ADVERSE CHILDHOOD EXPERIENCES AND CAREGIVER RELATIONSHIP QUALITY: RISK AND PROTECTIVE FACTORS AMONG EMERGING ADULTS FOR PRESCRIPTION PAIN RELIEVER MISUSE

by

MARIAM FATEHI

(Under the Direction of Orion Mowbray)

ABSTRACT

While it is well-established that prescription pain reliever misuse rates peak during emerging adulthood, there is limited understanding of how risk factors experienced during this developmental stage contribute to prescription pain reliever misuse. Additionally, there is limited understanding of underlying mechanisms that link childhood abuse experiences to prescription pain reliever misuse. Furthermore, no studies have examined the role of perceived adulthood status during emerging adulthood in prescription pain reliever misuse. The dissertation aims to address these gaps by proposing a conceptual model to investigate the risk and protective factors associated with the misuse of prescription pain relievers among emerging adults and adults. Data is from the National Longitudinal Study of Adolescent to Adult Health collected in five Waves from 1995-1996 to 2016-2018. Sample for this dissertation included all individuals who completed a survey at Wave 1, 3, and 5, exclusively those who responded about whether they had taken nonprescription pain relievers at Wave 5 (n = 9,950). This dissertation examined two developmental pathways for prescription pain

reliever misuse in emerging adulthood and in adulthood. Structural equation modeling was used to analyze the relationships between observed and latent variables within the conceptual model including six socio-demographic variables, fourteen observed variables, and the latent variable assessing the quality of the caregiver-adolescent relationship. The findings demonstrated that the protective role of the caregiver-child relationship does not end with adolescence but continues into emerging adulthood and significantly protects emerging adults from several risk factors for prescription pain reliever misuse. The results suggested the underlying mechanism that linked childhood abuse to the likelihood of prescription pain reliever misuse. This dissertation underscores when smoking and binge drinking are coupled with a perceived adulthood status during emerging adulthood, the risk for prescription pain reliever misuse is likely to increase. The dissertation can serve as a foundation for future research in the application of emerging adulthood theory constructs to explore the relationship between risk factors during this developmental phase and the misuse of prescription pain relievers later in adulthood. It also paves the way for further contribution to the understanding of the complex factors involved in prescription pain reliever misuse.

INDEX WORDS: Prescription pain reliever misuse, emerging adulthood, perceived adulthood status, adulthood, quality of caregiver-child relationship, sexual and physical childhood abuse, smoking, binge drinking

ADVERSE CHILDHOOD EXPERIENCES AND CAREGIVER RELATIONSHIP QUALITY: RISK AND PROTECTIVE FACTORS AMONG EMERGING ADULTS FOR PRESCRIPTION PAIN RELIEVER MISUSE

by

MARIAM FATEHI

BA, Azad University, Iran, 1995

MA, The Iran University of Medical Sciences, Iran, 2003

MSW, The University of Georgia, 2018

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

DOCTOR OF PHILOSOPHY

ATHENS, GEORGIA

2024

ADVERSE CHILDHOOD EXPERIENCES AND CAREGIVER RELATIONSHIP QUALITY: RISK AND PROTECTIVE FACTORS AMONG EMERGING ADULTS FOR PRESCRIPTION PAIN RELIEVER MISUSE

by

MARIAM FATEHI

Major Professor:	Orion P. Mowbray
Committee:	Rachel A. Fusco
	Michael A. Robinson

Electronic Version Approved:

Ron Walcott
Vice Provost for Graduate Education and Dean of the Graduate School
The University of Georgia
MAY 2024

ACKNOWLEDGEMENTS

My doctoral program was a valuable and enriching experience that became joyful and memorable and definitely easier as I was surrounded by intelligent, informed, experienced, witty, generous, and compassionate individuals. I am fortunate to have had these individuals around me, and I am grateful to each and every one of them for enriching my experience and helping me reach this level of success.

There are several persons who I would especially like to offer thanks. I am deeply grateful and indebted to my family for their unwavering love, affection, and continuous support. I would like to begin my acknowledgments by remembering my maternal grandmom, Behjat Lahijanian, who passed away a month before I began my doctoral program. She was a wise, lovely woman who loved reading books. The last time that I visited her in-person, she told me "Go to America and become a doctor." Mamanbozorg, I think of you always. I have completed my doctoral dissertation, and the day I become a doctor is coming soon.

I would like to thank my mother, Mahin Eshraghi. Maman, you taught me the importance of sincerity and empathy toward others. I appreciate you for always standing firmly by my side whenever I was striving for excellence. I would like to thank my father, Mostafa Fatehi, who has always been a symbol of perseverance and diligence for me. Baba, I've learned from you that success can be achieved through practice and dedication. Baba and Maman, thank you for fostering my pursuit of higher education, and always thinking of ways to meet my needs for my comfort and academic success. I am

deeply grateful and excited that despite all challenges, both of you are by my side today to celebrate this day together. It's a great honor for me.

I am immensely grateful for the support of my siblings, Omid, Alireza, and Leila, who are the people that I'm so comfortable with and who are always there for me during the happy and hard times of my life. How patient you all are when listening to me! Thank you to my older brother, Omid, who is my lifelong hero from childhood until now. He is someone who has gone above and beyond for my success and happiness. Omid, I sincerely appreciate your unwavering support, compassion, guidance, and wisdom. You taught me to think outside the box, to be determined and focused on my goals even when things get tough, and fight for success as a good player up to the last minutes of a game regardless of its result. Thank you for providing me with opportunities to live and delve into a larger world and for never giving up on me.

