking the medication, in which students can chose "mental or emotional health" from a list of choices.

Social Support

Perceived Social Support

Social support is measured through two survey questions assessing informal help-seeking sources. The first survey question asks, "In the past 12 month have you received counseling or support for your mental or emotional health from any of the following sources?"; responses include roommate, friend, significant other, religious counselor or other religious contact, support group, other non-clinical source, or no one. A binary variable was constructed that compares those that had any informal social support compared to those that did not have someone to provide social support. The aim of this social support variable is to measure the use and availability of a student's source of social support.

Quality of Perceived Social Support

There was a follow-up question asking how helpful it was to discuss their emotional and mental health concerns with their social support source, in which respondents stated very helpful,

helpful, somewhat helpful, not helpful. Reconfigured this into a three-category variable of helpful (very helpful and helpful), somewhat helpful, and not helpful.

Social Isolation

Social isolation is examined through a quantitative, validated measure of loneliness. The 3-item UCLA Loneliness Scale measures subjective social isolation and loneliness.[287] The three items assess lack of companionship, feeling left out, and feeling isolated from others. Responses include, "hardly ever", "some of the time", and "often". The 3-item scale has a Cronbach's alpha of 0.72. A score of 3-6 is considered as "moderately lonely" and a score of 6-9 is defined as "severely lonely". For the purposes of this study, we will examine using the scale as a binary variable (0-3: not lonely, 3-9: lonely).

The incorporation of the 3-item UCLA Loneliness Scale differs inherently from the assessment of perceived social support. While the perceived social support examines the utilization or accessibility of a social support source during times of distress, the loneliness scale focuses on an individual's subjective perception of social isolation. In essence, the loneliness scale delves into the emotional experience of feeling socially disconnected from others, capturing a distinct aspect of one's mental and emotional state, rather than the practical presence or availability of social support resources.

Covariates

Sociodemographic characteristics are included as controls in the study's statistical analyses, including gender, age, race/ethnicity, sexual orientation, current financial situation, and perceived stigma. Based on prior research, postsecondary students that identify as female and gender minorities as well as minority racial and ethnic groups have increased rates of mental health diagnosis on campuses but not reduced MHS utilization.[71,288] Additionally, to control for

any disparities in MHS access, students' nationality and their current financial were included as controls in the models.

Statistical Analyses

All analyses were conducted using Stata 16.1 and weighted using the HMS non-response sample weights. The sample's univariate and bivariate distributions of mental health, social support, and MHS utilization variables were presented. To examine subgroup differences in MHS utilization, stratified logistic regression was used to assess the relationship between perceived social support, quality of social support, and social isolation among students with mental health concerns (screeners and perceived need). All demographic variables were included as controls in regression analyses.

Results

Weighted Distributions of Mental Health Needs, Social Support, and MHS Utilization

Table 4-2 provides descriptive statistics of the mental health concerns of all undergraduate students in the HMS. Roughly half of students (55.96%) screened for mental health concerns that included anxiety, depression, eating disorder (ED), non-suicidal self-injury (NSSI), and suicide ideation. Looking at the individual mental health conditions, 34.83% screened positive for anxiety, 40.95% screened positive for depressive symptoms, 12.40% for eating disorders, 23.67% for NSSI, and 13% for suicide ideation. Approximately 59.4% of students self-reported a mental health need.

Table 4-2. Distribution of Postsecondary Students' Mental Health Concerns (2021-2022 Healthy Minds Study; N= 100,176)

Mental Health Concerns	n	%	Weighted %
Mental Health Condition (MHC) Screeners			
Any Mental Health Concern (Anxiety, Depressive, ED, SI, Suicidality)	56,055	55.96	59.31
Missing	9,318	9.30	
Anxiety	34,895	34.83	35.90
Missing	8,165	8.15	
Depressive	41,021	40.95	42.76
Missing	7,678	7.66	
Eating Disorder	12,420	12.40	12.44
Missing	7,839	7.83	
Non-Suicidal Self-Injury (NSSI)	23,711	23.67	25.01
Missing	9,203	9.19	
Suicide Ideation	13,025	13.00	14.32
Missing	7,820	7.81	
Perceived Mental Health Need			
Agree	59,522	59.42	62.85
Missing	10,216	10.20	

Note. All weighted percentages are calculated using HMS non-response survey weights.

Table 4-3 provides the descriptive statistics on the social support and MHS utilization of postsecondary students with mental health concerns. Assessing student's types of social support, 73.6% of students reported they had someone they could go to for informal support with their emotional and mental health concerns. When assessing the quality of the informal social support, 52.4% stated the advice was helpful, 18.5% said it was somewhat helpful, and 1.8% did not find their informal source of support helpful. Conversely, most students reported feelings of loneliness (67.2%). Lastly, 47.4% of students with a mental health concern have utilized any mental health services; 37.5% of students have used therapy/counseling and 29.2% have used medication for mental and/or emotional health.

Table 4-3. Distribution of Social Support and MHS Utilization among Postsecondary Students with Mental Health Concerns (2021-2022 Healthy Minds Study; N= 70,139)

	n	%	Weighted %
Social Support Variables			
Social Isolation (i.e., Loneliness) (-)	47,120	67.18	67.91
Missing	1,263	1.80	
Perceived Social Support (+)	51,615	73.59	74.85
Missing	3,851	5.49	
Quality of Perceived Social Support			
Helpful	36,764	52.42	71.81
Somewhat Helpful	12,949	18.46	25.69
Not Helpful	1,273	1.81	2.5
Missing/Did not need help	19,153	27.31	
Current Mental Health Services Utilization			
Any Mental Health Services (Therapy and/or Medication)	33,243	47.40	46.76
Therapy	26,356	37.58	38.03
Missing	2,401	3.42	
Medication	20,467	29.18	30.84
Missing	4,110	5.86	

Note. All weighted percentages are calculated using HMS non-response survey weights.

Table 4-4 displays the weighted percentage distribution of loneliness, perceived social support, and quality of that social support among students with the specified mental health concern. Of students who screened positive for depressive symptoms, 78.21% screened positive for loneliness 74.59% reported an informal source of support, and the quality of that support ranged from 65.25% helpful, 31.35% somewhat helpful, and 3.4% unhelpful. Of students who screened positive for anxiety, 78.03% screened positive for loneliness, 75.95% reported an informal source of support, and the quality of that support ranged from 66.59% helpful, 30.14% somewhat helpful, and 3.27% unhelpful. Of students who exhibited NSSI behaviors, 77.98% screened positive for loneliness, 78.94% reported an informal source of support, and the quality of that support ranged from 66.34% helpful, 30.34% somewhat helpful, and 3.33% unhelpful. Of

students who reported suicide ideation, 83.7% screened positive for loneliness, 75.99% reported an informal source of support, and the quality of that support ranged from 61.8% helpful, 34.06% somewhat helpful, and 4.14% unhelpful. Of students who screened for ED, 76.99% screened positive for loneliness, 73.67% reported an informal source of support, and the quality of that support ranged from 66.58% helpful, 30.33% somewhat helpful, and 3.09% unhelpful. Of students who reported a perceived mental health need, 69.5% screened positive for loneliness, 78.24% reported an informal source of support, and the quality of that support ranged from 71.56% helpful, 25.92% somewhat helpful, and 2.52% unhelpful.

Table 4-4. Distribution of Social Support Variables Among Students with Mental Health Concerns (2021-2022 Healthy Minds Study; N= 70,139)

	Social Support Variables				
	Loneliness	**Perceived Social Support**	**Quality of Social Support**		
			Helpful	*Somewhat*	*Not Helpful*
	Weighted %	Weighted %	Weighted %	Weighted %	Weighted %
Depressive	78.21	74.59	65.25	31.35	3.4
Anxiety	78.03	75.95	66.59	30.14	3.27
NSSI	77.98	78.94	66.34	30.34	3.33
Suicidality	83.70	75.99	61.8	34.06	4.14
ED	76.99	73.67	66.58	30.33	3.09
Perceived Need	69.50	78.24	71.56	25.92	2.52

Note. All percentages are calculated using HMS non-response survey weights.

Table 4-5 examines the MHS utilization and perceived social support among students who screened positive for each MHC. There were similar distribution patterns of MHS utilization and social support across MHCs. Most students use MHS and have social support, regardless of MHC type (41.45-49.21%). The next largest proportion of students have social support but do not use MHS, regardless of MHC type (26.78-34.4%). Students who do not use MHS and do not have social support make up the third largest percentage of each MHC (12.65-

16.27%). Lastly, students who use MHS but do not have social support are the smallest proportion of students among all MHCs (8.39-10.91%). Overall, most students with MHCs are receiving MHS and have an informal support. However, more than half of students who screened positive for MHCs are not utilizing MHS, regardless of having an informal support.

Table 4-5. Distribution of MHS Utilization & Perceived Social Support Among Students with Mental Health Concerns

	MHS Utilization & Perceived Social Support			
	MHS+,SS+	**MHS+, SS-**	**MHS-, SS+**	**MHS-, SS-**
Mental Health Concerns	*Weighted %*	*Weighted %*	*Weighted %*	*Weighted %*
Perceived MH	43.84	9.11	34.4	12.65
Depress	41.45	9.14	33.15	16.27
Anxiety	43.94	9.45	32.01	14.6
ED	42.39	9.19	31.28	17.14
NSSI	47.26	8.39	31.68	12.67
SI	49.21	10.91	26.78	13.1

Note. All values are calculated using HMS non-response propensity survey weights.
MHS = Mental Health Services Utilization
SS = Perceived Social Support
MHS+, SS+ = students using MHS and have an informal support
MHS+, SS- = students using MHS but do not have an informal support
MHS-, SS+ = students not using MHS but have an informal support
MHS-, SS- = students who do not use MHS and do not have an informal support

Regression Analyses by Perceived Mental Health Need and Combined Mental Health Screeners

Table 4-6 assess the association between social support and MHS utilization among students with mental health concerns. Among students who screened positive for a mental health concern, those who had social support were 2.2 times more likely to utilize mental health services compared to those that did not have social support. For students that screened positive for a mental health concern and screened for loneliness, they were 1.3 times more likely to utilize mental health services compared to students who were not lonely.

We also used a subjective mental health measure to assess the relationship between social support, mental health, and service utilization. Among students with a perceived mental health

need that had social support, they were 1.8 times more likely to use MHS compared to those with a perceived need and no social support. For students with a perceived need and who screened for loneliness, they were 1.2 times more likely to use mental health services compared to those with a perceived mental health need but were not lonely.

Table 4-6. Mental Health Concerns: Regression Models of Social Support & Social Isolation on MHS Utilization

Positive Mental Health Screeners										
	(+) Social Support, *higher = more support*					**(-) Social Isolation,** *higher = lonelier*				
	AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	2.20*	0.083	0.000	2.04	2.37	1.287*	0.043	0.000	1.205	1.376
Perceived Mental Health Need										
	(+) Social Support, *higher = more support*					**(-) Social Isolation,** *higher = lonelier*				
	AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	1.814*	0.069	0.000	1.683	1.956	1.160*	0.036	0.000	1.090	1.234

Asterisk indicates the adjusted odds ratio (AOR) is different from 1.0 at $p < 0.05$.
In the regression analysis for perceived social support, social isolation was accounted for as a control variable, while in the regression analysis for social isolation, perceived social support was included as a control variable.
Covariates for all analyses: gender, age, race or ethnicity, sexual orientation, current financial situation, and perceived stigma.

Table 4-7 assessed the quality of social support on MHS utilization. For students who screened positive for any mental health concern, those that found the advice of their social support helpful were 1.8 times more likely to utilize mental health services than students who did not find the advice helpful. There were no significant differences between students who found the advice of their social support somewhat helpful and not helpful.

Similarly, for students with a perceived mental health need, those who found their social support helpful, they were 1.8 times more likely to utilize mental health services than students who did not find their social support advice helpful. There was no significant difference between students who found the advice of their social support somewhat helpful and not helpful.

Table 4-7. Mental Health Concerns: Quality of Social Support on MHS Utilization

Positive Mental Health Screeners											
n= 45,622	**Not Helpful**	**Helpful**					**Somewhat Helpful**				
		AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	**REF**	1.774*	0.167	0.000	1.475	2.134	1.185	0.115	0.081	0.979	1.434
Perceived Mental Health Need											
n= 54,645	**Not Helpful**	**Helpful**					**Somewhat Helpful**				
		AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	**REF**	1.809*	0.175	0.000	1.497	2.186	1.157	0.115	0.144	0.951	1.406

Asterisk indicates the adjusted odds ratio (AOR) is different from 1.0 at $p < 0.05$.
Covariates: gender, age, race or ethnicity, sexual orientation, current financial situation, and perceived stigma.

Regression Analyses by each Mental Health Condition Screener

Table 4-8 assess the association between social support and MHS utilization among students with screened positive for specific MHCs. Among students who screened positive for depressive symptoms, those who had social support were 2.1 times more likely to utilize mental health services compared to those who did not have social support. For students who screened positive for depressive symptoms and for loneliness, they were 1.1 times more likely to utilize mental health services compared to students with depressive symptoms who were not lonely. Students who screened positive for anxiety and had social support were 2.1 times more likely to utilize MHS compared to students who did not have social support. Students who screened positive for anxiety and loneliness were 1.1 times more likely to utilize MHS compared to students with anxiety who were not lonely. Students with an ED that had social support were 2.3 times more likely to use MHS compared to students who did not have social support. The likelihood of MHS utilization was 2.2 times greater for students with NSSI and social support compared to students with NSSI and no social support. Students with suicidal ideation and social

support were 2.2 times more likely to use MHS than students experiencing suicidality and lacking social support. Students who screened positive for ED, NSSI, or suicide ideation and were experiencing loneliness did not see a significant association with MHS utilization.

Table 4-8. Mental Health Screeners: Social Support & Social Isolation on MHS Utilization

Depressive										
	(+) Social Support, *higher = more support*					**(-) Social Isolation,** *higher = more lonely*				
	AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	2.103*	0.094	0.000	1.928	2.295	1.117*	0.050	0.013	1.024	1.219
Anxiety										
	(+) Social Support, *higher = more support*					**(-) Social Isolation,** *higher = more lonely*				
	AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	2.102*	0.106	0.000	1.904	2.322	1.135*	0.055	0.009	1.032	1.248
Eating Disorders										
	(+) Social Support, *higher = more support*					**(-) Social Isolation,** *higher = more lonely*				
	AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	2.320*	0.191	0.000	1.973	2.727	1.091	0.093	0.308	0.923	1.290
Non-Suicidal Self Injury										
	(+) Social Support, *higher = more support*					**(-) Social Isolation,** *higher = more lonely*				
	AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	2.222*	0.131	0.000	1.967	2.510	1.078	0.063	0.199	0.961	1.209
Suicide Ideation										
	(+) Social Support, *higher = more support*					**(-) Social Isolation,** *higher = more lonely*				
	AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	2.235*	0.174	0.000	1.919	2.603	1.172	0.108	0.084	0.979	1.404

Asterisk indicates the adjusted odds ratio (AOR) is different from 1.0 at $p < 0.05$.
Covariates: gender, age, race or ethnicity, sexual orientation, current financial situation, and perceived stigma. Each mental health condition is an individual regression model. All other mental health conditions were controlled for in the regression models.

Table 4-9 assessed the quality of social support on MHS utilization by each MHC. For students who are depressive and who had helpful social support, they were 2.0 times more likely

to utilize MHS than students with depressive symptoms who did not find the advice of their social support helpful. Students with anxiety and helpful social support were 2.0 times more likely to use MHS than anxious students who did not find the advice of their social support helpful. For students with ED and helpful social support, they were 1.9 times more likely to utilize MHS than students with ED and unhelpful social support. The likelihood of MHS utilization was 2.4 times greater for students with NSSI and helpful social support, as well as 1.4 times greater for those that received somewhat helpful advice, compared to students with NSSI and unhelpful social support. Students with suicidal ideation and helpful social support were 2.2 times more likely to use MHS than students experiencing suicidality and having unhelpful social support. For all MHCs except NSSI, there were no significant differences between students that found the advice of their social support somewhat helpful and not helpful.

Table 4-9. Regression Models of Mental Health Screeners & Quality of Social Support on MHS Utilization

Depressive											
	Not Helpful	**Helpful**					**Somewhat Helpful**				
		AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	**REF**	1.969*	0.209	0.000	1.598	2.425	1.219	0.133	0.071	0.983	1.511
Anxiety											
	Not Helpful	**Helpful**					**Somewhat Helpful**				
		AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	**REF**	2.021*	0.233	0.000	1.612	2.534	1.249	0.148	0.061	0.990	1.576
Eating Disorders											
	Not Helpful	**Helpful**					**Somewhat Helpful**				
		AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	**REF**	1.878*	0.369	0.001	1.278	2.761	1.256	0.253	0.259	0.845	1.865
Non-Suicidal Self Injury											
	Not Helpful	**Helpful**					**Somewhat Helpful**				

		AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	**REF**	2.414*	0.318	0.000	1.865	3.126	1.430*	0.193	0.008	1.096	1.865
Suicide Ideation											
	Not Helpful	**Helpful**					**Somewhat Helpful**				
		AOR	**Std Err**	**p**	**95%**	**CI**	**AOR**	**Std Err**	**p**	**95%**	**CI**
MHS Utilization	**REF**	2.220*	0.385	0.000	1.580	3.119	1.333	0.237	0.107	0.940	1.889

Asterisk indicates the adjusted odds ratio (AOR) is different from 1.0 at $p < 0.05$.
Covariates: gender, age, race or ethnicity, sexual orientation, current financial situation, and perceived stigma. Each mental health condition is an individual regression model. All other mental health conditions were controlled for in the regression models.

Discussion

This study investigated the role of social support in MHS utilization among a large, diverse sample of U.S. postsecondary students with mental health concerns. This research is the first to assess the relationship between social support, mental health need and MHS utilization within a postsecondary student population, addressing a critical gap in our understanding of social support and MHS utilization. In the current analysis, we observed that perceived social support, the quality of the social support, and lack of social support (i.e., social isolation) are all independently associated with an increase in MHS utilization among postsecondary students in need of mental health care. These findings carry significant insights to inform their efforts in promoting positive mental health and enhancing MHS engagement among postsecondary students.

Prevalence of Mental Health Concerns Among Postsecondary Students

Within the HMS sample, approximately half of students screened positive for at least one MHC (59.3%). Roughly 36% of students screened positive for anxiety, 43% for depression, 12% for eating disorders, 25% for NSSI, and 14% for suicidality. However, a significant portion of students (63%) perceived themselves as having a mental health need, inferring that there are individuals who did not screen positively for a specific MHC but still recognize a mental health

need. Consequently, an overwhelming majority of postsecondary students expressed mental health concerns, aligning with similar findings from studies assessing the prevalence of MHCs before, during, and after the COVID-19 pandemic. Moreover, when exploring MHS utilization among the sample of students with mental health concerns, less than half used mental health services (47%), which is similar to prior HMS study findings from students who screened for MHCs.[285] This underscores the importance of investigating whether informal sources of support may be deterring MHS utilization among postsecondary students.

Social Support & Mental Health Services Utilization

Subsequently, we assessed the proportion of students with mental health concerns with social supports. Of students with mental health concerns, approximately 75% had a source of social support and of those with social support, 72% believed their social support was helpful. Although most students with mental health concerns identified someone as a source of social support, roughly 68% of students screened for loneliness. Social isolation and social connection are often seen as opposite ends of the same spectrum[289], however, future research efforts may need to consider how these two sub-constructs of social support interact with one another.

Next, we explored the social support variables in relation to specific mental health concerns. Approximately 77-78% of students who screened positive for depressive symptoms, anxiety, NSSI, and ED also screened for loneliness. Moreover, nearly 84% of students with suicidal ideation screened for loneliness, while 76% of students with a perceived need screened for loneliness. Our findings reveal that a majority of students facing mental health concerns are concurrently experiencing loneliness, particularly notable among those grappling with suicidality. These results align with prior research suggesting that social isolation is linked to adverse mental health outcomes.[259,260] Among students with various mental health concerns (e.g.,

depressive symptoms, anxiety, perceived need, etc.), approximately 75-78% identified someone as an informal social support. Of those with a social support system, 61-72% found their source of social support to be helpful, with very few reporting the quality of support as unhelpful. Overall, most students dealing with mental health concerns had an informal support source and perceived that person as helpful. Ultimately, our analysis unveiled no major differences in the distribution of social support variables among students with mental health concerns. This insight is particularly valuable for campus counseling centers and healthcare providers, suggesting that strategies aimed at enhancing students' social support networks and mitigating social isolation can be universally applied to students dealing with mental health concerns. It is worth noting that our findings differ somewhat from previous research. Specifically, our sample indicated a greater proportion of students with mental health concerns who had a source of social support and considered the quality of that support to be high. This contrasts with an earlier HMS sample where students with mental health concerns reported experiencing low quality social support.[257] This variation may stem from differences in the measures used to assess social support or the possibility of reduced stigma surrounding mental health over the past decade.

To understand the patterns of mental health services utilization (MHSU) and social support (SS) among students with mental health concerns, we classified students into four subgroups: those who utilized MHS and had SS (+MHSU, +SS), those who used MHS without SS (+MHSU, -SS), those with SS but no MHS utilization (-MHSU, +SS), and those without both MHS utilization and SS (-MHSU, -SS). Notably, there were no significant differences in the overall patterns of MHS utilization and social support among students with MHCs. Consequently, when ranking MHSU and SS from largest to smallest, the collective pattern for students with MHCs was as follows: 1) +MHSU, +SS, 2) -MHSU, +SS, 3) +MHSU, -SS, 4) -

MHSU, -SS. It appears that a segment of students with MHCs relies on informal sources of social support rather than seeking clinical care. Prior research on the role of social support in MHS utilization yields mixed results,[261–263] with some suggesting that social support might replace MHS, especially for less severe symptoms.[264] Thus, the severity of MHCs may influence this relationship. Overall, there is a need for further research to delve into the underlying reasons for these behavioral patterns. Previous studies among postsecondary students have underscored the significance of social belongingness in promoting positive mental health, particularly for students from marginalized backgrounds (e.g., LGBTQ+, racial and ethnic minorities, disabilities).[288,290] Therefore, it will be crucial to assess subgroups of students to effectively target intervention efforts.

Regression analyses were used to evaluate the impact of social support on MHS utilization among students with mental health concerns. There was a consistent 2-fold increase in MHS utilization among students with mental health concerns who had a source of social support. Moreover, the provision of helpful advice from a social support source is linked to increased MHS utilization. Additionally, these patterns of MHS utilization were reflected among each MHC (e.g., depressive symptoms, anxiety, NSSI, etc.). Thus, social support seems to be a useful resource to promote MHS utilization regardless of MHC. Further, relational agency is important for college students grappling with mental health concerns while actively seeking both social support and MHS. This capacity enables students to initiate and foster meaningful social connections, actively engage with professional mental health resources, and navigate the complexities of the mental health landscape on campus. Students with strong relational agency not only build supportive relationships but also contribute to reducing the stigma surrounding mental health by fostering open conversations.[285] This agency empowers individuals to advocate

for their well-being, recognizing the importance of both informal support networks and formal counseling services in navigating the challenges of college life and mental health struggles.

Similarly, the absence of social support (i.e., loneliness) demonstrated a positive correlation with MHS utilization among students exhibiting depressive and anxiety symptoms. Notably, this influence was observed to a lesser extent in comparison to having a source of social support. However, when considering students with ED, NSSI, or suicide ideation, loneliness did not reveal a significant link to MHS utilization. It remains uncertain whether this lack of association stems from insufficient statistical power or reflects a true absence of association, possibly linked to the unique manifestations of these mental health conditions among postsecondary students. As previously highlighted, exploring the potential influence of the severity of MHC symptoms on the patterns of social support and MHS utilization is crucial for future research.

The challenging landscape of the COVID-19 pandemic likely influenced college students' willingness to engage with MHS, such as counseling, for several reasons. The widespread adoption of telehealth solutions during the pandemic provided students with more accessible avenues to seek support, breaking down traditional barriers associated with in-person visits. Moreover, heightened awareness on campuses regarding the mental health needs of students during this critical time fostered an environment that encouraged seeking help. The perceived stigma surrounding mental health conversations began to diminish, partly due to the collective acknowledgment of the unique stressors brought about by the pandemic. This changing narrative created a more open atmosphere among peers, likely prompting discussions about mental health concerns and fostering a sense of community support. Consequently, this increased openness and mutual understanding likely played a pivotal role in cultivating a culture

where students felt more comfortable and willing to actively pursue mental health services when needed.

Strengths & Limitations

This study contributes valuable insights to an area that has inconsistent findings regarding the influence of social support on help-seeking behaviors. Our initial hypothesis suggested that informal social support might reduce MHS utilization, however our results suggest otherwise. Rather, social support emerges as a substantial catalyst for MHS utilization, prompting an evaluation of peer-led strategies to promote help-seeking behavior among postsecondary students. Peer-led interventions have already demonstrated success in increasing mental health awareness and knowledge while fostering self-efficacy and coping strategies among postsecondary students.[291] Scaling up these peer-led interventions could prove to be a fruitful approach in facilitating mental health support on campuses. Furthermore, we gauged this relationship through MHC screeners and assessments of perceived mental health need. Both of these metrics effectively elucidated the connection between social support and MHS utilization, indicating that either can be used in assessing the dynamics between mental health, social support, and MHS utilization.

Overall, our findings provide initial evidence to suggest the importance of social support in MHS utilization for postsecondary students with mental health needs. Contrary to our hypotheses, social support increased the likelihood of MHS utilization. There are several potential reasons for these findings. First, the destigmatizing of mental health has significantly evolved over the last decade and exponentially since the COVID-19 pandemic, which raised awareness for the importance of promoting positive mental health. In pop culture, we have public figures – U.S. senators, sports figures, and pop stars – openly discussing their MHCs and the

benefits of seeking MHS. This creates an open dialogue among young people to engage in the conversation and not be fearful of stigma.

There are some limitations to our study. First, the cross-sectional design of our study lends itself to the potential for reverse causality in several areas. We cannot conclusively determine that a lack of social support leads to mental health need, or if students with mental health needs lack strong social support systems because of the symptoms of their condition or other related factors.[257] Also, our statistical analyses could not control for unmeasurable factors such as prior MHS utilization (which may increase or decrease current MHS use, depending on experience), personality types, or lack of interest in sharing emotions. Therefore, it's important to consider these limiting factors in the interpretation of results as well as the design of future studies interested in understanding social support and MHS utilization.

Moreover, although the Healthy Minds Study includes a large, diverse sample of postsecondary institutions, it's crucial to note that these institutions self-select into the study. Consequently, the campus sample isn't randomly obtained, and the focus on mental health may stem from a concerted effort by the campus to address related concerns. For instance, many postsecondary institutions provide a limited number of free counseling services, potentially prompting students to utilize these services more when the campus actively promotes this resource. In situations where students engage with counseling services, therapists may also advocate for social connections to enhance positive mental health.[285] While, this study provides new insights into underlying factors that influence MHS utilization for many postsecondary students, there remains a subgroup lacking a source of social support and refraining from seeking MHS. Therefore, it is important to target research and intervention efforts towards understanding the barriers to care for this subgroup.

Study Implications

Aligned with the Andersen healthcare behavioral model, this study examines the dynamics of predisposing, enabling, and need factors that shape MHS utilization among postsecondary students. This study provides novel insights that enabling factors, particularly those associated with social support, and mental health needs are pivotal in informing patterns of MHS utilization. These findings can guide future interventions and research efforts grounded in the Andersen model and aimed at promoting positive mental health outcomes among postsecondary students. As we continue to investigate the effects of social support on MHS utilization, there are some considerations we should make moving forward. Below are research and postsecondary institutional recommendations for a research agenda that considers the role of social support in the promotion of lifelong mental health and MHS utilization.

i. *Recommendation: Future research studies utilize qualitative studies and examine postsecondary student subgroup motivations for seeking social support and MHS utilization.*

Our findings pave the way for future research efforts to investigate the role of social support in MHS utilization among postsecondary students. While it is crucial to acknowledge the connection between social support, social isolation, and MHS utilization, a substantial portion of students with mental health concerns have a source of social support but do not use MHS. Further examination may determine if these students are substituting social support for clinical mental health care. Additionally, research efforts will want to unpack the motivations underlying MHS usage or non-usage within specific subgroups of these relationships (e.g., LGBTQ+, gender identity, disability). Also, there is a greater need to understand what constitutes quality social support and its dynamic with mental health needs and service utilization. Qualitative

research efforts are a valuable way to learn more about the motivations and attitudes that shape help-seeking behaviors, specifically within the realm of MHS utilization.

ii. Recommendation: Postsecondary institutions implement campus-wide strategies to promote mental health awareness and foster social support networks.

In addition to these research implications, our study's findings carry practical implications for postsecondary institutions. Firstly, advocating for the importance of social support in campus campaigns could serve as a catalyst for increased MHS utilization among students with mental health concerns. As previously mentioned, strategies like peer-led interventions offer promising avenues for postsecondary institutions to explore. Secondly, when students undergo mental health screening, it may be beneficial to concurrently assess their social support and degree of social isolation. This dual assessment equips providers and campus counseling centers with valuable insights to identify potential resources for students seeking to enhance their mental health and well-being.[257] Lastly, with escalating demands for MHS utilization, postsecondary institutions may need to consider innovative interventions, such as mental health apps to meet student needs.[292,293] As campuses implement these novel approaches, they should consider the value of informal social support into their initiatives.

Conclusion

In conclusion, social support may be a pivotal factor in promoting MHS utilization among U.S. postsecondary students with mental health concerns. Postsecondary institutions should consider the integration of mental health initiatives aimed at bolstering social support among their students as a means to enhance overall mental well-being. This can be achieved through the incorporation of social support screening tools within intake assessments and

through investments in innovative approaches that alleviate the strain on conventional MHS resources. While our study offers preliminary insights into the significance of social support in MHS utilization, future research endeavors should prioritize a deeper understanding of the motivating factors behind MHS utilization, considering diverse student characteristics.

Chapter 5. Conclusion: Harnessing the Power of Youth's Social Ecosystem for Lifelong Mental Health

In recent years, there has been a growing recognition of the youth mental health crisis and a persistent decline in the overall well-being of the adult population in the United States. In May 2023, the U.S. Surgeon General officially acknowledged the existence of an "epidemic of loneliness" and underscored the pivotal role that social connections play in promoting health and overall well-being. While treatments and services for mental health are undoubtedly crucial, it has become increasingly evident that we must also focus on upstream efforts that embrace a life course health development (LCHD) approach. These efforts are essential for improving mental health outcomes, particularly among the younger population.

The transition to adulthood is a period marked by significant instability in youth's development and relationships. It involves a dynamic shift from family playing a central role in health development to an increasing reliance on peers and the broader community. Over the past decade there have been significant revelations into the factors influencing youth development, with a heightened emphasis on adverse childhood experiences that place young individuals at lifelong risk of poor health outcomes. In this dissertation, we have delved into the dynamic relationship between youth's social ecosystem and mental health during the transition to adulthood. Through a multi-faceted approach examining social support, social connectedness, and social capital, we have gained valuable insights into the factors that shape youth mental well-being. We have also explored the implications of these findings for promoting lifelong mental health.

Paper 1 illuminated the enduring impact of adolescent social capital on well-being during emerging adulthood. It underscored the critical role that social capital plays, particularly for

those facing adverse family environments. This research highlights the importance of fostering social resources outside of the home to build resilience and ensure positive health trajectories among youth. Furthermore, a collaborative effort involving various stakeholders, including caregivers, educators, healthcare providers, and community leaders, is essential to promote positive mental health outcomes in adolescence and beyond.

Paper 2 delved into the complex relationship between social connectedness, social media use, and the risk of depression among adolescents. In an era marked by a youth mental health crisis, understanding this relationship is paramount. This study emphasized the need to consider the quality of interpersonal relationships with parents and friends as protective factors and to identify underlying behavior patterns for social media use for potential intervention strategies. It also highlighted the importance of collaboration between researchers, social media companies, policymakers, and educators to support positive engagement on digital platforms.

Paper 3 contributed novel insights by examining the role of social support in mental health services (MHS) utilization among postsecondary students. This research illuminated the significance of social support, the quality of social support, and the impact of social isolation on MHS utilization. These findings carry important implications for postsecondary institutions and healthcare providers, emphasizing the need to integrate social support initiatives within student intake assessments and explore innovative approaches to alleviate the burden on traditional MHS resources.

While our research was conducted with an exploratory approach, the results highlight the notable advantages that accrue for youth with robust social ecosystems. The insights from this dissertation carry significance for the development of upstream initiatives aimed at nurturing positive mental health from early life stages, well before adulthood. The ripple effects of such

efforts have the potential to manifest as a reduced burden on our healthcare systems and a more holistic well-being across the U.S. population. Based on our research findings, we propose several recommendations for future research initiatives and policy considerations aimed at enhancing youth mental health and well-being:

1. *Social Connection/Isolation Screeners:* To address the pressing issue of social isolation, it is essential to develop and implement social connection and isolation screeners as integral components of routine assessments within healthcare and educational institutions. These screening tools can effectively identify individuals at risk of social isolation, enabling timely interventions tailored to their specific needs.
2. *Collaborative, Multidisciplinary Initiatives:* Building a robust social support system requires collaborative, multidisciplinary efforts at the local level. Engaging healthcare providers, educators, community leaders, and social service organizations in coordinated initiatives is crucial for fostering youth social connectedness, promoting mental well-being, and building relational agency. By leveraging the expertise and resources of these diverse stakeholders, we can create supportive structures within communities that provide young individuals with the tools and guidance they need to navigate the challenges of the transition to adulthood successfully.
3. *Federal and State Funding Support:* Advocacy for federal and state funding support is paramount to drive upstream preventive efforts focused on building social capital. These investments should prioritize programs and interventions that empower young people with the skills and resources necessary to forge strong social connections and navigate life's complexities.
4. *Research Directions:*

a. *Mental Health through a LCHD Lens:* Future research should delve into how a LCHD approach differs from conventional intervention strategies used in physical health promotion, particularly concerning mental health. Investigating the unique characteristics and timing of interventions that align with life course perspectives can provide valuable insights into the most effective strategies for promoting mental well-being across the lifespan.
b. *Contextual Factors in Youth Health Development*: Understanding the contextual factors that influence youth health development is critical. This includes a thorough exploration of subgroups of adolescents. Research efforts should aim to dissect these contextual elements to identify how they shape mental health outcomes and inform targeted interventions.
c. *Accurate Social Construct Measures*: Developing precise and tailored social construct measures for assessing youth health development ecosystem is needed. Accurate measurement tools related to the quality of social connections, the dynamics of social capital, and the nuances of social support can facilitate more nuanced research and policy initiatives.

Lastly, these three papers significantly advance our conceptual understanding of youth's social ecosystem and its impact on mental health outcomes. This is the first time a Life Course Health Development (LCHD) Perspective has been applied to understand lifelong mental health. This framework helps connect the dots between early experiences in the social ecosystem, such as adolescence, and later-life outcomes, promoting a more holistic understanding of mental health development. Additionally, this work utilizes an interdisciplinary approach, drawing from multiple disciplines, including psychology, sociology, and public health. This interdisciplinary

approach enriches our understanding by considering various facets of the social ecosystem, from family dynamics to digital interactions, and their collective influence on mental health.

In conclusion, this dissertation serves as a valuable contribution to the understanding of how the social ecosystem influences mental health and well-being during the transition to adulthood. It underscores the importance of advocating for relational agency, promoting positive mental health strategies, and the importance of considering both the positive and negative aspects of these social factors and their enduring impact on lifelong mental health. This nuanced understanding is essential for developing effective interventions and policies to support the mental well-being of young people. As we move forward, it is crucial to continue exploring these dynamics and collaborating across disciplines to support the mental well-being of emerging adults and future generations.

Appendix A. Paper Codebooks

Paper 1 Codebook – PSID CDS 2007 & TAS 2019

Variable	Code	Dataset (Age range of child)	Survey Question	Measures
EXPOSURE: Adverse Family Environment (AFE)				Factor built on following questions
HOME-SF Scale	HT3_07	CDS 2007 (10 yrs+)	PSID scale based on questions in Appendix B.2	0.2-1.5
Economic Strain (16 questions)	Q32J25A-O	CDS 2007 Respondent: PCG Household (10 yrs+)		- Yes - No - DK - NA/Refused
Applied for gov't assistance			Have you applied for government assistance (as a result of economic problems in the last 12 months)?	
Behind on bills			Have you fallen behind in paying bills (as a result of economic problems in the last 12 months)?	
Borrowed money from friends			Have you borrowed money from friends or relatives (“”)?	
Creditor visit			Have you had a creditor call or come to see you to demand payment (“ “)?	
Filed bankruptcy			Have you filed for or taken bankruptcy (“ “)?	
Garnished wages			Have you had your wages attached or garnished by a creditor (“”)?	
Got loan to pay off debt			Have you obtained a loan to consolidate or pay off debts (“”)?	
Lien filed on property			Have you had a lien filed against your property because you could not pay a bill (“”)?	
Money left at end of month			At the end of the month, do you end up with some money left over, just enough to make ends meet, or not enough money to make ends meet?	1 – some money left over 2- just enough to make ends meet 3 – not enough to make ends meet 8 – DK 9 – NA/Refused
Moved in w/ others			Have you moved in with other people (“ “) ?	- Yes

Moved to cheaper place			Have you moved to cheaper living quarters (“”)?	- No - DK NA/Refused
Postponed major purchase			Have you postponed major purchases as a result of economic problems in the last 12 months?	
Postponed medical care			Have you postponed medical care (“ “)?	
Property repossessed			Have you had your home, care or other property repossessed (“ “)?	
Sent kids elsewhere			Have you sent one or more of your children to live with someone else (“”)?	
Sold possessions			Think about what has happened in the last 12 months. Have you done any of the following or have any of the following happened as a result of economic problems: Sold possessions or cashed in life insurance?	
Social Capital				
Peer Influence (15 questions)	Q33K25A-O* Reverse code negative influences	CDS 2007 (10 yrs+)	How many of your friends do the following?	1 – none 2 – a few 3 – some 4 – many 5 – almost all or all 8 – n/a; DK; refused
Drink alcohol	-M		Drink alcohol regularly?	
Dangerous things	-E			
Disobey parents	- A			
Obey parents	+D			
Get in fights	-J			
Get in trouble at school	-G			
Attend church regularly	+I			
Job after HS	+P			
Plan attend college after HS	+N			
Refuse drugs	+H			
School is important	+L			
Volunteer	+F			

Participate in community groups	+B			
Gangs	-C			
relationships	+K			
School-Level Factors				
School connectedness (4 questions)	Q33E22A-D	CDS 2007 (10 yrs+)		1 – not in the last month 2 – once or twice in the last month 3 – about once a week 4 – two or three times a week 6 – every day 7 – does not go to school (includes home-schooled) 8 – DK 9 – N/A; refused
Feel close to school mates				
Feel happy to be at school				
Feel like part of school				
Feel safe at school				
Community-Level Factors				
Sports Teams	Q33K3	CDS 2007 (10 yrs+)	Were you a member of any athletic or sports team at school in the last 12 months?	1 – yes 5 – no 9 – NA/DK/refused
After school activities	Q33K4	CDS 2007 (10 yrs+)	Besides athletic teams, did you take part in any other school activities such as clubs or student government in the last 12 months?	
Community Groups	Q33K5	CDS 2007 (10 yrs+)	Were you a member of any groups in the community such as scouts or hobby clubs in the last 12 months?	
Volunteering	Q33K6	CDS 2007 (10 yrs+)	Were you involved in any volunteer service activities or service clubs in the last 12 months?	
OUTCOME VARIABLES: Well-being				
Well-being – Flourishing Scale	TA192152	TAS 2019 (22-28 years old)	Variables from Emotional Well-being, Social Well-being, Psychological Well-being	0-18
Emotional Well-being	TA192149			
Frequency of Happiness in Last Month	TA190070		In the last month, how often did you feel happy?	1-never 2- once or twice 3- about once a week

Frequency of Interest in Life in Last Month	TA190071			4- two or three times a week 5-almost every day 6-every day 8-DK 9-NA; refused
Frequency of Feeling Satisfied in Last Month	TA190072			
Social Well-being	TA192150			
Frequency of Feeling Something to Contribute to Society	TA190073			
Frequency of Feeling Belonging to the Community	TA190074			
Frequency of Feeling Society Getting Better	TA190075			
Frequency of Feeling People Basically Good	TA190076			
Frequency of Feeling Way Society Works Makes Sense	TA190077			
Psychological Well-being	TA192151			
Frequency of Feeling Good at Managing Daily Responsibility	TA190078			
Frequency of Feeling Has Trusting Relationships with Others	TA190079			
Frequency of Feeling Challenged to Grow	TA190080			
Frequency of Feeling Confident of Own Ideas	TA190081			
Frequency of Feeling Liked Own Personality	TA190082			
Frequency of Feeling Life Had Direction	TA190083			