I would like to thank Alireza for always being my support in difficulties and guiding me in studying and progressing. I learned from him that with continuous practice and planning, I can also summit high mountains, such as Damavand. Alireza, thank you for normalizing my academic failures, always encouraging me to try again and refusing to let me give up when I was afraid of failing. I am grateful for your infinite kindness.

Thank my lovely and kind-hearted sister, Leila, who is my role model and most immediate support person. I learned from her to be courageous about having new experiences and breaking limitations to my progress. Leila, thank you for always bringing joy, happiness, love, and creative ideas with you. You always celebrated my successes and thoughtfully supported and empathized with me through my hardships. Most

importantly, thank you, for introducing me to the world of psychology and social work that formed my professional identity and attitude.

I would like to thank the chair of my committee, my mentor, and my professor, Dr. Orion Mowbray. Dear Dr. Mowbray, words cannot express my gratitude to you. From you, I learned how to be a skilled researcher and educator, and to trust myself and my abilities. However, your role over the past seven years of my advance graduate studies went far beyond that of an instructor and a mentor. Throughout all those years, your calm, confident, wise, and trustworthy presence beside me gave me enough confidence and tranquility to come face to face with my uncertainties and enjoy overcoming them. Your timely encouragements and compassions gave me the courage and strength to move forward. I truly felt that you genuinely care about my academic progress, emotional wellbeing, and adaptation to the social and academic culture of the United States. Your teaching philosophy is undeniably a sign of the nobility of your dignity, intelligence, sincerity, wisdom, and a testament to your independent and original mind. I believe that your humble presence during these years has deeply influenced my worldview and made me a better person, and for that, I am forever grateful to you. I am proud and honored to have been your student and completed my doctoral dissertation under your supervision. Influence by you, I hope to be a benefit for my future students, colleagues, and the field of social work.

I would like to acknowledge my dissertation committee members, Dr. Rachel Fusco and Dr. Michael Robinson, for all their assistance and guidance throughout the process of completing my dissertation. Their insights have greatly enriched my work.

I would also like to thank my good friend, Frank Rolinson, an Application Programmer Specialist, and my colleague at the UGA Graduate School. Over the past three years, he has been my best friend. The door of his office was always open to me, not only to address my daily technical problems but also to celebrate with me at every step I passed in my dissertation completion process. He questioned about my progress and was ready to reframe my concerns in a positive way. Frank, thank you! You have showed me the meaning of a true friendship, despite all of our individual differences.

I would like to extend my thanks to the faculty in the School of Social Work who have helped me to become a better scholar. I would also like to thank all of the staff at the School of Social Work and the University of Georgia who have helped me navigate structures and gain access to the University resources. I am also fortunate to have found good friends from the University of Georgia and other universities during these years. Thank you, my friends. Your encouraging words and advice, together with your companionship, have been a source of strength and joy throughout this transformative process.

And so, to you all, named and unnamed, “I can no other answer make but thanks, and thanks, and ever thanks” (William Shakespeare, *Twelfth Night*).

TABLE OF CONTENTS

Page

LIST OF TABLES

Page

LIST OF FIGURES

Page

CHAPTER 1

INTRODUCTION AND OVERVIEW

Introduction

Opioid Misuse Crisis in the United States

Before the United States Congress passed the Harrison Narcotics Tax Act in 1914, there was no regulation for the use or distribution of opioids in the country. People commonly used opiates to alleviate a broad range of physical pain from toothaches to diarrhea (Clarke, 2016). The Harrison Narcotics Tax Act (1914) was the first federal law in the United States (U.S.) that obligated narcotics manufacturers, sellers, distributors, and even physicians who prescribed opioids for medical purposes to register with the Bureau of Internal Revenue under the U.S. Treasury Department (Drug Enforcement Administration Museum, 2021). Many physicians were reluctant to prescribe narcotics, such as morphine, to treat pain due to their concern about addictive potential of the opioids (Jones et al., 2018). Some people who illicitly used opioids for either recreation, pain relief, or opioid dependency hid their use because addiction was associated with crime, resulted in a lack exact estimation of the prevalence of opioid misuse (Peachey, 1989).

However, by the late twentieth century, some studies questioned an "opiophobia[1]" attitude in contemporary literature and argued that the hesitation to prescribe

[1] John P. Morgan in 1985 applied the term "opiophobia" to describe an irrational and undocumented fear of using opioid for the treatment of severe pain in the American culture, which resisted rational exploration and adequate pain treatment (Morgan, 1985).

pharmaceutical opioids to treat chronic non-cancer pains resulted in inadequate treatment of patients. These arguments led to an exponential increase in prescriptions of opioid pain relievers as one of the primary modalities for treating chronic non-cancer pains (Jones et al., 2018). However, this prevalence of pharmaceutical opioids for treating pain in the U.S. in the mid-1990s had a significant impact on opioid dependency, resulting in a severe nationwide public health crisis that persisted for more than two decades (Lyden & Binswanger, 2019). Disturbingly, the rate of opioid-related hospitalizations in the U.S. saw a staggering 64% increase between 2005 and 2014 (Lyden & Binswanger, 2019). From 2003 to 2016, there was a noteworthy surge in opioid-related deaths, encompassing instances of suicide, homicide, legal interventions, and unintentional firearm use (Mowbray & Fatehi, 2020). In 2017, recognizing the gravity of the situation, the U.S. Department of Health and Human Services (DHHS) declared the opioid crisis a nationwide public health emergency.