Self-reported health	TA191004	TAS 2019 (22-28 years old)	Now I have a few questions about your health. Would you say your health in general is excellent, very good, good, fair, or poor?	1 – excellent 2 – very good 3 – good 4 – fair 5 – poor 8 – DK 9 – NA; refused
Kessler 6 Scale	TA070919	TAS 2019 (22-28 years old)	This scale is constructed using non-missing responses to the following questions: TA070695 H14a. How Often Felt Nervous in Past Month TA070696 H14b. How Often Felt Hopeless in Past Month TA070697 H14c. How Often Felt Restless in Past Month TA070698 H14d. How Often Felt Everything an Effort in Past Month TA070699 H14e. How Often Felt Too Sad in Past Month TA070700 H14f. How Often Felt Worthless in Past Month The codes for these questions are as follows: 1 All of the time 2 Most of the time 3 Some of the time 4 A little of the time 5 None of the time To create the scale, the items are rescored as follows: A response of 'All of the Time' = 4 points, 'Most of the Time' = 3 points, 'Some of the Time' = 2 points, 'A Little of the Time' = 1 point, and	0-24

			'None of the Time' = 0 points. The scores are then summed; a score of 13 or higher indicates sensitivity around the threshold for the clinically significant range of the distribution of nonspecific distress. This variable may be based on fewer than the above six variables. Items containing "don't know" and "refused" responses are not included in the calculation of the scale.	
CONTROL VARIABLES: Demographics				
Age	ER33904	CDS 2007		0-18
Gender	ER32000	CDS 2007		0- Male 1-Female
Race/Ethnicity	Q33J1	CDS 2007		1 – African American 2- White 3 – Hispanic 4 – Asian/Pacific Islander 5- American Indian or Alaskan Native 6 – Multi-racial 98 – DK 99 – NA; refused
Family Income	ER41027	PSID Family Interview		1 - 9,999,998
SURVEY WEIGHTS				
Survey Weight	Weight	TBD	TAS 2019 Longitudinal weight for CDS-III	

*reverse code

Concept	Variable	Respondent	Survey Question	Measure
OUTCOME: Mental health				
Depression	Depression Risk - Children's Depression Inventory (CDI)	Child	The Children's Depression Inventory (CDI) Short Form is an assessment that rates the severity of symptoms related to depression or dysthymic disorder in children and adolescents. CDI Scale based on below: Select the sentence that best describes your feelings during the last two weeks. - Appearance - Cry - Do things okay - Friends - Irritability - Isolation - Loved - Sadness - Self-hate - Things will work out	Continuous: 1-20
Anxiety/ Depression	Behaviors Problem Index-Internalizing Symptoms	Primary Caregiver	The Behavior Problems Index (BPI) measures the incidence and severity of child behavior problems. (Would you say this is often true, sometimes true, or not true according to (CHILD NAME)'s behavior?) - [He / She] has sudden changes in mood or feeling. - [He / She] is too fearful or anxious. - [He / She] feels worthless or inferior - [He / She] is unhappy, sad or depressed. - [He / She] feels or complains that no one loves [him / her].	Continuous: 0-14

			- [He/She] is withdrawn, does not get involved with others.	
Anxiety	Behaviors Problem Index-Anxiety	Primary Caregiver	(Would you say this is often true, sometimes true, or not true according to (CHILD NAME)'s behavior?) - [He / She] is too fearful or anxious.	Constructed binary variable: 0 – not true 1 – often true, sometimes true
INDEPENDENT VARIABLE 1: SOCIAL MEDIA USE (SMU)				
Social Media Use	Frequency	Child	In the past 30 days, how often did you use a computer or other electronic device (such as a tablet or smartphone) to… Interact with friends or family on a social media site (like Facebook, Instagram, or Snapchat)? Would you say Categorical: 1. every day 2. a few times a week 3. once a week 4. less than once a week 5. never 6. DK/RF *SUBQUESTION FOR THOSE THAT ANSWERED EVERY DAY:* On an average day in the past 30 days, how often did you use a computer or other electronic device (such as a tablet or smartphone) to interact with friends or family on a social media site? Would you say… Categorical: 1. almost all of the time 2. several times a day 3. about once a day	Ordinal Categorical: 1. Never 2. Less than once a week 3. Once a week 4. A few times a week 5. Once a day 6. Several times a day 7. Almost all the time
Social Media Use	Frequency (3-category)	Child	Constructed categorical variable based on child response to monthly and daily SMU. 1. Non-User (never)	Ordinal Categorical: 4. Non-User 5. Occasional user 6. Constant User

			2. Occasional user (several times a day, once a day, a few times a week, once a week, less than once a week) 3. Constant (almost all the time)	
Social Media Use	Content	Child	Now I'm going to ask you about the types of online content that you share (through social media, a web site, or on a video sharing site). Which types of content have you shared in the past 30 days? 1. information about your everyday life 2. videos, pictures, or games you created 3. entertainment and celebrity news 4. political opinion, current events, or social causes you believe in 5. jokes or funny content [7] does not post information online	Binary: 0 – No 1 – Yes *[each type of content will be a separate variable]*
INDEPENDENT VARIABLE 2: SOCIAL CONNECTEDNESS				
Social Connectedness	Interpersonal Relationships: -Mother -Father -Friends	child	Now I have some questions about your family. How close do you feel towards... Your [mother]? Would you say… - (1) not very close, - (2) fairly close, - (3) quite close, - (4) extremely close	Constructed into binary variable: 0: not very close, fairly close, quite close 1: extremely close
Social Connectedness	Social Connectedness Count (SCC): Count of Parents & Friends	child	Constructed categorical variable based on the summation of responses from the interpersonal relationship closeness questions about youth's mother, father, and friends.	Ordinal Categorical variable: 1. One relationship 2. Two relationships 3. Three relationships

			Mother, Father, and Friend relationships that youth considered to be "extremely close" were considered toward the SCC measure.	
CONTROL VARIABLES: Demographics				
Age	age		Age 0-17	Continuous: 12-17 Stratified: 12-14 (young adolescence) 15-17 (late adolescence)
Gender	Gender		1 – Male 2 – Female	Binary
Race/Ethnicity	Race	child	1 – White 2 – Hispanic, Latino, Spanish 3 – Black or African American 4 – Asian 5 – American Indian or Alaskan Native 8 – Some other race, ethnicity, or origin	Categorical
Family income	Family income	Family file	The income reported here was collected in 2019 about tax year 2018.	Continuous: 1 - 9,999,997
CONTROL VARIABLES: Parental Social Media Rules				
Parental Rules	Parental social media rules	Primary caregiver	(What rules do you have about . . .) [Your child/Any of your children] using social media, texting, or emailing to interact with friends and others? (Do you have clear rules that are enforced, general rules that are monitored, are there rules but your [child/children] make their own choices, or are there no rules?) 1-Yes, clear rules that are enforced 2-Yes, general rules that are monitored 3-Yes, rules but child makes own choices 5-No rules	Constructed binary variable: 0 – Yes, but child makes own choices; no rules; child too young; child too old; don't know 1 – yes, clear rules that are enforced; yes, general rules that are monitored

			6-Child/children are too young (VOL) 7-Child/children are too old (VOL) 8-DK 9-NA; refused 0-Inap.: Household does not have any smartphones, computers or tablets or DK,NA,RF whether household has smartphones, computers or tablets (H19S14B=0,8,9 and H19S14D=0,98,99 and H19S14C=0,8,9)	
SURVEY WEIGHTS				
Survey Weight	Weight	X19CHWGT	Child CDS 2019 cross-sectional weight	

Variable	Code	Survey Question	Response
TARGET POPULATION			
Perceived Need of MHS	percneed	"How much do you agree with the following statement?: In the past 12 months, I needed help for emotional or mental health problems such as feeling sad, blue, anxious or nervous."	**1=Strongly agree** **2=Agree** **3=Somewhat Agree** 4=Somewhat Disagree 5=Disagree 6=Strongly disagree Constructed binary variable: 0 – somewhat disagree, disagree, strongly disagree 1- somewhat agree, agree, strongly agree
Anxiety Screener (GAD-7)	gad7_1 (Q3.6.1) gad7_2 (Q3.6.2) gad7_3 (Q3.6.3) gad7_4 (Q3.6.4) gad7_5 (Q3.6.5) gad7_6 (Q3.6.6) gad7_7 (Q3.6.7) anx_any (created during cleaning)	Over the last 2 weeks, how often have you been bothered by the following problems? 1 Feeling nervous, anxious or on edge 2 Not being able to stop or control worrying 3 Worrying too much about different things 4 Trouble relaxing 5 Becoming easily annoyed or irritable 6 Being so restless that it's hard to sit still 7 Feeling afraid as if something awful might happen Anx_any = positive case when anx_score>10 and<21	1=Not at all 2=Several days 3=Over half the days 4=Nearly every day Scale: Min = 0 Max = 21 Anx_any: 0 = No 1 = Yes
Depression Screener (PHQ-9)	phq9_1 (Q3.3.1) phq9_2 (Q3.3.2) phq9_3 (Q3.3.3) phq9_4 (Q3.3.4) phq9_5 (Q3.3.5) phq9_6 (Q3.3.6) phq9_7 (Q3.3.7) phq9_8 (Q3.3.8) phq9_9 (Q3.3.9)	Over the last 2 weeks, how often have you been bothered by any of the following problems? 1 Little interest or pleasure in doing things 2 Feeling down, depressed or hopeless 3 Trouble falling or staying asleep, or	1=Not at all 2=Several days 3=More than half the days 4=Nearly every day Min = 0 Max = 27

	dep_any (created during cleaning)	sleeping too much 4 Feeling tired or having little energy 5 Poor appetite or overeating 6 Feeling bad about yourself—or that you are a failure or have let yourself or your family down 7 Trouble concentrating on things, such as reading the newspaper or watching television 8 Moving or speaking so slowly that other people could have noticed; or the opposite—being so fidgety or restless that you have been moving around a lot more than usual 9 Thoughts that you would be better off dead or of hurting yourself in some way Sum of phq9_1 through phq9_9 (an observation receives an NA value for deprawsc if any one of the phq9 variables = NA) dep_any = positive case when deprawsc>10 and<27	Dep_any: 0 = No 1 = Yes
Eating Disorders	coff_1 (Q3.12.1 or Q7.20.1) scoff_2 (Q3.12.2 or Q7.20.2) scoff_3 (Q3.12.3 or Q7.20.3) scoff_4 (Q3.12.4 or Q7.20.4) scoff_5 (Q3.12.5 or Q7.20.5) ed_scoff (created during cleaning)	"Please answer the following questions as honestly as possible." 1 Do you ever make yourself sick because you feel uncomfortably full? 2 Do you worry that you have lost control over how much you eat? 3 Have you recently lost more than 15 pounds in a 3-month	1=Yes 0=No Ed_scoff: Sum of scoff_1 through scoff_5 (an observation receives an NA value for ed_scoff if any one of the scoff variables = NA) Range 0-5

	ed_any = positive case when ed_scoff > 3 and < 5	period? 4 Do you believe yourself to be fat when others say you are too thin? 5 Would you say that food dominates your life? ed_any = positive case when ed_scoff > 3 and < 5	
Non-Suicidal Self-Injury	ib_cut (Q3.13.1) sib_burn (Q3.13.2) sib_punch (Q3.13.3) sib_scratch (Q3.13.4) sib_pull (Q3.13.5) sib_bit (Q3.13.6) sib_wound (Q3.13.7) sib_carv (Q3.13.8) sib_rub (Q3.13.9) sib_pobj (Q3.13.10) sib_other (Q3.13.11) sib_other_text (Q3.13.11.TEXT) sib_none (Q3.13.12) sib_any (created during cleaning)	This question asks about ways you may have hurt yourself on purpose, without intending to kill yourself." In the past year, have you ever done any of the following intentionally? (Select all that apply) Binary Variables (1=selected, 0=unselected) 1 Cut myself 2 Burned myself 3 Punched or banged myself 4 Scratched myself 5 Pulled my hair 6 Bit myself 7 Interfered with wound healing 8 Carved words or symbols into skin 9 Rubbed sharp objects into skin 10 Punched or banged an object to hurt myself 11 Other (please specify) 12 No, none of these [mutually exclusive]	sib_any = positive case when any of the above (sib_cut through sib_other) = 1 1 = Yes 2 = No
Suicide Ideation	Sui_idea	In the past year, did you ever seriously think about attempting suicide?	1 – yes 0 – no
OUTCOME: Mental Health Services Utilization			
Ever used MH services	ther_ever	"Have you ever received counseling or therapy for mental health concerns?"	1=No, never **2=Yes, prior to starting college**

(Counseling) previously			3=Yes, since starting college 4=Yes, both of the above (prior to college and since starting college) [CCMH Standardized Data Set]
MHS (Counseling) utilization	ther_vis	How many total visits or sessions for counseling or therapy have you had in the past 12 months?	0=0 1=1-3 2=4-6 3=7-9 4=10 or more *Display only if "Yes, prior to starting colle"Yes, both of the above (prior to college an for "Have you ever received counseling or
Use of Medication	meds_1 (Q4.32.1) meds_2 (Q4.32.2) meds_3 (Q4.32.3) meds_4 (Q4.32.4) meds_5 (Q4.32.5) meds_6 (Q4.32.6) meds_7 (Q4.32.7) meds_7_text (Q4.32.7.TEXT) meds_8 (Q4.32.8) meds_9 (Q4.32.9 meds_any (created during cleaning)	In the past 12 months have you taken any of the following types of prescription medications? (Please count only those you took, or are taking, several times per week.) (Select all that apply) meds_any = positive case when any of the above (meds_1 through meds_7) = 1 (indicating any medication use during the past 12 months)	Binary Variables (1=selected, 0=unselected) 1 Psychostimulants (methylphenidate (Ritalin or Concerta), amphetamine salts (Adderall), dextroamphetamine (Dexerdine), etc.) 2 Antidepressants (e.g., fluoxetine (Prozac), sertraline (Zoloft), paroxetine (Paxil), escitalopram (Lexapro), venlafaxine (Effexor), buproprion (Wellbutrin), etc.) 3 Anti-psychotics (e.g., haloperidol (Haldol), clozapine (Clozaril), risperidone (Risperdal), olanzapine (Zyprexas), etc.) 4 Anti-anxiety medications (e.g., lorazepam (Ativan), clonazepam (Klonopin), alprazolam (Xanax), buspirone (BuSpar), etc.) 5 Mood stabilizers (e.g., lithium, valproate (Depakote), lamotrigine (Lamictal), carbamazepine (Tegretol), etc.) 6 Sleep medications (e.g., zolpidem (Ambien), zaleplon (Sonata), etc.) 7 Other medication for mental or emotional health (please specify) 8 No, none

			of these[mutually exclusive] 9 Don't know 1 = Yes 0 = No
MHS Utilization (Counseling and/or Medication)	tx_any (created during cleaning)	tx_any = positive case when ther_any = 1 or meds_any = 1, indicating having received any treatment (therapy or medication)) during the past 12 months	1 = Yes 0 = No
Social Support			
Informal Help seeking	inf_1 inf_2 inf_3 inf_4 inf_5 inf_6 inf_9 inf_10 inf_7 inf_8 inf_7_text inf_any	In the past 12 months have you received counseling or support for your mental or emotional health from any of the following sources?(Select all that apply)	1=Roommate 2=Friend (who is not a roommate)3=Significant other 4=Family member 5=Religious counselor or other religious contact6=Support group 7=Other non-clinical source (please specify)8=No, none of these[mutually exclusive] Inf_any: 0 – no, none of these 1 – any of the above sources of informal support
Informal Help seeking f/u Q	Inf_help	*f/u Q to row above:* How helpful was it to discuss these concerns?	1=Very helpful 2=Helpful 3=Somewhat helpful 4=Not helpful
UCLA Loneliness Scale	lone_lackcompanion (Q3.37.1) lone_leftout (Q3.37.2) lone_isolated (Q3.37.3)	Please answer the following: How often do you feel that you lack companionship? How often do you feel left out? How often do you feel isolated from others?	1=Hardly ever 2=Some of the time 3=Often

	lonesc (created during cleaning)	Sum of lone_lackcompanion + lone_leftout + lone_isolated (an observation receives an NA value for lonesc if any one of the lone variables = NA)	Min = 3 Max = 9
	lonely (created during cleaning)	lonely = positive case when lonsc>6 and<9	0 = No 1 = Yes
CONTROL VARIABLES: Demographics			
Gender	gender_male gender_female gender_transm gender_transf gender_queernv gender_nonbin gender_selfID gender_text	What is your gender identity? (Select all that apply)	1=Male 2=Femal e 3=Trans male/Trans man 4=Trans female/Trans woman 5=Genderqueer/Gender nonconforming 6=Self-identify (please specify) 7= Gender non-binary
Race/Ethnicity	race_black race_ainaan race_asian race_his_temp race_pi race_mides race_white race_other race_other_text	What is your race/ethnicity?(Select all that apply)	1=African American/Black 2=American Indian or Alaskan Native3=Asian American/Asian 4=Hispanic/Latino/a 5=Native Hawaiian or Pacific Islander 6=Middle Eastern, Arab, or Arab American7=White 8=Self-identify (please specify)
Undergraduate	undergrad	In what degree program are you currently enrolled? (Select all that apply)	1=Associate's 2=Bachelor's

Perceived mental health stigma	stig_pcv_2 (Q10.16.1) stig_pcv_3 (Q10.16.2) stig_pcv_1 (Q10.16.3 or Q4.15.1)	How much do you agree with the following statements? 1 Most people would willingly accept someone who has received mental health treatment as a close friend. 2 Most people feel that receiving mental health treatment is a sign of personal failure. 3 Most people think less of a person who has received mental health treatment.	1=Strongly agree 2=Agree 3=Somewhat agree 4=Somewhat disagree 5=Disagree 6=Strongly disagree

Appendix B. Supplementary Data Analyses

Chapter 2 Supplementary Data

Descriptive Data

All data beyond the Sample section use the larger study sample Cohort (N=967), which includes children ages 10-16 years old from the 2007 CDS-III that also completed the 2019 TAS. Among variables of interest, missingness is low and all newly constructed scales have high Cronbach's alphas among items.

FAMILY ENVIRONMENT

HOME-SF Scale:

Table 2d: HOME-SF Summary Statistics Among the 2007 CDS-2019 TAS Cohort (N=967; Ages 10-16).

The HOME-SF scale measures cognitive stimulation and emotional support that parents provide to adolescents. The mean HOME-SF score among the study sample was 1.0 (range 0-1.5), demonstrating most adolescents had moderate to high cognitive stimulation and emotional support at home. The data also has moderate skewness and kurtosis, demonstrating a relatively normal distribution among the data.

HOME-SF	
Mean	1.051
SD	0.205
Range	0.2 – 1.5
Obs.	956 (1% missing)
Variance	0.421
Skewness	-0.306
Kurtosis	2.963

Family Conflict & Economic Strain:

Table 2e: CDS-III Family Economic Strain Item Reliability Among the Sample Cohort (N=967; Ages 10-16).

Family Economic Strain includes 15 survey items, the items have a Crohn's alpha = 0.75, demonstrating high scale reliability. Both measures have minimal missingness (1.7%).

Family Economic Strain	
Sample Response	951
Missingness	1.7%
Average interitem covariance:	.2746259
Number of items in the scale:	15
Scale reliability coefficient (alpha):	0.7517

SOCIAL CAPITAL

Peer Influence and School Connectedness

Table 2g: CDS-III Peer Influence and School Connectedness Item Reliability Among the Sample Cohort (N=967; Ages 10-16).

Peer influence includes 15 survey items with a Crohn's alpha=0.83, demonstrating high scale reliability. School Connectedness includes 4 survey items, the items have a Crohn's alpha = 0.68, demonstrating moderate scale reliability. Both measures have minimal missingness (5%).

Interpersonal Variables	**Peer Influence**	**School Connectedness**
Sample Response	917	917
Missingness	5%	5%
Average interitem covariance:	0.5120717	.9684289
Number of items in the scale:	15	4
Scale reliability coefficient:	0.8366	0.6878

Community-Level Factors:

Table 2h. PSID CDS-III: Distribution of students participating in structured **activities in last 12 months* (Ages 10-16; N = 967)**

Many youth participated in structured activities (sports, after school activities, community groups, volunteering, and religious clubs) in the last 12 months. We hypothesize structured activities are a resilience promoter for youth.

	Sports Team (10+) n, %	**After School Activities (10+)** n, %	**Community groups (10+)** n, %	**Volunteered in last 12 months (10+)** n, %	**Religious clubs (12+)** n, %
Yes	497, 54.2%	410, 44.7%	188, 20.5%	354, 38.6%	401, 43.7%
No	412, 44.9%	497, 54.2%	719, 78.4%	550, 60.0%	170, 18.5%
Missing	50, 5.2%	50, 5.2%	50, 5.2%	50, 5.2%	50, 5.2%
Total Response	917	917	917	917	917

*Responses not mutually exclusive

WELL-BEING

Flourishing Scale

Table 2j: TAS-2019 Flourishing Scale Summary Statistics Among the Sample Cohort (N=967; Ages 22-28).

The Flourishing scale measures social, psychological, and emotional well-being (Scale scoring 3-18). The mean Flourishing score among the study cohort was 13.0, demonstrating adolescents had moderate to high well-being. The data also has moderate skewness and kurtosis, demonstrating a somewhat normal distribution among the data. Missingness is low.

Flourishing	
Mean	13.038

SD	2.842
Range	3-18
Obs.	950
Variance	8.074
Skewness	-0.572
Kurtosis	3.022
Missing	1.8%

Covariate Sensitivity Analyses:

There were significant differences in the association between social capital, AFEs, and well-being outcomes across gender, age, and race/ethnicity. Due to these differences, these variables were controlled for in the main analyses.

GENDER SENSITIVITY ANALYSES						
Male						
Psychological Distress	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
School Connectedness	-0.260	0.065	-3.990	0.000	-0.391	-0.128
Combined Social Capital	-1.469	0.612	-2.400	0.021	-2.705	-0.232
AFEs	1.878	0.872	2.150	0.037	0.117	3.639
Female						
Community Engagement	-0.456	0.227	-2.010	0.051	-0.914	0.001
Self-Reported Health	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Male						
School Connectedness	0.027	0.013	2.030	0.049	0.000	0.053
Community Engagement	0.151	0.052	2.900	0.006	0.046	0.255
Combined Social Capital	0.227	0.099	2.290	0.027	0.027	0.426
AFEs	-0.572	0.167	-3.420	0.001	-0.909	-0.234
Female						
Community Engagement	0.100	0.047	2.140	0.038	0.006	0.195
Combined Social Capital	0.183	0.094	1.960	0.057	-0.006	0.373
Flourishing	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
Male						

School Connectedness	0.157	0.035	4.470	0.000	0.086	0.228
Combined Social Capital	1.015	0.379	2.680	0.011	0.250	1.780
AFEs	-1.085	0.440	-2.470	0.017	-1.970	-0.200
Female						
School Connectedness	0.114	0.037	3.060	0.004	0.039	0.189
Community Engagement	0.336	0.130	2.590	0.013	0.075	0.597
Combined Social Capital	0.763	0.309	2.470	0.018	0.140	1.386

Only relationships demonstrating a p-value > 0.05 are presented in the table.

AGE GROUPS - SENSITIVITY ANALYSES						
Psychological Distress	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
9-12 yo						
School Connectedness	-0.315	0.099	-3.190	0.003	-0.514	-0.116
AFEs X Combined Social Capital	-5.272	1.945	-2.710	0.010	-9.204	-1.341
AFEs x Peer Relationships	-0.475	0.169	-2.810	0.008	-0.816	-0.134
13-16 yo						
School Connectedness	-0.119	0.056	-2.120	0.040	-0.232	-0.006
Social Capital	-1.042	0.434	-2.400	0.021	-1.920	-0.165
AFEs	2.641	0.720	3.670	0.001	1.185	4.097
Self-Reported Health	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
9-12 yo						
Community Engagement	0.189	0.061	3.090	0.004	0.065	0.312
School Connectedness	0.034	0.016	2.100	0.042	0.001	0.068
Combined Social Capital	0.340	0.139	2.440	0.019	0.058	0.621
AFEs	-0.416	0.151	-2.760	0.009	-0.720	-0.112
13-16 yo						
Community Engagement	0.090	0.040	2.240	0.031	0.009	0.172
AFEs	-0.469	0.154	-3.050	0.004	-0.779	-0.158
AFEs X Peer Relationships	0.078	0.037	2.110	0.041	0.003	0.153
Flourishing	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
9-12 yo						
Peer Relationships	0.088	0.041	2.180	0.035	0.006	0.170
School Connectedness	0.199	0.043	4.600	0.000	0.111	0.286
Community Engagement	0.380	0.170	2.230	0.031	0.035	0.724
Combined Social Capital	1.519	0.382	3.980	0.000	0.747	2.291
13-16 yo						

School Connectedness	0.108	0.033	3.250	0.002	0.041	0.174
Combined Social Capital	0.643	0.244	2.640	0.012	0.151	1.135
AFEs	-1.300	0.501	-2.600	0.013	-2.313	-0.288

Only relationships demonstrating a p-value > 0.05 are presented in the table.

RACIAL & ETHNIC SENSITIVITY ANALYSES						
Psychological Distress	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
White						
AFEs	2.438	0.684	3.560	0.001	1.046	3.830
Community Engagement	-0.555	0.201	-2.760	0.009	-0.964	-0.146
School Connectedness	-0.226	0.051	-4.460	0.000	-0.329	-0.123
Combined Social Capital	-1.237	0.458	-2.700	0.011	-2.170	-0.304
Black						
Peer Relationships	-0.120	0.054	-2.200	0.039	-0.233	-0.006
Hispanic						
Community Engagement	-1.052	0.470	-2.240	0.045	-2.076	-0.029
Self-Reported Health	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
White						
Community Engagement	0.153	0.040	3.780	0.001	0.071	0.235
Combined Social Capital	0.229	0.077	2.990	0.005	0.073	0.385
AFEs	-0.558	0.163	-3.430	0.002	-0.889	-0.227
AFEs x Peer Relationships	0.063	0.031	2.020	0.052	-0.001	0.127
Black						
Peer Relationships	0.027	0.010	2.720	0.013	0.006	0.047
Combined Social Capital	0.266	0.100	2.670	0.014	0.059	0.474
Hispanic						
Peer Relationships	-0.037	0.016	-2.310	0.039	-0.073	-0.002
Flourishing	**Coef.**	**Std. Err.**	**t**	**P>t**	**[95% Conf.**	**Interval]**
White						
AFEs	-1.529	0.486	-3.150	0.003	-2.517	-0.541
Community Engagement	0.354	0.119	2.970	0.005	0.112	0.596
School Connectedness	0.164	0.032	5.110	0.000	0.098	0.229
Combined Social Capital	1.054	0.253	4.160	0.000	0.538	1.569
Black						
School Connectedness	0.074	0.032	2.300	0.032	0.007	0.141
Combined Social Capital	0.557	0.245	2.270	0.034	0.048	1.065

Hispanic						
AFEs X Community Engagement	4.264	1.146	3.720	0.003	1.768	6.761
AFEs x Combined Social Capital	5.876	1.867	3.150	0.008	1.808	9.944

Only relationships demonstrating a p-value > 0.05 are presented in the table.

Chapter 3 Supplementary Data

Descriptive Data

All descriptive data is unweighted. Variable output uses study sample of children ages 12-17. Based on the figures, we are seeing a moderate association that higher CDI (risk of depression) is associated with lower social connectedness among each of the youth's interpersonal relationships. Both increased SMU-Frequency and never using SMU are associated with higher CDI. Each of the SMU-Content variables are statistically significant with CDI using OLS (no covariates).

CDI (DEPRESSION RISK)

Table 1a. Outcome: Depression Risk (CDI Scale) Summary Data Among Adolescents (ages 12-17)

The CDI Scale ranges from 1-19, the mean and median are skewed toward the low end of the scale signifying majority of adolescents in the sample do not experience depression symptoms. There is some missingness in responses (9.7%), but less than 20% so multiple imputation is not needed.

Summary Statistics	CDI Scale
Mean	**2.79**
Median	**2**
SD	**2.88**
Range	**1-19**
Obs.	**1,053**
Missingness	**9.7%**
Skewness	**1.65**
Kurtosis	**6.00**

SOCIAL CONNECTEDNESS

Table 1b. Distribution of Each Social Relationship Among Adolescents (ages 12-17)

Table demonstrates variability in responses of closeness in interpersonal relationships. Majority of adolescents stated they were extremely or quite close in their relationships. Roughly 20% of adolescents felt fairly or not very close to family, friends, or teachers. Important observation that nearly 20% of adolescents did not have a sibling. Within the supplementary material, there did seem to be variation in the distribution across the CDI scale for adolescents with no siblings compared to adolescents with siblings. Based on this information, separate analyses will be run for those with and without siblings.

How close do you feel to…?	**Not Very Close N (%)**	**Fairly Close N (%)**	**Quite Close N (%)**	**Extremely Close N (%)**	**DK/RF N (%)**	**Not applicable**
Father	195 (18.0%)	158 (14.6%)	278 (25.7%)	437 (40.4%)	3 (0.3%)	12 (1.1%)
Mother	41 (3.8%)	108 (10.0%)	279 (25.8%)	645 (59.6%)	2 (0.2%)	8 (0.7%)
Friends	44 (4.1%)	158 (14.6%)	420 (38.8%)	454 (41.9%)	2 (0.2%)	5 (0.5%)
Siblings	39 (3.6%)	113 (10.4%)	251 (23.2%)	484 (44.7%)	1 (0.1%)	195 (18.0%)
Teachers	282 (26.0%)	490 (45.2%)	253 (23.4%)	54 (5.0%)	1 (0.1%)	3 (0.3%)
Total	1,083					

Table 1c. Depression Risk (CDI) Summary Statistics by Each Social Relationship Among Adolescents (Ages 12-17)

For each relationship (father, mother, siblings, friends, teachers), the average CDI score increased with each category of less closeness demonstrating an association between social relationships and depression risk. Within each adolescent relationship's closeness categories, there was a significant difference in depression risk (Kruskal-Wallis test p=0.0001).

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
Father				Kruskal-Wallis test = 0.0001	
Extremely close	421	1.964371	2.053143	0	12
quite close	271	2.682657	2.950649	0	19
fairly close	158	3.632911	3.210957	0	13
Not very close	190	4.015789	3.36725	0	15
Not applicable	12	3.416667	3.579191	0	12
Mother				Kruskal-Wallis test = 0.0001	
Extremely close	626	2.084665	2.109223	0	12
quite close	275	2.952727	2.82351	0	15
fairly close	106	4.886792	3.82304	0	19
not very close	38	6.421053	3.922434	0	13
Not applicable	8	6.75	5.849298	1	15
Siblings				Kruskal-Wallis test = 0.0001	

Extremely close	470	2.151064	2.302439	0	13
quite close	249	2.88755	2.900814	0	13
fairly close	111	4.018018	3.09246	0	15
not very close	39	5.717949	4.412594	0	19
Not applicable	184	2.902174	3.008403	0	14
Friends				Kruskal-Wallis test = 0.0001	
Extremely close	445	2.577528	2.695749	0	19
quite close	410	2.529268	2.607188	0	13
fairly close	152	3.217105	3.141092	0	15
not very close	41	5.829268	4.04291	1	15
Not applicable	4	4.75	5.737305	0	13
Teachers				Kruskal-Wallis test = 0.0001	
Extremely close	52	2.5	2.396893	0	10
quite close	246	2.369919	2.448938	0	11
fairly close	478	2.382845	2.489786	0	19
not very close	274	3.857664	3.529804	0	15

SOCIAL MEDIA USE (SMU)

SMU Frequency

Table 1h: Social Media Frequency Distribution

Table shows majority of youth used social media every day, with about a fifth of them using it all the time, every day. However, there is about 15% of youth that do not use social media and about 15% that use it rarely. The variation in the SMU will be useful for gathering interpretable results; its beneficial the distribution is not homogenous.

How often use social media	Freq.	Percent
Never	161	14.88
Less than once a week	82	7.58
Once a week	71	6.56
A few times a week	261	24.12
Once a Day	63	5.82
Several times a day	225	20.79
Almost all the time	219	20.24

Total	1,082	100

Table 1j. Summary Statistics: Depression Risk (CDI Scale) by SMU Frequency
Average depression risk did not significantly differ among SMU frequency categories.

SMUfreq	Obs	CDI Mean	Std Dev	Min	Max
Almost all the time	214	2.981308	2.940669	0	15
several times a day	221	2.669683	2.934812	0	13
once a day	63	2.873016	2.345153	0	11
few times a week	253	2.588933	2.72208	0	19
once a week	68	2.970588	3.190333	0	13
less than once a week	80	3.15	3.311277	0	15
never	154	2.694805	2.789635	0	13
Kruskal-Wallis test = 0.5922					

Social Media Content

Table 1m: Percentage of Adolescents (ages 12-17) interacting with Different Social Media Content
Youth interact with different forms of content, the majority of youth share jokes or funny content. About a third of students post about their daily life, a fifth post about political and current events, and over a tenth of youth do not post anything online. Variation in responses will be beneficial to having interpretable results.

Please tell me which of the following online content have you shared in the past 30 days?	N	% of sample (n=1,083)*
Information about your everyday life	380	35.1%
Videos, pictures, or games you created	493	45.5%
Entertainment and celebrity news	273	25.2%
Political opinion, current events, or social causes you believe in	211	19.5%
Jokes or funny content	792	73.1%
Does not post online (passive user)	121	11.2%

*Percentages will not add up to 100 – responses were not mutually exclusive.

Table 1n. Summary Statistics: Depression Risk (CDI Scale) by SMU Content Among Adolescents (ages 12-17)
Adolescents engage in various types of social media content, including: posting about their daily life, pictures or videos, entertainment and pop culture, political and current events, humor and funny content, or not posting at all (passive viewing). For adolescents that posted about their daily life or political and current events, they had a higher average depression risk score than those that did not post about their daily life or political and current events. For adolescents that posted about pictures, entertainment, or humor, there was not a significant difference between those that posted about those types of content and those that did not. For those that passively

viewed social media content, there was not a significant difference between those that are active users and passive users.

SMU Content	Obs	Mean	Std Dev	Min	Max
Daily Life			T-test: p= 0.0130		
Yes	372	3.086022	3.011768	0	15
No	680	2.625	2.79263	0	19
pictures			T-test: p= 0.5426		
yes	478	2.84728	2.884881	0	15
no	574	2.738676	2.875789	0	19
entertainment			T-test: p= 0.6415		
yes	269	2.717472	2.849802	0	15
no	783	2.812261	2.890456	0	19
political and current events			T-test: p= 0.0071		
yes	207	3.270531	3.240258	0	15
no	845	2.669822	2.772769	0	19
humor			T-test: p= 0.2847		
yes	774	2.844961	2.920551	0	15
no	278	2.629496	2.759191	0	19
passive use			T-test: p= 0.6225		
yes	116	2.663793	2.989675	0	19
no	936	2.803419	2.866332	0	15

Sensitivity Analyses

The following analyses were used as comparisons to the analyses included in the manuscript. For social connectedness, we also looked at youth's relationships with siblings and teachers. Additionally, we assessed parental warmth and social media use on youth depression risk. For the outcome, we looked at broader mental health measures reported by the primary caregiver as the dependent variable. Lastly, for the interaction effects we looked at SMU using two different reference groups: never users or common/occasional users. All analyses were weighted.

Measures not included in the main study:

Social Connectedness Variables:

In addition to social connectedness, variables related to parental warmth were investigated and included as part of the sensitivity analyses. Specifically, *parental affection* and *parental praise* were included. The primary caregiver was asked, "How many times in the past week have you shown [CHILD NAME] physical affection (kiss, hug, stroke hair, etc.)?". For the purposes of our analyses, we created a binary variable to evaluate any level of parental affection versus no affection at all. Similarly, the primary caregiver was asked, "How many times in the past week have you praised [CHILD NAME] for doing something worthwhile?". A binary variable was created to assess any parental praise versus none at all. We assessed these variables separately from the interpersonal relationships and SCI. Rather, we wanted to understand if parental relationships played a significant role in the study aims.

Mental Health Variables:

As sensitivity analyses compared to the CDI, we looked at the Behavior Problems Index (BPI), which measures the incidence and severity of child behavior problems reported by the caregiver. CDS uses the same set of items used in the NLSY. The BPI breaks the measures into two subscales – externalizing and internalizing scales. The BPI-internalized score measures characteristics of anxiety, depression, and withdrawn behavior. In an effort to isolate anxiety, we also looked at the one BPI question that asks about anxiety.

Social Connectedness & Mental Health

Youth who were very close with their siblings were at decreased risk of depression risk, controlling for all covariates. However, its important to note that nearly 20% of the sample did

not have any siblings and thus were not included in this regression output. Teachers and the parental warmth variables did not have a significant association with depression risk.

Social Connectedness on Youth's Depression Risk (CDI) – PSID CDS: 2019. Youth ages 12-17.

Social Connectedness Variables[+]	***CDI***						
	Coef.	**SE**	**t**	**P**	**95%**	**CI**	**Adjusted R-2**
Siblings	-0.896***	0.250	-3.580	0.001	-1.399	-0.392	0.101
Teachers	-0.433	0.529	-0.820	0.417	-1.495	0.630	0.072
Parental affection	-1.088			0.264	-3.024	0.846	
Parental praise	-1.299			0.132	-3.002	0.404	

P-value: * 0.05, **0.01, ***0.001
Controlling for: Child's age, gender, race, family income, parental social media rules
[+]Each variable represents an independent and separate regression from other variables listed; each row controlled for the listed covariates.
[#]The Social Connectedness Count (SCC) measure represents youth that are very close to their mother, father, and friends.

The following table includes independent regressions for: SCC, father, mother, siblings, friends, teachers, affection, and praise. For the BPI-internalized scale, three close relationships were associated with decreased internalized symptoms among youth (as reported by PCG). No other significant associations were detected between the social connectedness variables and mental health outcomes.

Social Connectedness on Mental Health Outcomes – PSID CDS: 2019. Youth ages 12-17.

Social Connectedness Variables	***BPI (Internalized)*[$]**				***BPI (Anxiety)*[+] *(1: often anxious only)***				***BPI (Anxiety)*[+] *(1: often & sometimes anxious)***			
	Coef.	**p**	**95% CI**		**OR**	**p**	**95% CI**		**OR**	**p**	**95% CI**	
SCC												
1 close relationship	0.130	0.741	-0.657	0.918	0.459	0.221	0.130	1.623	1.128	0.641	0.672	1.894
2 close relationships	-0.261	0.531	-1.097	0.573	0.605	0.362	0.202	1.813	1.112	0.679	0.666	1.857

3 close relationships	**-0.898***	0.029	-1.697	-0.098	0.221	0.159	0.027	1.845	0.667	0.225	0.344	1.293
Individual Relationships^												
Father	-0.461	0.099	-1.011	0.089	0.461	0.107	0.179	1.188	0.873	0.514	0.578	1.320
Mother	-0.101	0.75	-0.739	0.535	0.716	0.438	0.303	1.690	1.137	0.523	0.761	1.700
Siblings	-0.525	0.121	-1.195	0.143	0.506	0.214	0.171	1.502	0.794	0.302	0.509	1.239
Friends	-0.502	0.08	-1.066	0.061	0.746	0.601	0.243	2.287	0.746	0.156	0.497	1.122
Teachers	0.367	0.626	-1.139	1.875	0.957	0.968	0.108	8.499	0.624	0.159	0.322	1.210
Parental Warmth^												
Affection	-0.713	0.263	-1.978	0.552	0.309	0.155	0.060	1.585	0.643	0.367	0.242	1.704
Praise	-0.128	0.8	-1.139	0.883	2.811	0.334	0.334	23.627	0.751	0.535	0.299	1.886

P-value: * 0.05, **0.01, ***0.001
Controlling for: Child's age, gender, race, family income, parental social media rules
$ Linear regressions; + Logistic Regression; ^ independent regressions

SMU & Mental Health

SMU-Frequency

The BPI-Internalized subscale showed a protective effect associated with using SMU a few times a week, several times a day, almost all the time when compared to never using social media. Similarly, daily and occasional users had decreased risk of internalizing symptoms (depression/anxiety) compared to never users. This may be hinting at there are unmeasured factors that play role in this relationship (i.e., never users are disconnected youth already or lacking social connections).

BPI-Anxiety (often anxious) var showed a significant association for those using social media all the time being at decreased risk of anxiety, compared to non-users. For the BPI-Anxiety (often & sometimes anxious) variable, daily users did not have a sig association but youth that used SM several times a day had a significant decrease in anxiety risk compared to never users.

SMU	***BPI (Internalized)***				***BPI (Anxiety)$^{+}$ (1: often anxious only)***				***BPI (Anxiety)$^{+}$ (1: often & sometimes anxious)***			
	Coef.	**p.**	**95 % CI**		**OR**	**p**	**95% CI**		**OR**	**p**	**95% CI**	
Frequency Categories												
Less than once a week	-0.849	0.322	-2.555	0.856	0.344	0.314	0.041	2.831	0.476	0.078	0.208	1.090
Once a week	-0.740	0.473	-2.802	1.321	0.487	0.4	0.089	2.666	0.570	0.266	0.209	1.556
A few times a week	**-1.602*** **	0.001	-2.535	-0.669	0.363	0.184	0.080	1.644	0.715	0.262	0.395	1.295
Once a Day	-1.142	0.079	-2.42	0.138	0.745	0.731	0.135	4.106	1.243	0.596	0.549	2.816
Several times a day	**-1.671****	0.004	-2.779	-0.563	0.292	0.07	0.076	1.110	**0.458** **	0.004	0.271	0.774
Almost all the time	**-1.679****	0.006	-2.861	-0.497	**0.236 ***	0.03	0.064	0.867	0.558	0.145	0.253	1.231
Frequency 3-category (reference group: never)												
Almost all the time	**-1.672****	0.006	-2.851	-0.493	**0.236 ***	0.031	0.064	0.872	0.561	0.150	0.253	1.241
Frequent	**-1.456****	0.003	-2.384	-0.527	0.382	0.075	0.132	1.107	0.619	0.061	0.374	1.023
Frequency (reference group: frequent)												
Never	**1.456****	0.003	0.528	2.384	2.613	0.075	0.903	7.561	1.615	0.061	0.977	2.668
Almost all the time	-0.216	0.518	-0.884	0.451	0.617	0.417	0.189	2.017	0.906	0.735	0.506	1.623

P-value: * 0.05, **0.01, ***0.001

Controlling for: Child's age, gender, race, and family income, parental social media rules

Interaction Effects: Social Connectedness & SMU on Mental Health
SMU-Freq & SC on MH (Research Question #2)
Youth that experienced parental affection and were common social media users were at 3.6x decreased risk of depression compared to never users. Similarly, when changing the reference group to the common users, never users were at 3.6x increased risk of depression compared to common users.