Despite efforts to address the crisis, opioid overdoses continued to rise. In 2010, there were 21,089 opioid-related deaths, a number that climbed to 47,600 in 2017, and further spiked to 80,411 deaths in 2021. These figures accounted for approximately 75.4% of all drug overdose deaths in the country that year (Drug Overdose Death Rates, 2023). Consequently, there was an average of 188 deaths per day in the U.S. throughout 2021 due to opioid overdoses (Drug Overdose Death Rates, 2023).

According to recent data from the National Survey on Drug Use and Health (NSDUH), in 2022, approximately 8.9 million individuals aged 12 or older engaged in the misuse of opioids within the past year (Substance Abuse and Mental Health Services Administration [SAMHSA], 2023). Among this group, around 7.9 million individuals

(88.2%) exclusively misused prescription pain relievers, approximately 461,000 individuals (5.2%) exclusively used heroin, and roughly 587,000 individuals (6.6%) misused both prescription pain relievers and heroin (SAMHSA, 2023).

In 2022, SAMHSA reported that among emerging adults aged 18 to 25, there were 1.1 million individuals who misused opioids, making up 3.2% of their age group's population. For adults aged 26 and older, the number of opioid misusers was 7.4 million individuals, representing similarly 3.2% of that age group's population (SAMHSA, 2023). Moreover, a large majority of individuals who engaged in opioid misuse also had an opioid use disorder. In 2022, approximately 6.1 million Americans (2.2% of the population aged 12 or older) were diagnosed with an opioid use disorder. Among them, 5.4 million were aged 26 and older, and 424,000 individuals were aged 18 to 25 (SAMHSA, 2023).

The economic burden of the opioid pandemic in the United States was staggering in 2017, amounting to $1 trillion, primarily due to the reduced quality of life (53.9%) and the loss of life (46.1%). This cost also encompassed lost productivity (3.1%), healthcare expenses (3.1%), crime-related costs (1.5%), and substance abuse treatment (0.3%; Florence et al., 2021). Recognizing the severity of the issue, the U.S. Government Administration outlined a comprehensive strategy in its 2022 National Drug Control Strategy, to address the crisis, guided by one fundamental principle: *saving lives*. In 2022, the U.S. Government has allocated $1.5 billion fund to distributed to all states and territories to combat the opioid epidemic (the White House, September 24, 2022). Additionally, the U.S. Government has requested $46.1 billion for 2024 Budget allocate for National Drug Control Program agencies to continue beating the overdose opioid

epidemic through implementing the Strategy. This budget represents a $2.3 billion increase over the FY 2023 and $5.0 billion increase from the FY22 enacted level (National Drug Control Budget FY 2024 Funding Highlights, 2023). This funding and budget aim to support efforts in prevention, treatment, harm reduction, and recovery services (National Drug Control Budget FY 2024 Funding Highlights, 2023).

Neurobiology of Opioid Dependency

Opioids include a group of chemically similar drugs, both natural and synthetic, that act on the nervous system or specific receptors in the brain (Centers for Disease Control and Prevention [CDC], 2022), spinal cord, and peripheral nociceptors to alleviate pain (Holtsman-Pharm & Fishman, 2005). This category includes substances such as heroin and various prescription pain relievers. Common prescription pain relievers include hydrocodone, oxycodone, tramadol, codeine, morphine, fentanyl, buprenorphine, oxymorphone, and hydromorphone, as well as demerol and methadone (SAMHSA, 2023).

When opioids are consumed, they attach to specific receptors known as opioid receptors, which are distributed throughout various regions of the brain, spinal cord, and peripheral nociceptors (Holtsman-Pharm & Fishman, 2005). These receptors play a role in regulating pain perception, as well as reward and pleasure pathways. By activating opioid receptors, opioid use leads to a decrease in pain perception and an increase in feelings of pleasure and euphoria. However, these receptors can also create a reinforcing effect that motivates individuals to repeatedly use the drug for its pleasurable effects (Kosten & George, 2002). Prolonged exposure to opioids can disrupt the normal functioning of brain regions involved in reward processing and increase the vulnerability

of individuals to develop a dependency, which can persist as a lifelong struggle (Browne et al., 2020).

Prevalence and Risk of Prescription Pain Reliever Misuse

Prescription pain reliever misuse ranks as the second most common form of illicit drug misuse, following marijuana, with approximately 8.9 million individuals aged 12 or older misusing these medications (SAMHSA, 2023). Prescription pain reliever misuse is defined as using medication that contains opioids without a doctor's prescription, taking the medication in greater amounts or for a longer duration than prescribed, or using medication in a manner not directed by a doctor (Center for Behavioral Health Statistics and Quality, 2022). Similar to the misuse of other substances such as alcohol and marijuana, the prevalence of prescription pain reliever misuse starts during adolescence, peaks in emerging adulthood, and then declines through the life course (Bonar et al., 2020). For several years, emerging adults (18-25) represented the largest percentage of prescription pain reliever misusers. However, in 2022, there was a slight decrease among emerging adults (around 0.3%), and adults aged 26 and older surpassed emerging adults as the largest group of prescription pain reliever misusers. Among individuals with prescription pain reliever misuse in 2022, approximately 3.2% of emerging adults (1.1 million) aged 18 to 25 and also 3.2% of adults aged 26 and older (7.4 million) reported misusing these medications within the past year (SAMHSA, 2023). The number of overdose deaths involving prescription pain relievers reached 16,706 cases, or forty-five deaths per day, which accounted for almost 21% of all opioid overdose deaths in 2021. The rate was 17,029 deaths in 2017 and 14,139 deaths in 2019 (Drug Overdose Death Rates, 2023).