CDI									
	Coef.	**P>t**	**[95% Conf.**	**Interval]**		**Coef.**	**P>t**	**[95% Conf.**	**Interval]**
Affection x SMU Frequency (reference group: Never)					***Affection x SMU Frequency (reference group: Common)***				
1#Common	**-3.628***	0.016	-6.542	-0.714	1#Never	**3.628***	0.016	0.714	6.542
1#Almost the time	-0.807	0.429	-2.843	1.228	1#Almost the time	2.821	0.105	-0.607	6.248
Praise x SMU Frequency (reference group: Never)					***Praise x SMU Frequency (reference group: Common)***				
1#Common	-1.643	0.368	-5.275	1.988	1#Never	1.643	0.368	-1.988	5.275
1#Almost the time	1.048	0.312	-1.013	3.109	1#Almost the time	2.691	0.146	-0.970	6.353

P-value: * 0.05, **0.01, ***0.001; Controlling for: Child's age, gender, race, family income, parental social media rules

The BPI-internalized and the BPI-anxiety vars did not demonstrate any significant associations with the interactions of social media and social connectedness.

BPI (internalized)									
	Coef.	**P>t**	**[95% Conf.**	**Interval]**		**Coef.**	**P>t**	**[95% Conf.**	**Interval]**
SCS x SMU Frequency (reference group: Never)					***SCS x SMU Frequency (reference group: Common)***				
1#Common	-1.691	0.205	-4.336	0.955	1#Never	1.691	0.205	-0.955	4.336
1#Almost the time	-1.619	0.293	-4.682	1.444	1#Almost the time	0.072	0.951	-2.243	2.387
2#Frequent	-0.694	0.553	-3.032	1.644	2#Never	0.694	0.553	-1.644	3.032
2#Almost the time	-1.069	0.513	-4.334	2.195	2#Almost the time	-0.376	0.695	-2.292	1.540
3# Common	0.094	0.950	-2.885	3.073	3#Never	-0.094	0.950	-3.073	2.885
3#Almost the time	-1.287	0.479	-4.919	2.346	3#Almost the time	-1.381	0.248	-3.754	0.993
Affection x SMU Frequency (reference group: Never)					***Affection x SMU Frequency (reference group: Frequent)***				

1#Common	0.806	0.637	-2.609	4.220	1#Never	-0.806	0.637	-4.220	2.609
1#Almost the time	-2.109	0.253	-5.774	1.557	1#Almost the time	-2.914	0.063	-5.989	0.161
Praise x SMU Frequency (Reference group: Never)					***Praise x SMU Frequency (Reference group:*** Common***)***				
1#Common	-0.781	0.445	-2.821	1.260	1#Never	0.781	0.445	-1.260	2.821
1#Almost the time	-2.376	0.182	-5.902	1.150	1#Almost the time	-1.596	0.409	-5.450	2.259

P-value: * 0.05, **0.01, ***0.001

Controlling for: Child's age, gender, race, family income, parental social media rules

BPI (Anxiety) (1: often & sometimes anxious)									
	Odds Ratio	**P>t**	**[95% Conf.**	**Interval]**		**Odds Ratio**	**P>t**	**[95% Conf.**	**Interval]**
SCS x SMU Frequency (Reference group: Never)					***SCS x SMU Frequency (Reference group: Frequent)***				
1#Frequent	-1.691	0.205	-4.336	0.955	1#Never	3.738	0.106	0.747	18.694
1#Almost the time	-1.619	0.293	-4.682	1.444	1#Almost the time	2.117	0.411	0.344	13.018
2#Frequent	-0.694	0.553	-3.032	1.644	2#Never	1.505	0.569	0.358	6.323
2#Almost the time	-1.069	0.513	-4.334	2.195	2#Almost the time	1.843	0.467	0.345	9.847
3#Frequent	0.094	0.950	-2.885	3.073	3#Never	2.501	0.317	0.405	15.456
3#Almost the time	-1.287	0.479	-4.919	2.346	3#Almost the time	2.421	0.392	0.309	18.975
Affection x SMU Frequency (Reference group: Never)					***Affection x SMU Frequency (Reference group: Frequent)***				
1#Common	0.806	0.637	-2.609	4.220	1#Never	0.536	0.620	0.043	6.616
1#Almost the time	-2.109	0.253	-5.774	1.557	1#Almost the time	0.671	0.573	0.163	2.760
Praise x SMU Frequency (Reference group: Never)					***Praise x SMU Frequency (Reference group: Common)***				
1#Common	-0.781	0.445	-2.821	1.260	1#Never	0.884	0.911	0.096	8.123
1#Almost the time	-2.376	0.182	-5.902	1.150	1#Almost the time	1.162	0.865	0.200	6.732

Sensitivity Analyses – SMU Daily Users

3-Category SMU Frequency for Daily Users, Occasional Users, Never Users

We did not see significant differences between daily users and our main analyses.

	CDI				
SMU Frequency	**Coefficient**	**std. err.**	**P>t**	**[95% conf.**	**interval]**
Total Sample					
reference= never					
Occasional User	0.177	0.306	0.567	-0.439	0.792
Daily User	0.274	0.376	0.470	-0.482	1.030
Female					
reference= never					
Occasional User	0.408	0.442	0.361	-0.480	1.295
Daily User	0.795	0.555	0.158	-0.320	1.911
Male					
reference= never					
Occasional User	0.059	0.333	0.859	-0.609	0.728
Daily User	-0.227	0.365	0.537	-0.961	0.507
Age 12-14					
reference= never					
Occasional User	0.330	0.345	0.343	-0.362	1.022
Daily User	0.686	0.400	0.092	-0.117	1.489
Age 15-17					
reference= never					
Occasional User	-0.577	0.718	0.425	-2.020	0.866
Daily User	-0.640	0.737	0.389	-2.121	0.841

	CDI				
Interaction Effects	**Coefficient**	**std. err.**	**P>t**	**[95% conf.**	**interval]**
Total Sample					
one relationship					
Occasional User	0.408	0.660	0.540	-0.919	1.734188

Daily User	-0.232	0.629	0.714	-1.496	1.032469
two relationships					
Occasional User	-0.203	0.791	0.799	-1.792	1.386334
Daily User	-1.470	0.843	0.088	-3.165	0.2246572
three relationships					
Occasional User	-0.086	0.690	0.902	-1.471	1.300146
Daily User	-1.047	0.769	0.180	-2.592	0.4983889
Female					
one relationship					
Occasional User	0.483	1.026	0.640	-1.578	2.544
Daily User	0.086	1.055	0.936	-2.034	2.206
two relationships					
Occasional User	-0.571	1.456	0.696	-3.498	2.355
Daily User	-1.994	1.399	0.160	-4.805	0.817
three relationships					
Occasional User	-1.048	0.907	0.253	-2.870	0.774
Daily User	-0.873	0.952	0.364	-2.785	1.040
Male					
one relationship					
Occasional User	0.343	0.881	0.698	-1.426	2.113
Daily User	0.184	0.976	0.851	-1.776	2.145
two relationships					
Occasional User	0.280	0.856	0.745	-1.440	2.000
Daily User	-0.307	0.807	0.706	-1.929	1.316
three relationships					
Occasional User	0.377	0.853	0.661	-1.337	2.090
Daily User	0.031	0.982	0.975	-1.942	2.004
Ages 12-14					
one relationship					
Occasional User	-0.867	0.912	0.346	-2.697	0.963
Daily User	-0.373	0.744	0.618	-1.867	1.120
two relationships					
Occasional User	-0.254	0.943	0.789	-2.146	1.639
Daily User	-1.366	0.868	0.121	-3.108	0.375

three relationships					
Occasional User	-0.723	0.879	0.414	-2.487	1.040
Daily User	-0.567	0.861	0.513	-2.295	1.161
Ages 15-17					
one relationship					
Occasional User	**3.586**	**1.036**	**0.001****	**1.504**	**5.667**
Daily User	1.131	1.191	0.347	-1.263	3.525
two relationships					
Occasional User	-1.304	3.348	0.699	-8.032	5.423
Daily User	-2.306	3.493	0.512	-9.325	4.714
three relationships					
Occasional User	1.852	1.265	0.150	-0.690	4.393
Daily User	0	(omitted)			

Chapter 4 Supplementary Data

SAMPLE

HMS 2021-2022 Academic Year Study Sample of College Students (N=137,916)
Study sample includes students that took the self-administered survey in Fall 2020 or Winter 2021.

Survey	Freq.	Percent
HMS Fall 2020	34,168	24.77
HMS Winter 2021	103,748	75.23
Total	**137,916**	**100**

MHS UTILIZATION

HMS College Students that Have Ever Used Counseling or Therapy Services for Mental Health Concerns (N=137,916).
Half of college students in the study sample have never used counseling or therapy services for mental health concerns. While nearly half have ever used counseling or therapy services for mental health concerns (16% prior to college, 15% since starting college, and 17% have used counseling/therapy prior to college and since starting college).

Ever received counseling/therapy for mental health concerns?	Freq.	Percent
No, never	59,946	50.25
Yes, prior to starting college	19,183	16.08
Yes, since starting college	18,816	15.77
Yes, both of the above (prior to college)	21,113	17.7
Refused/Did not Answer	228	0.19
Total	119,286	100
Missing	18,630	13.5%

HMS College Students that Used Counseling or Therapy Services for Mental Health Concerns in the last 12 months (N=137,916).
Nearly a quarter of college students have frequently used counseling/therapy services in the last 12 months (10 or more visits). While nearly fifth have used it occasionally in the last 12 months. Only 36% of students have never used therapy/counseling services.

Total Visits for Counseling/therapy last 12 months	Freq.	Percent

0	21,410	36.17
1-3	10,946	18.49
4-6	7,808	13.19
7-9	4,419	7.46
10 or more	14,616	24.69
Total	59,199	100

MENTAL HEALTH SCREENERS

Summary Statistics of Anxiety and Depression Screeners among HMS College Students (N=137,916).
Summary statistics (i.e., Frequency, Mean, SD) of the anxiety screener (GAD-7) and the depression screener (PHQ-9) among college students in the HMS 2021-2022 study sample.

Variable	Obs	Mean	Std. Dev.	Min	Max
anxiety (GAD-7)	123,745	7.941072	5.914773	0	21
depression (PHQ-9)	124,949	9.186764	6.55621	0	27

HMS College Students with a Perceived Need of Mental Health Services (N=137,916).
Nearly half of college students strongly agreed or agreed that had a perceived need of mental health services.

How much do you agree with the following statement?		
In the past 12 months, I needed help for emotional or mental health problems such as feeling sad, blue, anxious, or nervous,	**Freq.**	**Percent**
Strongly agree	35,675	29.82
Agree	22,812	19.07
Somewhat agree	19,943	16.67
Somewhat disagree	6,993	5.85
Disagree	16,419	13.72
Strongly disagree	17,797	14.88
Total	119,639	100

SOCIAL SUPPORT VARIABLES

Distribution of HMS College Students Across the UCLA 3-item Loneliness Scale (N=137,916).

Among the three items included in the UCLA Loneliness Scale, majority of students expressed they often or sometimes felt lack of companionship, left out, or isolated.

UCLA 3-item Loneliness Scale	Lack companion	Left out	Isolated
Hardly ever	42,931, 31.1%	37,361, 27.1%	36,853, 26.7%
Sometimes	53,234, 38.6%	57,037, 41.4%	50,745, 36.8%
Often	25,791, 18.7%	27,493, 19.9%	34,253, 24.8%
Missing	15,950, 11.6%	16,025, 11.6%	16,065, 24.8%
Total	121,956	121,891	121,851
Mean:5.76		**SD: 1.93**	

Distribution of HMS College Students by positive or negative case of loneliness by the UCLA 3-item Loneliness Scale (N=137,916).

A positive case of loneliness is a score of 6 or higher on the UCLA 3-item loneliness scale. Nearly half of students scored as a positive case on the scale.

lonely	Freq.	Percent
Negative	53,666	38.91
Positive Case (6-9)	68,067	49.35
Missing	16,183	11.73
Total	121,733	100

Distribution of non-clinician sources that College Students receive informal social support for mental health concerns (N=137,916).

Frequency and percentage of total sample of students that stated they received counseling or mental health support from a non-clinician source. Data demonstrates that most college students relied on other sources of mental health support than clinical support.

In the past 12 months have you received counseling or support for mental health concerns from …	Freq	% of sample
Roommate	19,235	14%
Friend (not roommate)	52,631	38%
Significant Other	38,577	28%
Family Member	46,483	34%
Religious Counselor	4,602	3%
Support group	2,544	18%
other non-clinician source	848	6%
None of these	35,348	26%

*Sources of informal support are not mutually exclusive

References

1. Lynch J, Smith GD. A LIFE COURSE APPROACH TO CHRONIC DISEASE EPIDEMIOLOGY. *Annu Rev Public Health*. 2005;26(1):1-35. doi:10.1146/annurev.publhealth.26.021304.144505

2. Chesney E, Goodwin GM, Fazel S. Risks of all-cause and suicide mortality in mental disorders: a meta-review. *World Psychiatry*. 2014;13(2):153-160. doi:10.1002/wps.20128

3. Kessler RC, Demler O, Frank RG, et al. Prevalence and Treatment of Mental Disorders, 1990 to 2003. *N Engl J Med*. 2005;352(24):2515-2523. doi:10.1056/NEJMsa043266

4. *Key Substance Use and Mental Health Indicators in the United States: Results from the 2020 National Survey on Drug Use and Health*. Substance Abuse and Mental Health Services Administration; 2020. https://www.samhsa.gov/data/sites/default/files/reports/rpt35325/NSDUHFFRPDFWHTMLFiles2020/2020NSDUHFFR1PDFW102121.pdf

5. Colizzi M, Lasalvia A, Ruggeri M. Prevention and early intervention in youth mental health: is it time for a multidisciplinary and trans-diagnostic model for care? *Int J Ment Health Syst*. 2020;14(1):23. doi:10.1186/s13033-020-00356-9

6. Centers for Disease Control and Prevention (CDC). *Youth Risk Behavior Survey (YRBS) Data Summary and Trends Report 2011-2021*. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBS_Data-Summary-Trends_Report2023_508.pdf; 2023.

7. Weiner S. A growing psychiatrist shortage and an enormous demand for mental health services. AAMC News. Published August 9, 2022. Accessed November 4, 2023.

https://www.aamc.org/news/growing-psychiatrist-shortage-enormous-demand-mental-health-services

8. Health Resources & Services Administration. Health Workforce Shortage Areas. Accessed November 4, 2023. https://data.hrsa.gov/topics/health-workforce/shortage-areas

9. U.S. Surgeon General's Office. *Our Epidemic of Loneliness and Isolation: The U.S. Surgeon General's Advisory on the Healing Effects of Social Connection and Community*.; 2023.

10. World Health Organization. *Promoting Mental Health: Concepts, Emerging Evidence, Practice; a Report*. (Herrman H, Saxena S, Moodie R, eds.). World Health Organization; 2005.

11. O'Connor M, Sanson AV, Toumbourou JW, Norrish J, Olsson CA. Does Positive Mental Health in Adolescence Longitudinally Predict Healthy Transitions in Young Adulthood? *J Happiness Stud*. 2017;18(1):177-198. doi:10.1007/s10902-016-9723-3

12. Veldman K, Reijneveld SA, Verhulst FC, Ortiz JA, BÃ¼ltmann U. A life course perspective on mental health problems, employment, and work outcomes. *Scand J Work Environ Health*. 2017;43(4):316-325. doi:10.5271/sjweh.3651

13. Health (US) NI of, Study BSC. Information about Mental Illness and the Brain. In: *NIH Curriculum Supplement Series [Internet]*. National Institutes of Health (US); 2007. Accessed November 8, 2023. https://www.ncbi.nlm.nih.gov/books/NBK20369/

14. KESSLER RC, ANGERMEYER M, ANTHONY JC, et al. Lifetime prevalence and age-of-onset distributions of mental disorders in the World Health Organization's World Mental Health Survey Initiative. *World Psychiatry*. 2007;6(3):168-176.

15. Hedden SL, Kennet J, Lipari R, et al. *Key Substance Use and Mental Health Indicators in the United States: Results from the 2015 National Survey on Drug Use and Health*. Substance Abuse and Mental Health Services Administration; 2015.

https://www.samhsa.gov/data/sites/default/files/NSDUH-FFR1-2015/NSDUH-FFR1-2015/NSDUH-FFR1-2015.pdf

16. *Mental Health and COVID-19: Early Evidence of the Pandemic's Impact*. World Health Organization; 2022. https://iris.who.int/bitstream/handle/10665/352189/WHO-2019-nCoV-Sci-Brief-Mental-health-2022.1-eng.pdf?sequence=1

17. Vogels, E, Gelles-Watnick R, Massarat N. *Teens, Social Media and Technology 2022*.; 2022. Accessed November 8, 2023. https://www.pewresearch.org/internet/2022/08/10/teens-social-media-and-technology-2022/

18. Weir K. The roots of mental illness. *Am Psychol Assoc*. 2012;43(6):30.

19. Lerner RM, Dowling E, Anderson P. Positive Youth Development: Thriving as the Basis of Personhood and Civil Society. In: *Beyond the Self*. Routledge; 2003.

20. O'Connor M, Sanson A, Hawkins MT, et al. Predictors of Positive Development in Emerging Adulthood. *J Youth Adolesc*. 2011;40(7):860-874. doi:10.1007/s10964-010-9593-7

21. Lamers SMA, Westerhof GJ, Bohlmeijer ET, ten Klooster PM, Keyes CLM. Evaluating the psychometric properties of the mental health Continuum-Short Form (MHC-SF). *J Clin Psychol*. 2011;67(1):99-110. doi:10.1002/jclp.20741

22. Land K, Lamb V. Child and Youth Well-Being Index (CWI). In: Michalos AC, ed. *Encyclopedia of Quality of Life and Well-Being Research*. Springer Netherlands; 2014. doi:10.1007/978-94-007-0753-5

23. Halfon N, Forrest C. The Emerging Theoretical Framework of Life Course Health Development. In: Halfon N, Forrest CB, Lerner RM, Faustman EM, eds. *Handbook of Life Course Health Development*. Springer International Publishing; 2018. doi:10.1007/978-3-319-47143-3

24. Halfon N, Forrest CB, Lerner RM, Faustman EM, eds. *Handbook of Life Course Health Development*. Springer International Publishing; 2018. doi:10.1007/978-3-319-47143-3

25. Bronfenbrenner U. *The Ecology of Human Development: Experiments by Nature and Design*. Harvard University Press; 1979. https://www.google.com/books?id=OCmbzWka6xUC

26. Ford DH, Lerner RM. *Developmental Systems Theory: An Integrative Approach*. Sage Publications, Inc; 1992:xi, 259.

27. Lerner RM, Lerner JV, Almerigi JB, et al. Positive Youth Development, Participation in Community Youth Development Programs, and Community Contributions of Fifth-Grade Adolescents. *J Early Adolesc*. 2005;25(1):17-71. doi:10.1177/0272431604272461

28. Lerner RM, Brentano C, Dowling EM, Anderson PM. Positive youth development: Thriving as the basis of personhood and civil society. *New Dir Youth Dev*. 2002;2002(95):11-34. doi:10.1002/yd.14

29. Lerner RM, Brindis CD, Batanova M, Blum RWm. Adolescent Health Development: A Relational Developmental Systems Perspective. In: *Handbook of Life Course Health Development*. Springer International Publishing; 2018:109-121. doi:10.1007/978-3-319-47143-3_6

30. Helm PJ, Medrano MR, Allen JJB, Greenberg J. EXISTENTIAL ISOLATION, LONELINESS, DEPRESSION, AND SUICIDE IDEATION IN YOUNG ADULTS. *J Soc Clin Psychol*. 2020;39(8):641-674. doi:10.1521/jscp.2020.39.8.641

31. Schwartz-Mette RA, Shankman J, Dueweke AR, Borowski S, Rose AJ. Relations of friendship experiences with depressive symptoms and loneliness in childhood and adolescence: A meta-analytic review. *Psychol Bull*. 2020;146(8):664-700. doi:10.1037/bul0000239

32. Almedom A, Glandon D. Social Capital and Mental Health. In: Kawachi I, Subramanian S, Kim D, eds. *Social Capital and Health*. Springer; 2008.