National data showed that there were no significant differences in prescription pain reliever misuse among racial or ethnic groups in individuals aged 12 or older, in 2022 (SAMHSA, 2023). However, when comparing emerging adults aged 18 to 22 who misuse prescription pain relievers to non-users, specific demographic factors have been identified as risk factors for prescription opioid misuse. These risk factors include being male (compared to female), being non-Hispanic White, and having lower education levels, such as having a high school diploma/general education diploma (GED) or less education compared to college students (Martins et al., 2015).

Furthermore, individuals with a history of substance use disorder or misuse are at a higher risk of misusing prescription pain relievers. An analysis of data from the National Survey of Drugs and Health in 2019 revealed that at least half of adolescents and emerging adults aged 18 to 25 who misused prescription pain relievers had also used tobacco, alcohol, and marijuana in the past month (Hudgins et al., 2019).

Childhood sexual and physical abuse experience has also been associated with an increased risk of prescription pain reliever misuse and opioid use disorders (Elhammady et al., 2014; Sansone et al., 2009; Santo Jr. et al., 2022), although the underlying mechanisms require further investigation (Santo Jr. et al., 2022). A systematic review of the prevalence of child maltreatment among people with opioid use disorder found that the prevalence of physical abuse among individuals with opioid use disorders was 43%, and the prevalence of childhood sexual abuse was higher among women (41%) with opioid use disorder than men (16%; Santo Jr. et al., 2022). Moreover, a history of mental health disorders, such as anxiety, depression, and post-traumatic stress disorder, can increase susceptibility to prescription pain reliever misuse (Dunn et al., 2022; Oswald et

al., 2021; Santo Jr. et al., 2022). Many individuals may use these medications as a mean of self-medication to cope with emotional or psychological distress (Austin & Shanahan, 2018; Tang et al., 2020). However, opioid use tends to progress over time. Recent research found that many emerging adults diagnosed with opioid use disorder began misusing prescription opioid around the age of 17. Within four years, the majority of these individuals progressed to using heroin (83%) and engaging in heroin injection (64%; Guarino et al., 2018).

Consequences of Opioid Misuse among Emerging Adults

The focus on substance misuse particularly opioid misuse among emerging adults is driven by several important factors that aim to disrupt the trajectory of misuse and reduce its consequences for individuals, families, and society. Emerging adulthood is a critical transitional stage from adolescence to adulthood, during which emerging adults strive to establish a sense of self, stable social roles, and self-efficacy. However, those engaging in substance use may find reaching these milestones challenging, and often take longer than their peers to attain stability in areas such as identity, work, love, and relationships (Arnett, 2005, 2007).

The misuse of prescription pain relievers among emerging adults can be influenced by psychological needs associated with their developmental phase. Research has revealed that the motives behind misusing these medications among emerging adults include several factors, such as seeking a euphoric high, managing chronic pain, and coping with feelings of depression or anxiety (Lord et al., 2010). Emerging adults who engage in the misuse of prescription pain relievers tend to exhibit higher levels of sensation-seeking behavior. Additionally, they may hold the perception that these

medications are less harmful compared to traditional opioids (Arria et al., 2008; Lord et al., 2010).

However, the initiation of prescription pain reliever misuse is a critical factor that can lead to the progression into more dangerous behaviors, such as sniffing opioids, injecting opioids, and initiating opioid injection drug use among emerging adults aged 16 to 25 (Lankenau et al., 2012). The misuse of prescription pain relievers is associated with the misuse of other substances among emerging adults, particularly smoking, marijuana use, and alcohol use (Hudgins et al., 2019). Furthermore, research has shown that opioid misuse is linked to lower grade averages among college students (Beane, 2020). Prescription opioid misuse and related disorders also contribute significantly to the high rate of suicidal thoughts and behaviors among both emerging adults and older individuals (Barman-Adhikari et al., 2019; Chan et al., 2019; Santaella-Tenorio et al., 2022). Moreover, alcohol and substance misuse in emerging adults can increase the likelihood of entering the criminal justice system, impacting their relationships, parenting styles, and careers (Arnett, 2005), and in pregnant women, posing harm to the unborn child.

Despite efforts to provide treatment services, emerging adults with opioid use disorders face serious challenges. Research indicates that emerging adults tend to experience less favorable treatment outcomes in comparison to both adolescents and older adults who undergo similar treatments (Smith et al., 2011). Compared to other age groups, they are the least likely to seek treatment services (SAMHSA, 2023), often delaying treatment-seeking until more severe use (Guarino et al., 2018). Emerging adults who receive opioid treatments are more likely to test positive for illicit opioids,

experience relapse, or drop out of treatment within a year after treatment (Schuman-Olivier et al., 2014).

Poor treatment outcomes among emerging adults with prescription pain reliever misuse can stem from the lack of sufficient information concerning side effects, disorder symptoms, and accessibility and effectiveness of treatment services (Frank et al., 2015). A qualitative study examining overdose-related knowledge among emerging adults with prescription opioid misuse found that emerging adults often perceived prescription opioids as safer and with a lower risk of overdose compared to traditional heroin users (Frank et al., 2015). Additionally, they were often unaware of or unwilling to engage with overdose prevention services (Frank et al., 2015). The stigma surrounding addiction and the discrepancy between treatment services and the developmental needs of emerging adults also contribute to these outcomes (Smith, 2017).

Emerging adulthood: Definition and Association of the Emerging Adulthood Constructs to Substance Use

Emerging adulthood refers to a distinct stage in the human life course, typically encompassing the age range from the late teens through the mid- to late twenties, with a focus on ages 18-25. This concept was first introduced by Jeffrey Jensen Arnett, a developmental research scientist, in 2000 (Arnett, 2000). The emergence of this phase is a result of societal shifts in industrialized societies, where young individuals now encounter expanded career options, delay marriage, and devote more time to education compared to previous generations. During this developmental stage, individuals gradually attain a sense of self-identity, establish stable social roles, and develop self-efficacy. The

term *emerging* aptly captures the dynamic and changeable nature of this period, reflecting its fluid quality (Arnett, 2000).

Arnett argues that emerging adulthood is distinct from young adulthood because most individuals in this age period see themselves as gradually transitioning into adulthood and do not subjectively feel fully adult until after the age of 30 (Arnett, 2000).

The onset of emerging adulthood is typically at the age of 18, signifying the end of adolescence. At this age, many individuals finish their secondary education, move away from their parents' homes, and attain the legal age of adulthood. However, the exact age at which the transition from emerging adulthood to adulthood occurs is not precisely defined. The perception of adulthood is subjective, and young people experience this transition at various ages during their twenties. Nevertheless, most young individuals tend to view themselves as fully adult by their late twenties (Arnett, 2000).

Since Arnett introduced the theory of emerging adulthood in 2000 numerous studies have focused on examining factors that differentiate emerging adults from adults, especially concerning substance misuse and the effectiveness of recovery services. However, an inconsistency in the research literature lies in the operational definition of the age range for emerging adulthood. Some studies use the term *young adults* to refer to individuals aged 18 to 25 (e.g., Fiellin et al., 2013; Hudgins et al., 2019), while others use *emerging adults* to describe the same age range (e.g., Taylor, 2020; Schuman-Olivier et al., 2014; Smith et al., 2014). Additionally, there are variations in the age ranges used when studying this population. For example, Quinn et al. (2019) used data from the Add Health survey and defined adolescence as ranging from 11 to 21 years, emerging adulthood from 18 to 28 years, and adulthood from 24 to 34 years, while another study

using the same dataset referred to the age group of 18 to 26 as young adulthood. In other examples, Nelson and Barry (2005) referred to individuals aged 19 to 25 as young adults, Teicher et al. (2009) used the term young adults for individuals aged 18 to 22, and Clary et al. (2022) used emerging adults to describe individuals aged 18 to 29.

In this dissertation, the term "*emerging adults*" refers to individuals who participated in the Add Health Survey in Wave 3, and the operational definition of emerging adulthood for this study is an age range between 18 to 27. To maintain consistency and coherence throughout the dissertation, the terms *emerging adults* and *emerging adulthood* are used, with the understanding that the operational definition used by other studies for this population is also mentioned if needed.

The theory of emerging adulthood defines five constructs for emerging adulthood that can be measured through surveys and interviews. These constructs are *identity explorations, instability, self-focus, feeling in-between,* and *possibilities/optimism.* It is hypothesized that these constructs, except for *possibilities/optimism*, are positively associated with the risk for substance use (Arnett, 2005). However, there is limited empirical evidence to support the explanatory power of the theory for substance use.

The research on the emerging adulthood constructs and their association with substance misuse has yielded inconsistent and modest findings. For instance, in one study focused on low-income emerging adults who met the criteria for lifetime alcohol and marijuana dependency, found that only *feeling in-between* was positively associated with substance-related problems (Smith et al., 2014). Another study found that only considering emerging adulthood as a time to focus on others was associated with a lower likelihood of marijuana use and engaging in binge drinking (Allem et al., 2013). Another

research found that self-focus was linked to heavy drinking and negativity/instability was associated with alcohol problem, but their effects are small in magnitude (Gates et al., 2016). However, no research has examined the relationship between the constructs defined in the theory of emerging adulthood and the likelihood of prescription pain reliever misuse.

Purpose of the Dissertation

The objective of this dissertation is to investigate the risk and protective factors associated with the misuse of prescription pain relievers among emerging adults and later in adulthood. While it is well-established that prescription pain reliever misuse rates peak during emerging adulthood, there is limited understanding of how risk factors experienced during this developmental stage contribute to prescription pain reliever misuse. In addition, while there is evidence that child abuse experiences are associated with substance misuse, there is limited understanding of underlying mechanisms that link childhood experiences, including abuse, to prescription pain reliever misuse (Santo Jr. et al., 2022). Furthermore, no studies have examined the hypotheses of the theory of emerging adulthood and its relationship to prescription pain reliever misuse among emerging adults. Previous studies that have investigated the relationship between the constructs of emerging adulthood theory and substance misuse have shown inconsistent findings, and the role of these constructs in individuals' propensity for substance misuse remains understudied.

This dissertation aims to address these gaps by proposing a conceptual model to address three major research questions. The dissertation first aims to examine how childhood abuse experiences and the quality of the parent-child relationship during

adolescence impact prescription pain reliever misuse and various social and mental health outcomes during emerging adulthood. Additionally, the study investigates how these outcomes are associated to a developmental construct of *feeling in-between*. Ultimately, this study aims to explore the role of this construct and sociodemographics in prescription pain reliever misuse in adulthood. The author anticipates that the findings of this research will yield insights into the field of social work, particularly in the field of substance use. These insights should inform the development of targeted interventions, enhance social work education, practice, and contribute to the formulation of evidence-based policies to address the prescription pain reliever misuse epidemic.