33. Woodcock M, Narayan D. Social capital: Implications for development: Toward a theoretical synthesis and policy framework. *Theory Soc*. 2000;(27):151-208.

34. Lakey B, Cohen, Sheldon. Social Support Theory and Measurement. In: Cohen S, Underwood LG, Gottlieb BH, eds. *Social Support Measurement and Intervention: A Guide for Health and Social Scientists*. Oxford University Press; 2000:29-49.

35. Lee RM, Robbins SB. The relationship between social connectedness and anxiety, self-esteem, and social identity. *J Couns Psychol*. 1998;45(3):338-345. doi:10.1037/0022-0167.45.3.338

36. Duh-Leong C, Dreyer BP, Huang TTK, et al. Social Capital as a Positive Social Determinant of Health: A Narrative Review. *Acad Pediatr*. 2021;21(4):594-599. doi:10.1016/j.acap.2020.09.013

37. Bourdieu P. The Forms of Capital. In: Szeman I, Kaposy T, eds. *Cultural Theory: An Anthology*. John Wiley & Sons; 1986.

38. Olfson M, Druss BG, Marcus SC. Trends in Mental Health Care among Children and Adolescents. *N Engl J Med*. 2015;372(21):2029-2038. doi:10.1056/NEJMsa1413512

39. Eisenberg D, Hunt J, Speer N, Zivin K. Mental Health Service Utilization Among College Students in the United States. *J Nerv Ment Dis*. 2011;199(5):301-308. doi:10.1097/NMD.0b013e3182175123

40. Rickwood D, Thomas K. Conceptual measurement framework for help-seeking for mental health problems. *Psychol Res Behav Manag*. 2012;5:173-183. doi:10.2147/PRBM.S38707

41. Eccles JS. Schools, Academic Motivation, and Stage-Environment Fit. In: *Handbook of Adolescent Psychology*. John Wiley & Sons, Ltd; 2004:125-153. doi:10.1002/9780471726746.ch5

42. ARNETT JJ. Young People's Conceptions of the Transition to Adulthood. *Youth Soc*. 1997;29(1):3-23. doi:10.1177/0044118X97029001001

43. Arnett JJ. Learning to Stand Alone: The Contemporary American Transition to Adulthood in Cultural and Historical Context. *Hum Dev*. 1998;41(5-6):295-315. doi:10.1159/000022591

44. Greene AL, Wheatley SM, Aldava JF. Stages on Life's Way: Adolescents' Implicit Theories of the Life Course. *J Adolesc Res*. 1992;7(3):364-381. doi:10.1177/074355489273006

45. Lerner RM, Busch-Rossnagel NA. *Individuals as Producers of Their Development: A Life-Span Perspective*. Elsevier; 1982.

46. Lerner RM, Walls T. Revisiting Individuals as Producers of Their Development: From dynamic interactionism to developmental systems. In: *Action & Self-Development: Theory and Research through the Life Span*. Sage Publications, Inc; 1999:3-36. doi:10.4135/9781452204802.n1

47. Ricco RB, Overton WF. Dual systems Competence ←-→ Procedural processing: A relational developmental systems approach to reasoning. *Dev Rev*. 2011;31(2):119-150. doi:10.1016/j.dr.2011.07.005

48. Freund AM, Baltes PB. Life-management strategies of selection, optimization and compensation: Measurement by self-report and construct validity. *J Pers Soc Psychol*. 2002;82(4):642-662. doi:10.1037/0022-3514.82.4.642

49. Mascolo MF, Fischer KW. Dynamic Development of Thinking, Feeling, and Acting. In: Lerner RM, ed. *Handbook of Child Psychology and Developmental Science*. 1st ed. Wiley; 2015:1-49. doi:10.1002/9781118963418.childpsy104

50. Erikson EH. *Identity Youth and Crisis*. W. W. Norton & Company; 1968.

51. Hartup WW. Social relationships and their developmental significance. *Am Psychol*. 1989;44(2):120-126. doi:10.1037/0003-066X.44.2.120

52. Ragelienė T. Links of Adolescents Identity Development and Relationship with Peers: A Systematic Literature Review. *J Can Acad Child Adolesc Psychiatry*. 2016;25(2):97-105.

53. Pittman JF, Keiley MK, Kerpelman JL, Vaughn BE. Attachment, Identity, and Intimacy: Parallels Between Bowlby's and Erikson's Paradigms. *J Fam Theory Rev*. 2011;3(1):32-46. doi:10.1111/j.1756-2589.2010.00079.x

54. Branje SJT, van Aken MAG, van Lieshout CFM. Relational support in families with adolescents. *J Fam Psychol*. 2002;16(3):351-362. doi:10.1037/0893-3200.16.3.351

55. Gecas V, Schwalbe ML. Parental Behavior and Adolescent Self-Esteem. *J Marriage Fam*. 1986;48(1):37-46. doi:10.2307/352226

56. Stattin H, Kerr M. Parental Monitoring: A Reinterpretation. *Child Dev*. 2000;71(4):1072-1085. doi:10.1111/1467-8624.00210

57. Steinberg L. We Know Some Things: Parent–Adolescent Relationships in Retrospect and Prospect. *J Res Adolesc*. 2001;11(1):1-19. doi:10.1111/1532-7795.00001

58. Rew L, Horner SD. Youth resilience framework for reducing health-risk behaviors in adolescents. *J Pediatr Nurs*. 2003;18(6):379-388. doi:10.1016/S0882-5963(03)00162-3

59. Ruiz-Hernández JA, Moral-Zafra E, Llor-Esteban B, Jiménez-Barbero JA. Influence of Parental Styles and Other Psychosocial Variables on the Development of Externalizing

Behaviors in Adolescents: A Systematic Review. *Eur J Psychol Appl Leg Context*. 2019;11(1):9-21.

60. Bender HL, Allen JP, McELHANEY KB, et al. Use of harsh physical discipline and developmental outcomes in adolescence. *Dev Psychopathol*. 2007;19(1):227-242. doi:10.1017/S0954579407070125

61. Van Doorn MD, Branje SJT, Meeus WHJ. Longitudinal transmission of conflict resolution styles from marital relationships to adolescent-parent relationships. *J Fam Psychol*. 2007;21(3):426-434. doi:10.1037/0893-3200.21.3.426

62. Silva CS, Calheiros MM, Carvalho H. Interparental conflict and adolescents' self-representations: The role of emotional insecurity. *J Adolesc*. 2016;52:76-88. doi:10.1016/j.adolescence.2016.07.007

63. Halfon N, Inkelas M, Hochstein M. The Health Development Organization: An Organizational Approach to Achieving Child Health Development. *Milbank Q*. 2000;78(3):447-497. doi:10.1111/1468-0009.00180

64. Gardner M, Steinberg L. Peer Influence on Risk Taking, Risk Preference, and Risky Decision Making in Adolescence and Adulthood: An Experimental Study. *Dev Psychol*. 2005;41(4):625-635. doi:10.1037/0012-1649.41.4.625

65. La Greca AM, Harrison HM. Adolescent Peer Relations, Friendships, and Romantic Relationships: Do They Predict Social Anxiety and Depression? *J Clin Child Adolesc Psychol*. 2005;34(1):49-61. doi:10.1207/s15374424jccp3401_5

66. Williams LR, Anthony EK. A Model of Positive Family and Peer Relationships on Adolescent Functioning. *J Child Fam Stud*. 2015;24(3):658-667. doi:10.1007/s10826-013-9876-1

67. Prinstein MJ, Boergers J, Spirito A. Adolescents' and Their Friends' Health-Risk Behavior: Factors That Alter or Add to Peer Influence. *J Pediatr Psychol*. 2001;26(5). doi:10.1093/jpepsy/26.5.287

68. Leather NC. Risk-taking behaviour in adolescence: a literature review. *J Child Health Care*. 2009;13(3):295-304. doi:10.1177/1367493509337443

69. Jones SE, Ethier KA, Hertz M, et al. Mental Health, Suicidality, and Connectedness Among High School Students During the COVID-19 Pandemic — Adolescent Behaviors and Experiences Survey, United States, January–June 2021. *MMWR Suppl*. 2022;71(3):16-21. doi:10.15585/mmwr.su7103a3

70. Ghandour RM, Sherman LJ, Vladutiu CJ, et al. Prevalence and Treatment of Depression, Anxiety, and Conduct Problems in US Children. *J Pediatr*. 2019;206:256-267.e3. doi:10.1016/j.jpeds.2018.09.021

71. Lipson SK, Lattie EG, Eisenberg D. Increased Rates of Mental Health Service Utilization by U.S. College Students: 10-Year Population-Level Trends (2007–2017). *Psychiatr Serv*. 2019;70(1):60-63. doi:10.1176/appi.ps.201800332

72. (CDC), Centers for Disease Control and Prevention. *Youth Risk Behavior Survey Data Summary & Trends Report: 2009-2019*. urvey: data summary and trends report 2009–2019. Atlanta, GA:; 2021. https://www.cdc.gov/healthyyouth/data/yrbs/pdf/YRBSDataSummaryTrendsReport2019-508.pdf

73. Centers for Disease Control (CDC) UD of H and HS. *CDC WONDER: Underlying Cause of Death, 1999–2019.* https://wonder.cdc.gov/Deaths-by-Underlying-Cause.html; 2020.

74. Arnett JJ. Emerging adulthood: A theory of development from the late teens through the twenties. *Am Psychol*. 2000;55(5):469-480. doi:10.1037/0003-066X.55.5.469

75. Wood D, Crapnell T, Lau L, et al. Emerging adulthood as a critical stage in the life course. In: Halfon N, Forrest CB, Lerner RM, Faustman EM, eds. *Handbook of Life Course Health Development*. Springer International Publishing; 2018. doi:10.1007/978-3-319-47143-3

76. Chatterjee S, Kim J, Chung S. Emerging adulthood milestones, perceived capability, and psychological well-being while transitioning to adulthood: Evidence from a national study. *Financ Plan Rev*. 2021;4(4):e1132. doi:10.1002/cfp2.1132

77. Liu CH, Zhang E, Wong GTF, Hyun S, Hahm H "Chris." Factors associated with depression, anxiety, and PTSD symptomatology during the COVID-19 pandemic: Clinical implications for U.S. young adult mental health. *Psychiatry Res*. 2020;290:113172. doi:10.1016/j.psychres.2020.113172

78. McGrath JJ, Al-Hamzawi A, Alonso J, et al. Age of onset and cumulative risk of mental disorders: a cross-national analysis of population surveys from 29 countries. *Lancet Psychiatry*. 2023;10(9):668-681. doi:10.1016/S2215-0366(23)00193-1

79. Salimi N, Gere B, Talley W, Irioogbe B. College Students Mental Health Challenges: Concerns and Considerations in the COVID-19 Pandemic. *J Coll Stud Psychother*. 2023;37(1):39-51. doi:10.1080/87568225.2021.1890298

80. Horigian VE, Schmidt RD, Feaster DJ. Loneliness, Mental Health, and Substance Use among US Young Adults during COVID-19. *J Psychoactive Drugs*. 2021;53(1):1-9. doi:10.1080/02791072.2020.1836435

81. Hamza CA, Ewing L, Heath NL, Goldstein AL. When social isolation is nothing new: A longitudinal study on psychological distress during COVID-19 among university students with and without preexisting mental health concerns. *Can Psychol Psychol Can*. 2021;62(1):20-30. doi:10.1037/cap0000255

82. Collins ME. Transition to Adulthood for Vulnerable Youths: A Review of Research and Implications for Policy. *Soc Serv Rev*. 2001;75(2):271-291. doi:10.1086/322209

83. Kaplan K, Salzer MS, Brusilovskiy E. Community participation as a predictor of recovery-oriented outcomes among emerging and mature adults with mental illnesses. *Psychiatr Rehabil J*. 2012;35(3):219-229. doi:10.2975/35.3.2012.219.229

84. Wray-Lake L, Shubert J, Lin L, Starr LR. Examining associations between civic engagement and depressive symptoms from adolescence to young adulthood in a national U.S. sample. *Appl Dev Sci*. 2019;23(2):119-131.

85. Cutler D, Lleras-Muney A. *Education and Health: Evaluating Theories and Evidence*. National Bureau of Economic Research; 2006. doi:10.3386/w12352

86. Goesling B. The Rising Significance of Education for Health? *Soc Forces*. 2007;85(4):1621-1644. doi:10.1353/sof.2007.0068

87. Clair R, Gordon M, Kroon M, Reilly C. The effects of social isolation on well-being and life satisfaction during pandemic. *Humanit Soc Sci Commun*. 2021;8(1):28. doi:10.1057/s41599-021-00710-3

88. Shpancer N. Why So Many Young People Are Struggling. *Psychology Today*. https://www.psychologytoday.com/us/blog/insight-therapy/202302/why-young-people-are-languishing. Published March 1, 2023. Accessed November 4, 2023.

89. Keyes CLM. The Mental Health Continuum: From Languishing to Flourishing in Life. *J Health Soc Behav*. 2002;43(2):207-222. doi:10.2307/3090197

90. Grant A. There's a Name for the Blah You're Feeling: It's Called Languishing. *The New York Times*. https://www.nytimes.com/2021/04/19/well/mind/covid-mental-health-languishing.html. Published April 19, 2021. Accessed November 4, 2023.

91. Barnhart S, Garcia AR, Karcher NR. Adolescent Mental Health and Family Economic Hardships: The Roles of Adverse Childhood Experiences and Family Conflict. *J Youth Adolesc*. 2022;51(12):2294-2311. doi:10.1007/s10964-022-01671-9

92. Burt KB, Paysnick AA. Resilience in the transition to adulthood. *Dev Psychopathol*. 2012;24(2):493-505. doi:10.1017/S0954579412000119

93. Masten AS. Resilience in developing systems: Progress and promise as the fourth wave rises. *Dev Psychopathol*. 2007;19(3):921-930. doi:10.1017/S0954579407000442

94. Gartland D, Riggs E, Muyeen S, et al. What factors are associated with resilient outcomes in children exposed to social adversity? A systematic review. *BMJ Open*. 2019;9(4):e024870. doi:10.1136/bmjopen-2018-024870

95. Windle M. Parental, Sibling, and Peer Influences on Adolescent Substance Use and Alcohol Problems. *Appl Dev Sci*. 2000;4(2):98-110. doi:10.1207/S1532480XADS0402_5

96. Merrick MT, Ports KA, Ford DC, Afifi TO, Gershoff ET, Grogan-Kaylor A. Unpacking the impact of adverse childhood experiences on adult mental health. *Child Abuse Negl*. 2017;69:10-19. doi:10.1016/j.chiabu.2017.03.016

97. Schickedanz AB, Escarce JJ, Halfon N, Sastry N, Chung PJ. Adverse Childhood Experiences and Household Out-of-Pocket Healthcare Costs. *Am J Prev Med*. 2019;56(5):698-707. doi:10.1016/j.amepre.2018.11.019

98. Herrman H, Stewart DE, Diaz-Granados N, Berger EL, Jackson B, Yuen T. What is Resilience? *http://dx.doi.org/101177/070674371105600504*. 2011;56(5):258-265. doi:10.1177/070674371105600504

99. Masten AS, Barnes AJ. Resilience in Children: Developmental Perspectives. *Children*. 2018;5(7):98. doi:10.3390/children5070098

100. McBride CM, Curry SJ, Cheadle A, et al. School-Level Application of a Social Bonding Model to Adolescent Risk-Taking Behavior. *J Sch Health*. 1995;65(2):63-68. doi:10.1111/j.1746-1561.1995.tb03347.x

101. Resnick MD, Ireland M, Borowsky I. Youth violence perpetration: What protects? What predicts? Findings from the National Longitudinal Study of Adolescent Health. *J Adolesc Health*. 2004;35(5):424.e1-424.e10. doi:10.1016/j.jadohealth.2004.01.011

102. Shochet IM, Dadds MR, Ham D, Montague R. School Connectedness Is an Underemphasized Parameter in Adolescent Mental Health: Results of a Community Prediction Study. *J Clin Child Adolesc Psychol*. 2006;35(2):170-179. doi:10.1207/s15374424jccp3502_1

103. van Loon AWG, Creemers HE, Beumer WY, et al. Can Schools Reduce Adolescent Psychological Stress? A Multilevel Meta-Analysis of the Effectiveness of School-Based Intervention Programs. *J Youth Adolesc*. 2020;49(6):1127-1145. doi:10.1007/s10964-020-01201-5

104. Werner EE, Smith RS. *Overcoming the Odds: High Risk Children from Birth to Adulthood*. Cornell University Press; 1992.

105. Masten AS, Burt KB, Roisman GI, Obradović J, Long JD, Tellegen A. Resources and resilience in the transition to adulthood: Continuity and change. *Dev Psychopathol*. 2004;16(4):1071-1094. doi:10.1017/S0954579404040143

106. Conger RD, Ge X, Elder GH, Lorenz FO, Simons RL. Economic Stress, Coercive Family Process, and Developmental Problems of Adolescents. *Child Dev*. 1994;65(2):541-561. doi:10.1111/j.1467-8624.1994.tb00768.x

107. Gutman, Leslie Morrison, Sameroff, Arnold. Continuities in depression from adolescence to young adulthood: Contrasting ecological influences | Development and Psychopathology | Cambridge Core. *Dev Psychopathol*. 2004;16(4):967-984.

108. Burt KB, Masten AS. Development in the transition to adulthood: Vulnerabilities and opportunities. In: Grant JE, Potenza MN, eds. *Young Adult Mental Health*. Oxford University Press; 2010.

109. Conger RD, Conger KJ. Resilience in Midwestern Families: Selected Findings from the First Decade of a Prospective, Longitudinal Study. *J Marriage Fam*. 2002;64(2):361-373. doi:10.1111/j.1741-3737.2002.00361.x

110. Resnick MD, Bearman PS, Blum RWm, et al. Protecting Adolescents From Harm: Findings From the National Longitudinal Study on Adolescent Health. *JAMA*. 1997;278(10):823-832. doi:10.1001/jama.1997.03550100049038

111. Wickrama KAS, Noh S. The Long Arm of Community: The Influence of Childhood Community Contexts Across the Early Life Course. *J Youth Adolesc*. 2010;39(8):894-910. doi:10.1007/s10964-009-9411-2

112. Granger TA, Cook PF, Ramos G. Adolescent Peer and Parent Relationships Into Emerging Adulthood. *West J Nurs Res*. 2020;42(2):90-96. doi:10.1177/0193945919848439

113. Ehrlich KB, Hoyt LT, Sumner JA, McDade TW, Adam EK. Quality of relationships with parents and friends in adolescence predicts metabolic risk in young adulthood. *Health Psychol*. 2015;34(9):896-904. doi:10.1037/hea0000213

114. Saxton K, Chyu L. Early life adversity increases the salience of later life stress: an investigation of interactive effects in the PSID. *J Dev Orig Health Dis*. 2020;11(1):25-36. doi:10.1017/S2040174419000308

115. Heidinger LS, Willson AE. The childhood roots of adult psychological distress: Interdisciplinary perspectives toward a better understanding of exposure to cumulative childhood adversity. *Child Abuse Negl*. 2019;97:104136. doi:10.1016/j.chiabu.2019.104136

116. Patalay P, Fitzsimons E. Development and predictors of mental ill-health and wellbeing from childhood to adolescence. *Soc Psychiatry Psychiatr Epidemiol*. 2018;53(12):1311-1323. doi:10.1007/s00127-018-1604-0

117. Viner RM, Ozer EM, Denny S, et al. Adolescence and the social determinants of health. *The Lancet*. 2012;379(9826):1641-1652. doi:10.1016/S0140-6736(12)60149-4

118. National Research Council. *Civic Engagement and Social Cohesion: Measuring Dimensions of Social Capital to Inform Policy*. The National Academies Press; 2014.