The Dissertation Blueprint

Chapter 1 introduces the significance of studying prescription pain reliever misuse among both adults and emerging adults. It states the objectives of the dissertation and provides an overview of the dissertation's structure.

Chapter 2 is informed by the emerging adulthood theory framework which posits the constructs of the developmental phase and explains the assumptions stated on their relationship with the high rate of substance misuse among emerging adults. It explains the theory of emerging adulthood and the five constructs that are defined for this developmental stage. Additionally, the chapter includes a comprehensive literature review on the risk and protective factors associated with prescription pain reliever misuse. The chapter concludes by outlining the hypotheses of the dissertation and proposing a conceptual model. Figure 1 represents the conceptual model designed for this dissertation.

Chapter 3 focuses on the dissertation's methodology. The study uses data from Waves 1, 3, and 5 of the National Longitudinal Study of Adolescent to Adult Health (Add Health; Harris et al., 2009). The chapter provides details about the data collection process and sample characteristics. It also describes the measures used, including six socio-demographic variables, fourteen observed variables, and the latent variable assessing the quality of the caregiver-adolescent relationship (See Figure 1). The chapter explains data, the preparation method, and the statistical analyses conducted, such as data merging, individual sample weighting, descriptive analyses, and structural equation modeling.

Chapter 4 presents the results of the data analyses. The findings demonstrate that establishing warm relationships between caregivers and their children during emerging adulthood significantly protects emerging adults from prescription pain reliever misuse during this developmental stage. The results also indicate that a history of sexual and/or physical abuse influences the likelihood of prescription pain reliever misuse during emerging adulthood. Additionally, the findings show that the subjective feeling of being an adult during emerging adulthood is significantly positively associated with prescription pain reliever misuse in adulthood. This dissertation suggests that the perceived adulthood status plays a significant role in the associations between emerging adulthood risk factors and the likelihood of prescription pain reliever misuse in adulthood.

Finally, Chapter 5 concludes the dissertation by interpreting the results, discussing the study's limitations, and exploring the potential applications in practice and policy.

The chapter ends by providing recommendation for future direction to address the prescription pain reliever misuse epidemic.

Conclusion

The opioid crisis in the United States has had a profound impact on individuals, families, and communities. The ability to perform multiple functions at different professional levels and work constructively in interprofessional teams potentially gives social workers a differentiated perspective and skillset for providing effective prevention and treatment plans to address the opioid use crisis (Lombardi et al., 2019; Mowbray & Fatehi, 2021). This dissertation aligns with the mission of social work and aims to contribute valuable insights to the field, particularly concerning prescription pain reliever misuse.

The primary objectives of the dissertation are to advance our understanding of the protective effects of the caregiver-adolescent relationship on several outcomes related to PPR misuse during emerging adulthood, examine the impact of childhood abuse experiences as a risk factor for these outcomes, and explore the influence of self-perceived adulthood status on the association between the risk factors of emerging adulthood and prescription pain reliever misuse.

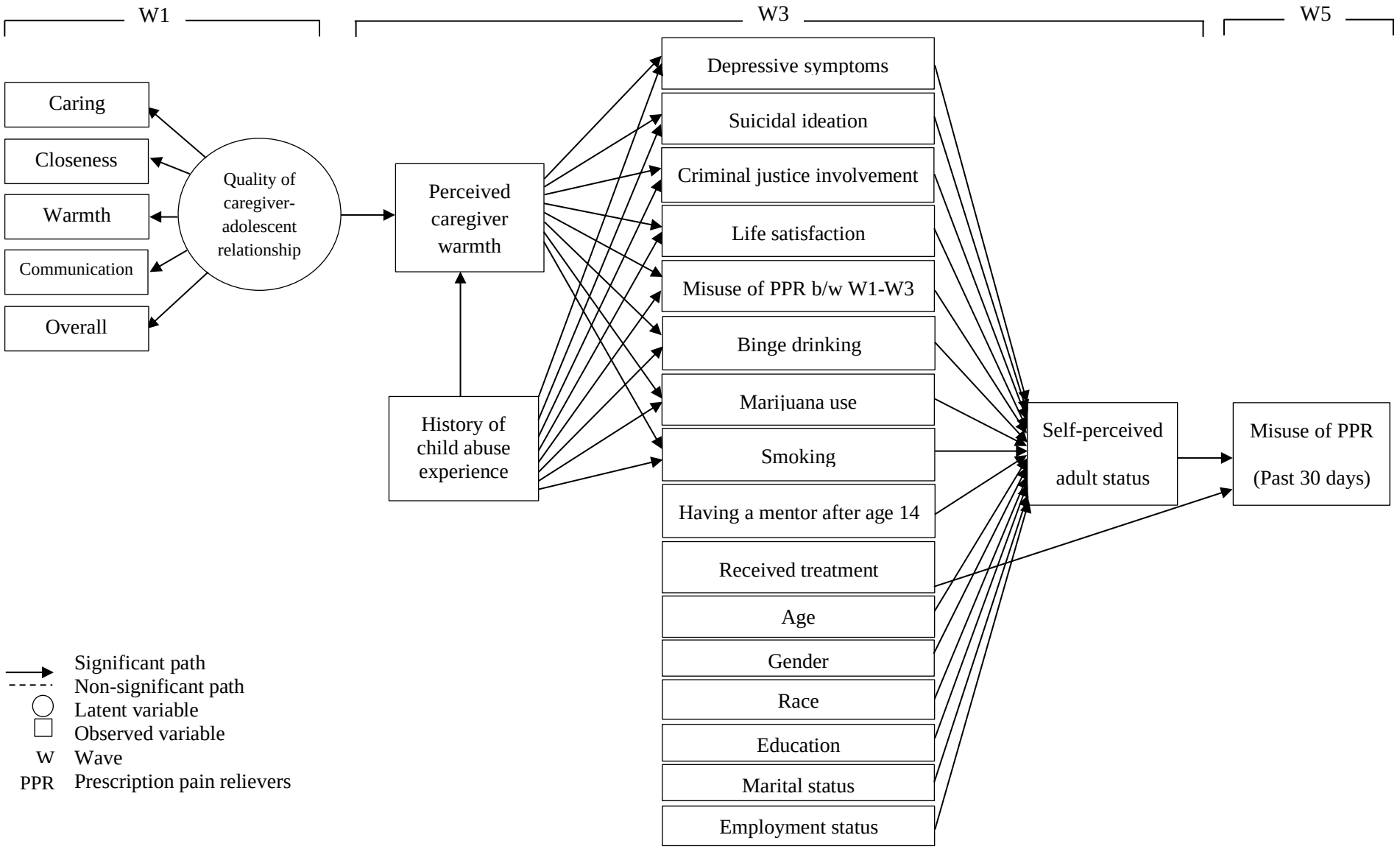
The findings of this dissertation can have immediate educational and practical implications for social workers. By disseminating the research findings, social workers can gain a deeper understanding of the protective factors within the caregiver-offspring relationship during adolescence and emerging adulthood and the risk of childhood abuse experiences for emerging adult outcomes. The findings can enhance the social workers' knowledge about the role of emerging adulthood developmental needs on substance

misuse. This knowledge can inform the development of tailored interventions that consider the unique challenges and needs of emerging adults at risk of prescription pain reliever misuse.

The dissertation can, furthermore, serve as a foundation for future research in the application of emerging adulthood theory constructs to explore the relationship between risk factors during this developmental phase and the misuse of prescription pain relievers later in adulthood, and pave the way for further investigations and contribute to a more comprehensive understanding of the complex factors involved in prescription pain reliever misuse.

Ultimately, its goal is to assist social workers working in the areas of substance use, child welfare, social justice, and emerging adulthood. The findings can inform the development of justice-based interventions that address the root causes of substance misuse and promote positive outcomes for individuals and communities affected by the opioid crisis. By combining research and practice, social workers can make a meaningful difference in the lives of emerging adults who are at risk for prescription pain reliever misuse.

Figure 1: Conceptual model for prescription pain reliever misuse



CHAPTER 2

THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Theoretical Framework

This dissertation focuses on understanding the experiences of individuals during emerging adulthood that contribute to the misuse of prescription pain relievers. To provide valuable insights into the psychological significance of this developmental stage and its impact on the risk factors associated with prescription pain reliever misuse, Arnett's (2000) theory of identity formation serves as the study's theoretical framework. This theory has several important strengths, making it a suitable application for investigating factors that predispose emerging adults to misuse of substances.

First, the theory distinguishes between the biopsychological profile of emerging adults and that of adolescents and adults. It can explain the unique characteristics that contribute to the increasing trend of substance use among emerging adults, followed by a decreasing trend as social responsibilities increase (Wood et al., 2018). Accordingly, substance use is seen as a part of the process of identity exploration for many emerging adults who desire diverse experiences. However, substance use can also function as a means to cope with identity confusion, life stressors, and mental health issues during this developmental phase (Arnett, 2005; Rose & Bond, 2008). Recognizing the significant psychological attributes of this age group can guide policies aimed at understanding the factors that enhance substance use interventions for this vulnerable population.

Second, Arnett's (2000) identity theory effectively conceptualizes emerging adulthood as a pivotal stage in the life course, during which individuals encounter new opportunities that can profoundly influence their future trajectory. Arnett (2000) posits that emerging adulthood represents the age of abilities that fosters greater resilience in individuals. This life-course stage is essential to understand, as changes in educational attainment, social roles, and functional capacities significantly impact the future well-being of emerging adults (Wood et al., 2018). The theory elucidates how the numerous contextual and individual transitions inherent in emerging adulthood have a significant impact on redirecting individuals' trajectories of well-being and problem behaviors, as well as contribute to the emergence or resolution of mental health difficulties during this phase of life (Arnett & Tanner, 2006, p. 138). By employing the identity theory, researchers can also explain why risk-taking behaviors such as substance use among emerging adults may hinder healthy identity formation and impede the optimal pathway to adulthood (Wood et al., 2018).

Third, Arnett's theory defines five constructs that facilitate the explanation of the characteristics of emerging adulthood, which can be measured through surveys or interviews. This feature enables researchers to apply the key concepts of the theory in both research and practice. Finally, any investigation involving emerging adults must consider their developmental needs and challenges at this stage of life.

Theory of Identity Formation: Theory of Emerging Adulthood

Identity formation is a complex process that begins in infancy and evolves throughout an individual's development. Cognitive, socio-emotional, and physical maturities that advance during adolescence contribute to the process of individualization.