119. Kawachi I, Subramanian SV, Kim D. Social Capital and Health. In: Kawachi I, Subramanian SV, Kim D, eds. *Social Capital and Health*. Springer; 2008:1-26. doi:10.1007/978-0-387-71311-3_1

120. Ferguson KM. Social capital and children's wellbeing: a critical synthesis of the international social capital literature. *Int J Soc Welf*. 2006;15(1):2-18. doi:10.1111/j.1468-2397.2006.00575.x

121. Almedom AM. Social capital and mental health: An interdisciplinary review of primary evidence. *Soc Sci Med*. 2005;61(5):943-964. doi:10.1016/j.socscimed.2004.12.025

122. Kotch JB, Smith J, Margolis B, et al. Does Social Capital Protect Against the Adverse Behavioural Outcomes of Child Neglect? *Child Abuse Rev*. 2014;23(4):246-261. doi:10.1002/car.2345

123. Vyncke V, De Clercq B, Stevens V, et al. Does neighbourhood social capital aid in levelling the social gradient in the health and well-being of children and adolescents? A literature review. *BMC Public Health*. 2013;13(1):65. doi:10.1186/1471-2458-13-65

124. Jung M, Lin L, Viswanath K. Associations between health communication behaviors, neighborhood social capital, vaccine knowledge, and parents' H1N1 vaccination of their children. *Vaccine*. 2013;31(42):4860-4866. doi:10.1016/j.vaccine.2013.07.068

125. Santini ZI, Pisinger V, Nielsen L, et al. Social Disconnectedness, Loneliness, and Mental Health Among Adolescents in Danish High Schools: A Nationwide Cross-Sectional Study. *Front Behav Neurosci*. 2021;15. doi:10.3389/fnbeh.2021.632906

126. McPherson KE, Kerr S, McGee E, et al. The association between social capital and mental health and behavioural problems in children and adolescents: an integrative systematic review. *BMC Psychol*. 2014;2(1):7. doi:10.1186/2050-7283-2-7

127. Institute for Social Research. *Panel Study of Income Dynamics, Transition into Adulthood Supplement 2019: User Guide*.; 2021. Accessed November 9, 2023. https://psidonline.isr.umich.edu/cds/TAS19_UserGuide.pdf

128. The Institute for Social Research. *The Panel Study of Income Dynamics Child Development Supplement User Guide for CDS-III*. University of Michigan; 2012. Accessed November 9, 2023. https://psidonline.isr.umich.edu/cds/cdsiii_userGd.pdf

129. Bradley RH, Caldwell BM. The HOME Inventory and family demographics. *Dev Psychol*. 1984;20(2):315-320. doi:10.1037/0012-1649.20.2.315

130. Baker PC, Others A. *NLSY Child Handbook: A Guide to the 1986-1990 National Longitudinal Survey of Youth Child Data. Revised Edition*. Center for Human Resource

Research, Ohio State University, 921 Chatham Lane, Suite 200, Columbus, OH 43221 (free).; 1993.

131. The Institute for Social Research. *The Panel Study of Income Dynamics Child Development Supplement User Guide for CDS-II*. University of Michigan; 2010. Accessed November 9, 2023. https://psidonline.isr.umich.edu/cds/cdsii_userGd.pdf

132. KESSLER RC, ANDREWS G, COLPE LJ, et al. Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med*. 2002;32(6):959-976. doi:10.1017/S0033291702006074

133. Kessler RC, Green JG, Gruber MJ, et al. Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. *Int J Methods Psychiatr Res*. 2010;19(S1):4-22. doi:10.1002/mpr.310

134. Prochaska JJ, Sung HY, Max W, Shi Y, Ong M. Validity study of the K6 scale as a measure of moderate mental distress based on mental health treatment need and utilization. *Int J Methods Psychiatr Res*. 2012;21(2):88-97. doi:10.1002/mpr.1349

135. Bombak AE. Self-Rated Health and Public Health: A Critical Perspective. *Front Public Health*. 2013;1. doi:10.3389/fpubh.2013.00015

136. Keyes CLM, Wissing M, Potgieter JP, Temane M, Kruger A, van Rooy S. Evaluation of the mental health continuum–short form (MHC–SF) in setswana-speaking South Africans. *Clin Psychol Psychother*. 2008;15(3):181-192. doi:10.1002/cpp.572

137. Masten AS. Resilience in developing systems: Progress and promise as the fourth wave rises. *Dev Psychopathol*. 2007;19(3):921-930. doi:10.1017/S0954579407000442

138. Sanders J, Munford R, Liebenberg L, Ungar M. Peer paradox: the tensions that peer relationships raise for vulnerable youth. *Child Fam Soc Work*. 2017;22(1):3-14. doi:10.1111/cfs.12188

139. Wilkinson RB. The Role of Parental and Peer Attachment in the Psychological Health and Self-Esteem of Adolescents. *J Youth Adolesc*. 2004;33(6):479-493. doi:10.1023/B:JOYO.0000048063.59425.20

140. Farineau HM, Stevenson Wojciak A, McWey LM. You matter to me: important relationships and self-esteem of adolescents in foster care. *Child Fam Soc Work*. 2013;18(2):129-138. doi:10.1111/j.1365-2206.2011.00808.x

141. Theokas C, Lerner RM. Observed Ecological Assets in Families, Schools, and Neighborhoods: Conceptualization, Measurement, and Relations With Positive and Negative Developmental Outcomes. *Appl Dev Sci*. 2006;10(2):61-74. doi:10.1207/s1532480xads1002_2

142. Shackleton N, Jamal F, Viner RM, Dickson K, Patton G, Bonell C. School-Based Interventions Going Beyond Health Education to Promote Adolescent Health: Systematic Review of Reviews. *J Adolesc Health*. 2016;58(4):382-396. doi:10.1016/j.jadohealth.2015.12.017

143. Payton JW, Wardlaw DM, Graczyk PA, Bloodworth MR, Tompsett CJ, Weissberg RP. Social and Emotional Learning: A Framework for Promoting Mental Health and Reducing Risk Behavior in Children and Youth. *J Sch Health*. 2000;70(5):179-185. doi:10.1111/j.1746-1561.2000.tb06468.x

144. Kimber B, Sandell R, Bremberg S. Social and emotional training in Swedish classrooms for the promotion of mental health: results from an effectiveness study in Sweden. *Health Promot Int*. 2008;23(2):134-143. doi:10.1093/heapro/dam046

145. Bobek D, Zaff J, Li Y, Lerner RM. Cognitive, emotional, and behavioral components of civic action: Towards an integrated measure of civic engagement. *J Appl Dev Psychol*. 2009;30(5):615-627. doi:10.1016/j.appdev.2009.07.005

146. Hogan MJ, Parker JDA, Wiener J, Watters C, Wood LM, Oke A. Academic success in adolescence: Relationships among verbal IQ, social support and emotional intelligence. *Aust J Psychol*. 2010;62(1):30-41. doi:10.1080/00049530903312881

147. Berlan ED, Bravender T. Confidentiality, consent, and caring for the adolescent patient. *Curr Opin Pediatr*. 2009;21(4):450. doi:10.1097/MOP.0b013e32832ce009

148. Ford CA. Influence of Physician Confidentiality Assurances on Adolescents' Willingness to Disclose Information and Seek Future Health Care. *JAMA*. 1997;278(12):1029. doi:10.1001/jama.1997.03550120089044

149. Lehrer JA, Pantell R, Tebb K, Shafer MA. Forgone Health Care among U.S. Adolescents: Associations between Risk Characteristics and Confidentiality Concern. *J Adolesc Health*. 2007;40(3):218-226. doi:10.1016/j.jadohealth.2006.09.015

150. Cates CB, Weisleder A, Mendelsohn AL. Mitigating the Effects of Family Poverty on Early Child Development through Parenting Interventions in Primary Care. *Acad Pediatr*. 2016;16(3):S112-S120. doi:10.1016/j.acap.2015.12.015

151. Perrin EC, Sheldrick RC, McMenamy JM, Henson BS, Carter AS. Improving Parenting Skills for Families of Young Children in Pediatric Settings. *JAMA Pediatr*. 2014;168(1):16. doi:10.1001/jamapediatrics.2013.2919

152. de Graaf I, Speetjens P, Smit F, de Wolff M, Tavecchio L. Effectiveness of the Triple P Positive Parenting Program on Parenting: A Meta-Analysis. *Fam Relat*. 2008;57(5):553-566. doi:10.1111/j.1741-3729.2008.00522.x

153. Mendelsohn AL, Huberman HS, Berkule SB, Brockmeyer CA, Morrow LM, Dreyer BP. Primary Care Strategies for Promoting Parent-Child Interactions and School Readiness in At-Risk Families. *Arch Pediatr Adolesc Med*. 2011;165(1). doi:10.1001/archpediatrics.2010.254

154. Gitterman BA, Flanagan PJ, Cotton WH, et al. Poverty and Child Health in the United States. *Pediatrics*. 2016;137(4). doi:10.1542/peds.2016-0339

155. Vasan A, Kenyon CC, Palakshappa D. Differences in Pediatric Residents' Social Needs Screening Practices Across Health Care Settings. *Hosp Pediatr*. 2020;10(5):443-446. doi:10.1542/hpeds.2019-0286

156. Jefferies P, McGarrigle L, Ungar M. The CYRM-R: A Rasch-Validated Revision of the Child and Youth Resilience Measure. *J Evid-Based Soc Work*. 2019;16(1):70-92. doi:10.1080/23761407.2018.1548403

157. Martinez RR, Gavin Williams R, Green J. The Role of School Counselors Delivering a Trauma-Informed Care Approach to Supporting Youth in Foster Care. *Prof Sch Couns*. 2019;23(1):2156759X2094774. doi:10.1177/2156759X20947747

158. Rumsey A, Milsom A. Supporting School Engagement and High School Completion Through Trauma-Informed School Counseling - Amanda D. Rumsey, Amy Milsom, 2018. *Prof Sch Couns*. 2018;22(1). Accessed November 4, 2023. https://journals.sagepub.com/doi/10.1177/2156759X19867254

159. Donohue P, Goodman-Scott E, Jennifer BB. Using Universal Screening for Early Identification of Students at Risk: A Case Example from the Field. *Prof Sch Couns*. 2015;19(1):1096-2409-19.1. doi:10.5330/1096-2409-19.1.133

160. Foy JM, Perrin J. Enhancing Pediatric Mental Health Care: Strategies for Preparing a Community. *Pediatrics*. 2010;125(Supplement_3):S75-S86. doi:10.1542/peds.2010-0788D

161. Jensen PS, Goldman E, Offord D, et al. Overlooked and Underserved: "Action Signs" for Identifying Children With Unmet Mental Health Needs. *Pediatrics*. 2011;128(5):970-979. doi:10.1542/peds.2009-0367

162. Bains RM, Diallo AF. Mental Health Services in School-Based Health Centers. *J Sch Nurs*. 2016;32(1):8-19. doi:10.1177/1059840515590607

163. Twenge JM, Martin GN, Spitzberg BH. Trends in U.S. Adolescents' media use, 1976–2016: The rise of digital media, the decline of TV, and the (near) demise of print. *Psychol Pop Media Cult*. 2019;8(4):329-345. doi:10.1037/ppm0000203

164. Anderson M, Jiang J. *Teens, Social Media, & Technology 2018*. Pew Research Center Accessed November 9, 2023. https://www.pewinternet.org/wp-content/uploads/sites/9/2018/05/PI_2018.05.31_TeensTech_FINAL.pdf

165. Lu W. Adolescent Depression: National Trends, Risk Factors, and Healthcare Disparities. *Am J Health Behav*. 2019;43(1):181-194. doi:10.5993/AJHB.43.1.15

166. Leeb RT. Mental Health–Related Emergency Department Visits Among Children Aged 18 Years During the COVID-19 Pandemic — United States, January 1–October 17, 2020. *MMWR Morb Mortal Wkly Rep*. 2020;69. doi:10.15585/mmwr.mm6945a3

167. Whitney DG, Peterson MD. US National and State-Level Prevalence of Mental Health Disorders and Disparities of Mental Health Care Use in Children. *JAMA Pediatr*. 2019;173(4):389. doi:10.1001/jamapediatrics.2018.5399

168. Office of the Surgeon General. *Protecting Youth Mental Health: The US Surgeon General's Advisory*.; 2021.

169. U.S. Surgeon General Office. *Social Media and Youth Mental Health*. Office of the Surgeon General; 2023. https://www.hhs.gov/sites/default/files/sg-youth-mental-health-social-media-advisory.pdf

170. *Health Advisory on Social Media Use in Adolescence*. American Psychological Association; 2023. https://www.apa.org/topics/social-media-internet/health-advisory-adolescent-social-media-use.pdf

171. George MJ, Jensen MR, Russell MA, et al. Young Adolescents' Digital Technology Use, Perceived Impairments, and Well-Being in a Representative Sample. *J Pediatr*. 2020;219:180-187. doi:10.1016/j.jpeds.2019.12.002

172. Subcommittee: Protecting Kids Online: Testimony from a Facebook Whistleblower. Published online October 5, 2021. Accessed November 10, 2023. https://www.commerce.senate.gov/2021/10/protecting kids online: testimony from a facebook whistleblower

173. *The California Age-Appropriate Design Code Act.*; 2023. Accessed November 10, 2023. https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202120220AB2273

174. McKell MK, Teuscher JD. *SOCIAL MEDIA REGULATION AMENDMENTS*. Accessed November 10, 2023. https://le.utah.gov/~2023/bills/static/SB0152.html

175. Vance S. *Ban TikTok in Montana Act.*; 2023. Accessed November 10, 2023. https://leg.mt.gov/bills/2023/billhtml/SB0419.htm

176. Odgers CL, Jensen MR. Annual Research Review: Adolescent mental health in the digital age: facts, fears, and future directions. *J Child Psychol Psychiatry*. 2020;61(3):336-348. doi:10.1111/jcpp.13190

177. McCrae N, Gettings S, Purssell E. Social Media and Depressive Symptoms in Childhood and Adolescence: A Systematic Review. *Adolesc Res Rev*. 2017;2(4):315-330. doi:10.1007/s40894-017-0053-4

178. Primack BA, Swanier B, Georgiopoulos AM, Land SR, Fine MJ. Association Between Media Use in Adolescence and Depression in Young Adulthood. *Arch Gen Psychiatry*. 2009;66(2):181. doi:10.1001/archgenpsychiatry.2008.532

179. Toseeb U, Inkster B. Online Social Networking Sites and Mental Health Research. *Front Psychiatry*. 2015;6. doi:10.3389/fpsyt.2015.00036

180. Galica VL, Vannucci A, Flannery KM, Ohannessian CM. Social Media Use and Conduct Problems in Emerging Adults. *Cyberpsychology Behav Soc Netw*. 2017;20(7):448-452. doi:10.1089/cyber.2017.0068

181. Ra CK, Cho J, Stone MD, et al. Association of Digital Media Use With Subsequent Symptoms of Attention-Deficit/Hyperactivity Disorder Among Adolescents. *JAMA*. 2018;320(3):255. doi:10.1001/jama.2018.8931

182. Huang C. A meta-analysis of the problematic social media use and mental health. *Int J Soc Psychiatry*. 2022;68(1):12-33. doi:10.1177/0020764020978434

183. Wang P, Wang X, Wu Y, et al. Social networking sites addiction and adolescent depression: A moderated mediation model of rumination and self-esteem. *Personal Individ Differ*. 2018;127:162-167. doi:10.1016/j.paid.2018.02.008

184. Griffiths MD, Kuss DJ, Demetrovics Z. Chapter 6 - Social Networking Addiction: An Overview of Preliminary Findings. In: Rosenberg KP, Feder LC, eds. *Behavioral Addictions*. Academic Press; 2014:119-141. doi:10.1016/B978-0-12-407724-9.00006-9

185. Lup K, Trub L, Rosenthal L. Instagram #Instasad?: Exploring Associations Among Instagram Use, Depressive Symptoms, Negative Social Comparison, and Strangers Followed. *Cyberpsychology Behav Soc Netw*. 2015;18(5):247-252. doi:10.1089/cyber.2014.0560

186. de Vries DA, Möller AM, Wieringa MS, Eigenraam AW, Hamelink K. Social Comparison as the Thief of Joy: Emotional Consequences of Viewing Strangers' Instagram Posts. *Media Psychol*. 2018;21(2):222-245. doi:10.1080/15213269.2016.1267647

187. Yang C chen. Instagram Use, Loneliness, and Social Comparison Orientation: Interact and Browse on Social Media, But Don't Compare. *Cyberpsychology Behav Soc Netw*. 2016;19(12):703-708. doi:10.1089/cyber.2016.0201

188. Thorisdottir IE, Sigurvinsdottir R, Asgeirsdottir BB, Allegrante JP, Sigfusdottir ID. Active and Passive Social Media Use and Symptoms of Anxiety and Depressed Mood Among Icelandic Adolescents. *Cyberpsychology Behav Soc Netw*. 2019;22(8):535-542. doi:10.1089/cyber.2019.0079

189. Heffer T, Good M, Daly O, MacDonell E, Willoughby T. The Longitudinal Association Between Social-Media Use and Depressive Symptoms Among Adolescents and Young Adults: An Empirical Reply to Twenge et al. (2018). *Clin Psychol Sci*. 2019;7(3):462-470. doi:10.1177/2167702618812727

190. Kreski N, Platt J, Rutherford C, et al. Social Media Use and Depressive Symptoms Among United States Adolescents. *J Adolesc Health*. 2021;68(3):572-579. doi:10.1016/j.jadohealth.2020.07.006

191. Orben A, Dienlin T, Przybylski AK. Social media's enduring effect on adolescent life satisfaction. *Proc Natl Acad Sci*. 2019;116(21):10226-10228. doi:10.1073/pnas.1902058116

192. Twenge JM, Joiner TE, Rogers ML, Martin GN. Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time. *Clin Psychol Sci*. 2018;6(1):3-17. doi:10.1177/2167702617723376

193. Pasquini G, Keeter S. At least four-in-ten U.S. adults have faced high levels of psychological distress during COVID-19 pandemic. Pew Research Center. Published December 12, 2022. Accessed November 10, 2023. https://www.pewresearch.org/short-reads/2022/12/12/at-least-four-in-ten-u-s-adults-have-faced-high-levels-of-psychological-distress-during-covid-19-pandemic/

194. Lenhart A. *Teens, Social Media & Technology Overview 2015*. Pew Research Center; 2015. Accessed November 10, 2023. https://policycommons.net/artifacts/619187/teens-social-media-technology-overview-2015/1600266/

195. Azhari A, Toms Z, Pavlopoulou G, Esposito G, Dimitriou D. Social media use in female adolescents: Associations with anxiety, loneliness, and sleep disturbances. *Acta Psychol (Amst)*. 2022;229:103706. doi:10.1016/j.actpsy.2022.103706

196. Hamm MP, Newton AS, Chisholm A, et al. Prevalence and Effect of Cyberbullying on Children and Young People: A Scoping Review of Social Media Studies. *JAMA Pediatr*. 2015;169(8):770-777. doi:10.1001/jamapediatrics.2015.0944

197. Valkenburg PM, Meier A, Beyens I. Social media use and its impact on adolescent mental health: An umbrella review of the evidence. *Curr Opin Psychol*. 2022;44:58-68. doi:10.1016/j.copsyc.2021.08.017

198. Ybarra ML, Mitchell KJ, Palmer NA, Reisner SL. Online social support as a buffer against online and offline peer and sexual victimization among U.S. LGBT and non-LGBT youth. *Child Abuse Negl*. 2015;39:123-136. doi:10.1016/j.chiabu.2014.08.006

199. Naslund JA, Bondre A, Torous J, Aschbrenner KA. Social Media and Mental Health: Benefits, Risks, and Opportunities for Research and Practice. *J Technol Behav Sci*. 2020;5(3):245-257. doi:10.1007/s41347-020-00134-x

200. Hair EC, Moore KA, Garrett SB, Ling T, Cleveland K. The Continued Importance of Quality Parent–Adolescent Relationships During Late Adolescence. *J Res Adolesc*. 2008;18(1):187-200. doi:10.1111/j.1532-7795.2008.00556.x

201. Aquilino WS. From Adolescent to Young Adult: A Prospective Study of Parent-Child Relations during the Transition to Adulthood. *J Marriage Fam*. 1997;59(3):670. doi:10.2307/353953

202. Narr RK, Allen JP, Tan JS, Loeb EL. Close Friendship Strength and Broader Peer Group Desirability as Differential Predictors of Adult Mental Health. *Child Dev*. 2019;90(1):298-313. doi:10.1111/cdev.12905

203. Espinoza G, Hernandez HL. Adolescent loneliness, stress and depressive symptoms during the <scp>COVID</scp> -19 pandemic: The protective role of friends. *Infant Child Dev*. 2022;31(3). doi:10.1002/icd.2305

204. K. Holt M, L. Espelage D. Perceived Social Support among Bullies, Victims, and Bully-Victims. *J Youth Adolesc*. 2007;36(8):984-994. doi:10.1007/s10964-006-9153-3

205. Wei HS, Jonson-Reid M. Friends can hurt you: Examining the coexistence of friendship and bullying among early adolescents. *Sch Psychol Int*. 2011;32(3):244-262. doi:10.1177/0143034311402310

206. Olenik-Shemesh D, Heiman T. Cyberbullying Victimization in Adolescents as Related to Body Esteem, Social Support, and Social Self-Efficacy. *J Genet Psychol*. 2017;178(1):28-43. doi:10.1080/00221325.2016.1195331

207. Haslam C, Cruwys T, Haslam SA, Jetten J. Social Connectedness and Health. In: Pachana NA, ed. *Encyclopedia of Geropsychology*. Springer; 2015:1-10. doi:10.1007/978-981-287-080-3_46-1

208. Whitley R, McKenzie K. Social Capital and Psychiatry: Review of the Literature. *Harv Rev Psychiatry*. 2005;13(2):71-84. doi:10.1080/10673220590956474

209. Raiziene S, Erentaite R, Pakalniskiene V, Grigutyte N, Crocetti E. Identity Formation Patterns and Online Activities in Adolescence. *Identity*. 2022;22(2):150-165. doi:10.1080/15283488.2021.1960839

210. Sebre SB, Miltuze A. Digital Media as a Medium for Adolescent Identity Development. *Technol Knowl Learn*. 2021;26(4):867-881. doi:10.1007/s10758-021-09499-1

211. Guo J, Chen HT. How does political engagement on social media impact psychological well-being? Examining the mediating role of social capital and perceived social support. *Comput Hum Behav*. 2022;133:107248. doi:10.1016/j.chb.2022.107248

212. Twenge JM. Does Online Social Media Lead to Social Connection or Social Disconnection? *J Coll Character*. 2013;14(1):11-20. doi:10.1515/jcc-2013-0003

213. Marciano L, Ostroumova M, Schulz PJ, Camerini AL. Digital Media Use and Adolescents' Mental Health During the Covid-19 Pandemic: A Systematic Review and Meta-Analysis. *Front Public Health*. 2021;9. doi:10.3389/fpubh.2021.793868

214. Berryman C, Ferguson CJ, Negy C. Social Media Use and Mental Health among Young Adults. *Psychiatr Q*. 2018;89(2):307-314. doi:10.1007/s11126-017-9535-6

215. Coyne SM, Rogers AA, Zurcher JD, Stockdale L, Booth M. Does time spent using social media impact mental health?: An eight year longitudinal study. *Comput Hum Behav*. 2020;104:106160. doi:10.1016/j.chb.2019.106160

216. Tighe LA, Birditt KS, Turkelson AE, Sastry N. Under my skin: Parenting behavior and children's cortisol in the Los Angeles family and neighborhood survey. *Dev Psychobiol*. 2022;64(4). doi:10.1002/dev.22263

217. Owen DJ, Slep AMS, Heyman RE. The Effect of Praise, Positive Nonverbal Response, Reprimand, and Negative Nonverbal Response on Child Compliance: A Systematic Review. *Clin Child Fam Psychol Rev*. 2012;15(4):364-385. doi:10.1007/s10567-012-0120-0

218. Levenson JC, Shensa A, Sidani JE, Colditz JB, Primack BA. The association between social media use and sleep disturbance among young adults. *Prev Med*. 2016;85:36-41. doi:10.1016/j.ypmed.2016.01.001

219. Scott H, Woods HC. Understanding Links Between Social Media Use, Sleep and Mental Health: Recent Progress and Current Challenges. *Curr Sleep Med Rep*. 2019;5(3):141-149. doi:10.1007/s40675-019-00148-9

220. Mikkelsen K, Stojanovska L, Polenakovic M, Bosevski M, Apostolopoulos V. Exercise and mental health. *Maturitas*. 2017;106:48-56. doi:10.1016/j.maturitas.2017.09.003

221. Nota MHC, Nicolas S, O'Leary OF, Nolan YM. Outrunning a bad diet: Interactions between exercise and a Western-style diet for adolescent mental health, metabolism and microbes. *Neurosci Biobehav Rev*. 2023;149:105147. doi:10.1016/j.neubiorev.2023.105147

222. Jacka FN, Berk M. Depression, diet and exercise. *Med J Aust*. 2013;199(S6). doi:10.5694/mja12.10508

223. Institute for Social Research. Panel Study of Income Dynamics Child Development Supplement. Published online 2019. Accessed November 10, 2023. https://simba.isr.umich.edu/CDS/default.aspx

224. Bevans KB, Forrest CB. The reliability and validity of children's and adolescents' self-reported health. In: *Economic Evaluation in Child Health*. Oxford University PressOxford; 2009:33-54. doi:10.1093/acprof:oso/9780199547494.003.02

225. Cairns RB, Leung MC, Buchanan L, Cairns BD. Friendships and Social Networks in Childhood and Adolescence: Fluidity, Reliability, and Interrelations. *Child Dev*. 1995;66(5):1330-1345. doi:10.1111/j.1467-8624.1995.tb00938.x

226. Kovacs M. Rating scales to assess depression in school-aged children. *Acta Paedopsychiatr Int J Child Adolesc Psychiatry*. 1981;46(5-6):305-315.

227. Kovacs M. *Children's Depression Inventory (CDI): Technical Manual Update*. Multi-Health Systems, Inc.; 2003.

228. SHEMESH E, YEHUDA R, ROCKMORE L, et al. Assessment of Depression in Medically Ill Children Presenting to Pediatric Specialty Clinics. *J Am Acad Child Adolesc Psychiatry*. 2005;44(12):1249-1257. doi:10.1097/01.chi.0000181043.29208.a2

229. Sun S, Wang S. The Children's Depression Inventory in Worldwide Child Development Research: A Reliability Generalization Study. *J Child Fam Stud*. 2015;24(8):2352-2363. doi:10.1007/s10826-014-0038-x

230. Kovacs M, Devlin B. Internalizing Disorders in Childhood. *J Child Psychol Psychiatry*. 1998;39(1):S0021963097001765. doi:10.1017/S0021963097001765

231. Saylor CF, Finch AJ, Spirito A, Bennett B. The Children's Depression Inventory: A systematic evaluation of psychometric properties. *J Consult Clin Psychol*. 1984;52(6):955-967. doi:10.1037/0022-006X.52.6.955

232. Carey MP, Faulstich ME, Gresham FM, Ruggiero L, Enyart P. Children's Depression Inventory: Construct and discriminant validity across clinical and nonreferred (control) populations. *J Consult Clin Psychol*. 1987;55(5):755-761. doi:10.1037/0022-006X.55.5.755

233. Wang JL, Gaskin J, Wang HZ, Liu D. Life satisfaction moderates the associations between motives and excessive social networking site usage. *Addict Res Theory*. 2016;24(6):450-457. doi:10.3109/16066359.2016.1160283

234. Peterson JL, Zill N. Marital Disruption, Parent-Child Relationships, and Behavior Problems in Children. *J Marriage Fam*. 1986;48(2):295. doi:10.2307/352397

235. Meshi D, Ellithorpe ME. Problematic social media use and social support received in real-life versus on social media: Associations with depression, anxiety and social isolation. *Addict Behav*. 2021;119:106949. doi:10.1016/j.addbeh.2021.106949

236. Jo S, Jang MY. Concept analysis of adolescent use of social media for emotional well-being. *Int J Nurs Pract*. 2023;29(1). doi:10.1111/ijn.13116

237. Ivie EJ, Pettitt A, Moses LJ, Allen NB. A meta-analysis of the association between adolescent social media use and depressive symptoms. *J Affect Disord*. 2020;275:165-174. doi:10.1016/j.jad.2020.06.014

238. Craig W, Boniel-Nissim M, King N, et al. Social Media Use and Cyber-Bullying: A Cross-National Analysis of Young People in 42 Countries. *J Adolesc Health*. 2020;66(6):S100-S108. doi:10.1016/j.jadohealth.2020.03.006

239. Winstone L, Mars B, Haworth CMA, Heron J, Kidger J. Adolescent social media user types and their mental health and well-being: Results from a longitudinal survey of 13–14-year-olds in the United Kingdom. *JCPP Adv*. 2022;2(2). doi:10.1002/jcv2.12071

240. Nick EA, Kilic Z, Nesi J, Telzer EH, Lindquist KA, Prinstein MJ. Adolescent Digital Stress: Frequencies, Correlates, and Longitudinal Association With Depressive Symptoms. *J Adolesc Health*. 2022;70(2):336-339. doi:10.1016/j.jadohealth.2021.08.025

241. Raudsepp L, Kais K. Longitudinal associations between problematic social media use and depressive symptoms in adolescent girls. *Prev Med Rep*. 2019;15:100925. doi:10.1016/j.pmedr.2019.100925

242. Valentine L, McEnery C, D'Alfonso S, Phillips J, Bailey E, Alvarez-Jimenez M. Harnessing the Potential of Social Media to Develop the Next Generation of Digital Health Treatments in Youth Mental Health. *Curr Treat Options Psychiatry*. 2019;6(4):325-336. doi:10.1007/s40501-019-00184-w

243. National Center for Education Statistics. *College Enrollment Rates*. U.S. Department of Education Accessed August 22, 2022. https://nces.ed.gov/programs/coe/indicator/cpb/college-enrollment-rate

244. Chrikov I, Soria KM, Horgos B, Jones-White D. *Undergraduate and Graduate Students' Mental Health During the COVID-19 Pandemic*. SERU Consortium, University of California - Berkeley and University of Minnesota.; 2020. Accessed November 4, 2023. http://conservancy.umn.edu/handle/11299/215271

245. Eisenberg D, Lipson SK, Zhou S. The Healthy Minds Study, 2022-2023 Data Report. Published online 2023. https://healthymindsnetwork.org/wp-content/uploads/2023/08/HMS_National-Report-2022-2023_full.pdf

246. Casey SM, Varela A, Marriott JP, Coleman CM, Harlow BL. The influence of diagnosed mental health conditions and symptoms of depression and/or anxiety on suicide ideation, plan, and attempt among college students: Findings from the Healthy Minds Study, 2018–2019. *J Affect Disord*. 2022;298:464-471. doi:10.1016/j.jad.2021.11.006

247. Lipson SK, Sonneville KR. Understanding suicide risk and eating disorders in college student populations: Results from a National Study. *Int J Eat Disord*. 2020;53(2):229-238. doi:10.1002/eat.23188

248. Center for Collegiate Mental Health (CCMH). *2020 Annual Report*. Penn State University; 2021. https://ccmh.psu.edu/assets/docs/2020%20CCMH%20Annual%20Report.pdf

249. Xiao H, Carney DM, Youn SJ, et al. Are we in crisis? National mental health and treatment trends in college counseling centers. *Psychol Serv*. 2017;14(4):407-415. doi:10.1037/ser0000130

250. Center for Collegiate Mental Health. *2021 Annual Report*. Penn State University; 2022. Accessed November 10, 2023. https://ccmh.psu.edu/assets/docs/2021-CCMH-Annual-Report.pdf

251. Fitzsimmons-Craft EE, Karam AM, Monterubio GE, Taylor CB, Wilfley DE. Screening for Eating Disorders on College Campuses: a Review of the Recent Literature. *Curr Psychiatry Rep*. 2019;21(10):101. doi:10.1007/s11920-019-1093-1

252. Andersen RM. Revisiting the Behavioral Model and Access to Medical Care: Does it Matter? *J Health Soc Behav*. 1995;36(1):1-10. doi:10.2307/2137284

253. Garlow SJ, Rosenberg J, Moore JD, et al. Depression, desperation, and suicidal ideation in college students: results from the American Foundation for Suicide Prevention College Screening Project at Emory University. *Depress Anxiety*. 2008;25(6):482-488. doi:10.1002/da.20321

254. Horwitz AG, McGuire T, Busby DR, et al. Sociodemographic differences in barriers to mental health care among college students at elevated suicide risk. *J Affect Disord*. 2020;271:123-130. doi:10.1016/j.jad.2020.03.115

255. Eisenberg D, Hunt J, Speer N. Help Seeking for Mental Health on College Campuses: Review of Evidence and Next Steps for Research and Practice. *Harv Rev Psychiatry*. 2012;20(4):222-232. doi:10.3109/10673229.2012.712839

256. Pace K, Silk K, Nazione S, Fournier L, Collins-Eaglin J. Promoting Mental Health Help-Seeking Behavior Among First-Year College Students. *Health Commun*. 2018;33(2):102-110. doi:10.1080/10410236.2016.1250065

257. Hefner J, Eisenberg D. Social support and mental health among college students. *Am J Orthopsychiatry*. 2009;79(4):491-499. doi:10.1037/a0016918

258. Sripada RK, Bohnert ASB, Teo AR, et al. Social networks, mental health problems, and mental health service utilization in OEF/OIF National Guard veterans. *Soc Psychiatry Psychiatr Epidemiol*. 2015;50(9):1367-1378. doi:10.1007/s00127-015-1078-2

259. Loades ME, Chatburn E, Higson-Sweeney N, et al. Rapid Systematic Review: The Impact of Social Isolation and Loneliness on the Mental Health of Children and Adolescents in the Context of COVID-19. *J Am Acad Child Adolesc Psychiatry*. 2020;59(11):1218-1239.e3. doi:10.1016/j.jaac.2020.05.009

260. Wang J, Lloyd-Evans B, Giacco D, et al. Social isolation in mental health: a conceptual and methodological review. *Soc Psychiatry Psychiatr Epidemiol*. 2017;52(12):1451-1461. doi:10.1007/s00127-017-1446-1

261. Counte MA, Glandon GL. A Panel Study of Life Stress, Social Support, and the Health Services Utilization of Older Persons. *Med Care*. 1991;29(4):348-361.

262. Sherbourne CD. The role of social support and life stress events in use of mental health services. *Soc Sci Med*. 1988;27(12):1393-1400. doi:10.1016/0277-9536(88)90205-5

263. Maulik PK, Eaton WW, Bradshaw CP. The Effect of Social Networks and Social Support on Mental Health Services Use, Following a Life Event, among the Baltimore Epidemiologic Catchment Area Cohort. *J Behav Health Serv Res*. 2011;38(1):29-50. doi:10.1007/s11414-009-9205-z

264. Thoits PA. Perceived Social Support and the Voluntary, Mixed, or Pressured Use of Mental Health Services. *Soc Ment Health*. 2011;1(1):4-19. doi:10.1177/2156869310392793

265. Graham A, Hasking P, Brooker J, Clarke D, Meadows G. Mental health service use among those with depression: an exploration using Andersen's Behavioral Model of Health Service Use. *J Affect Disord*. 2017;208:170-176. doi:10.1016/j.jad.2016.08.074

266. Fortin M, Bamvita JM, Fleury MJ. Patient satisfaction with mental health services based on Andersen's Behavioral Model. *Can J Psychiatry*. 2018;63(2):103-114. doi:10.1177/0706743717737030

267. Wells KB, Sturm R, Burnam A. National Survey of Alcohol, Drug, and Mental Health Problems [Healthcare for Communities] 2000-2001. Published online 2005.

268. Spitzer RL, Kroenke K, Williams JBW, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder. *Arch Intern Med*. 2006;166(10):1092. doi:10.1001/archinte.166.10.1092

269. Plummer F, Manea L, Trepel D, McMillan D. Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic metaanalysis. *Gen Hosp Psychiatry*. 2016;39:24-31. doi:10.1016/j.genhosppsych.2015.11.005

270. Sriken J, Johnsen ST, Smith H, Sherman MF, Erford BT. Testing the Factorial Validity and Measurement Invariance of College Student Scores on the Generalized Anxiety Disorder (GAD-7) Scale Across Gender and Race. *Meas Eval Couns Dev*. 2022;55(1):1-16. doi:10.1080/07481756.2021.1902239

271. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9. *J Gen Intern Med*. 2001;16(9):606-613. doi:10.1046/j.1525-1497.2001.016009606.x

272. Sun Y, Fu Z, Bo Q, Mao Z, Ma X, Wang C. The reliability and validity of PHQ-9 in patients with major depressive disorder in psychiatric hospital. *BMC Psychiatry*. 2020;20(1):474. doi:10.1186/s12888-020-02885-6

273. Wittkampf KA, Naeije L, Schene AH, Huyser J, van Weert HC. Diagnostic accuracy of the mood module of the Patient Health Questionnaire: a systematic review. *Gen Hosp Psychiatry*. 2007;29(5):388-395. doi:10.1016/j.genhosppsych.2007.06.004

274. Gilbody S, Richards D, Brealey S, Hewitt C. Screening for Depression in Medical Settings with the Patient Health Questionnaire (PHQ): A Diagnostic Meta-Analysis. *J Gen Intern Med*. 2007;22(11):1596-1602. doi:10.1007/s11606-007-0333-y

275. Keum BT, Miller MJ, Inkelas KK. Testing the factor structure and measurement invariance of the PHQ-9 across racially diverse U.S. college students. *Psychol Assess*. 2018;30(8):1096-1106. doi:10.1037/pas0000550

276. Morgan JF, Reid F, Lacey JH. The SCOFF questionnaire: assessment of a new screening tool for eating disorders. *BMJ*. 1999;319(7223):1467-1468. doi:10.1136/bmj.319.7223.1467

277. Luck AJ, MorganLuck JF, Reid F, et al. The SCOFF questionnaire and clinical interview for eating disorders in general practice: comparative study. *BMJ*. 2002;325(7367):755-756. doi:10.1136/bmj.325.7367.755

278. Mond JM, Myers TC, Crosby RD, et al. Screening for eating disorders in primary care: EDE-Q versus SCOFF. *Behav Res Ther*. 2008;46(5):612-622. doi:10.1016/j.brat.2008.02.003

279. Maguen S, Hebenstreit C, Li Y, et al. Screen for Disordered Eating: Improving the accuracy of eating disorder screening in primary care. *Gen Hosp Psychiatry*. 2018;50:20-25. doi:10.1016/j.genhosppsych.2017.09.004

280. Sanchez-Armass O, Raffaelli M, Andrade FCD, et al. Validation of the SCOFF questionnaire for screening of eating disorders among Mexican university students. *Eat Weight Disord - Stud Anorex Bulim Obes*. 2017;22(1):153-160. doi:10.1007/s40519-016-0259-7

281. Parker SC, Lyons J, Bonner J. Eating Disorders in Graduate Students: Exploring the SCOFF Questionnaire as a Simple Screening Tool. *J Am Coll Health*. 2005;54(2):103-107. doi:10.3200/JACH.54.2.103-107

282. Gollust SE, Eisenberg D, Golberstein E. Prevalence and Correlates of Self-Injury Among University Students. *J Am Coll Health*. 2008;56(5):491-498. doi:10.3200/JACH.56.5.491-498

283. Whitlock J, Eckenrode J, Silverman D. Self-injurious Behaviors in a College Population. *Pediatrics*. 2006;117(6):1939-1948. doi:10.1542/peds.2005-2543

284. Ganson KT, Rodgers RF, Lipson SK, Cadet TJ, Putnam M. Eating Disorder Symptoms, Non-suicidal Self-injury, and Suicidal Behavior are Associated Among College Men. *Clin Soc Work J*. 2022;50(4):426-435. doi:10.1007/s10615-021-00831-x

285. Eisenberg D, Golberstein E, Gollust SE. Help-Seeking and Access to Mental Health Care in a University Student Population. *Med Care*. 2007;45(7):594-601.

286. Zivin K, Eisenberg D, Gollust SE, Golberstein E. Persistence of mental health problems and needs in a college student population. *J Affect Disord*. 2009;117(3):180-185. doi:10.1016/j.jad.2009.01.001

287. Hughes ME, Waite LJ, Hawkley LC, Cacioppo JT. A Short Scale for Measuring Loneliness in Large Surveys. *Res Aging*. 2004;26(6):655-672. doi:10.1177/0164027504268574

288. Lipson SK, Zhou S, Abelson S, et al. Trends in college student mental health and help-seeking by race/ethnicity: Findings from the national healthy minds study, 2013–2021. *J Affect Disord*. 2022;306:138-147. doi:10.1016/j.jad.2022.03.038

289. Cacioppo JT, Hawkley LC. Perceived social isolation and cognition. *Trends Cogn Sci*. 2009;13(10):447-454. doi:10.1016/j.tics.2009.06.005

290. Gopalan M, Linden-Carmichael A, Lanza S. College Students' Sense of Belonging and Mental Health Amidst the COVID-19 Pandemic. *J Adolesc Health*. 2022;70(2):228-233. doi:10.1016/j.jadohealth.2021.10.010

291. Ahorsu DK, Sánchez Vidaña DI, Lipardo D, et al. Effect of a peer-led intervention combining mental health promotion with coping-strategy-based workshops on mental health awareness, help-seeking behavior, and wellbeing among university students in Hong Kong. *Int J Ment Health Syst*. 2021;15(1):6. doi:10.1186/s13033-020-00432-0

292. Lattie E, Cohen KA, Winquist N, Mohr DC. Examining an App-Based Mental Health Self-Care Program, IntelliCare for College Students: Single-Arm Pilot Study. *JMIR Ment Health*. 2020;7(10):e21075. doi:10.2196/21075

293. Goozee R, Barrable A, Lubenko J, et al. Investigating the feasibility of MePlusMe, an online intervention to support mental health, well-being, and study skills in higher education students. *J Ment Health*. 2022;0(0):1-11. doi:10.1080/09638237.2022.2069699