The transition from familial constraints and the emergence of a sense of agency are key developmental achievements during this period (Gilmore, 2019). Erikson (1950) emphasized the importance of developing a coherent and integrated sense of identity during adolescence for a successful transition to adulthood. Individuals with a confused sense of identity may experience internalizing and externalizing symptoms and engage in personal and socially destructive behaviors (Schwartz et al., 2011).

In the theory of emerging adulthood, Arnett (2000) expands upon Erikson's (1950) identity formation theories to post-industrial society (Schwartz et al., 2005). Arnett identifies a *generational shift* in achieving adult milestones, with a delay of approximately seven to eight years compared to previous generations (Gilmore, 2019; Schulenberg et al., 2018, p. 203). He also acknowledges a *sociocultural shift* related to gender roles, sexuality, approach to work, globalization, and a shift to an information technology-driven economy (Gilmore, 2019). Arnett observes that the majority of emerging adults describe themselves as neither fully adult nor adolescent. Recognizing the prolonged transition from adolescence to adulthood in contemporary society, he introduces a new phase called *emerging adulthood*, situated between adolescence and adulthood in existing life course models. This phase exhibits distinct developmental characteristics specific to post-industrial societies and is considered the most heterogeneous period of the life course (Arnett, 2007). The developmental challenges in this phase revolve primarily around identity exploration and role experimentation. Researchers acknowledge that emerging adults are "not just becoming adults; rather, they are something in and of themselves" (Syed, 2015, as cited in Gilmore, 2019). Arnett

proposes five constructs that characterize emerging adulthood, which are briefly outlined below:

The Age of Identity Explorations. Emerging adulthood is a period when individuals are recognized as independent beings, no longer restricted by parental rules, or fully committed to adult roles. This allows them to explore their environment, discover their identity, and focus on career choices and personal relationships (Arnett & Tanner, 2006, p. 8).

The Age of Instability. Emerging adulthood is characterized by high levels of instability. As individuals explore different opportunities in work, love, and education, they experience uncertainty and change, which are integral to their self-discovery process (Arnett & Tanner, 2006, p. 9).

The Self-focused Age. Emerging adults tend to be less egocentric compared to adolescents. They spend more time alone and have increased freedom to make independent decisions. Their focus shifts towards attaining self-sufficiency, which enables them to take on adult social roles (Arnett & Tanner, 2006, p. 10).

The Age of Feeling In-between. Many individuals in emerging adulthood do not perceive themselves as fully adults but rather, feel *in-between* adolescence and adulthood. Initially, they may be more dependent on others, but as they progress through their mid-to-late 20s, they accept responsibility for themselves, make independent decisions, and become financially independent (Arnett & Tanner, 2006, p. 11).

The Age of Possibilities. Emerging adulthood is a time when individuals perceive endless possibilities for their lives. They leverage their independence to shape their lives before committing to a more structured adult life (Arnett & Tanner, 2006, p. 13). During

this phase, many individuals are undecided about their plans for work and love and prefer to explore their environment. They may frequently change jobs, romantic partners, or geographic locations while pursuing further education or training, gradually moving towards enduring choices and self-sufficiency (Arnett, 2007). During this phase, substantial changes in social cognition occur, consolidating more thoughtful, emotionally regulated, and planned decision-making behaviors, as well as enhancing social-cognitive maturity (Arnett, 2007; Taber-Thomas & Perez-Edgar, 2015).

Arnett believes that this new phase in the human life course benefits society. Most young people use this period to obtain education and skill training courses, so they have the potential to make contributions to a global economy that is based on information and technology (Arnett & Tanner, 2006). By about age 30, most emerging adults will achieve stable family and work routines and settle into enduring adult roles (Arnett & Tanner, 2006).

Substance Use in Emerging Adulthood and Later Misuse of Prescription Pain Relievers

Theoretically, the high prevalence and popularity of substance use among emerging adults can be attributed to the developmental needs of emerging adulthood stage. Exploring the environment and engaging in this risk behavior may be seen as normative and less harmful during this developmental phase (Arnett, 2005). Even emerging adults who misuse prescription pain relievers often perceive them as less harmful compared to traditional opioids (Arria et al., 2008; Hayley et al., 2017).

Research has established a correlation between the misuse of prescription pain relievers and the use of other substances, in particular alcohol, marijuana, and tobacco,

among emerging adults (Hudgins et al., 2019; Hayley et al., 2017). One study using data from the National Survey on Drug Use and Health (NSDUH) has shown that a significant proportion of adolescents (12-17 years old) and emerging adults (18-25 years old) who misuse prescription opioids also report recent use of tobacco (55.5%), alcohol (66.9%), or marijuana (49.9%) in the past month (Hudgins et al., 2019). Another study found that alcohol, cigarette, and marijuana use significantly increase the likelihood of prescription opioid misuse during emerging adulthood (18-25), with marijuana use being the most influential factor among men (Fiellin et al., 2013).

Recent studies have indicated that substance use during emerging adulthood can have long-lasting consequences and increase the risk of severe substance use, including opioid use, in adulthood (McCabe et al. 2022; Thrul et al., 2023). Longitudinal research using data from the Monitoring the Future (MTF) study found that individuals with severe substance use disorder symptoms in early adulthood (18 years old) were more likely to exhibit substance use disorder symptoms and misuse prescription drugs, including opioids, later in adulthood at ages 35 to 50 years old (McCabe et al. 2022). Another study focusing on alcohol use disorder, marijuana use disorder, and nicotine dependency in emerging adulthood (a cohort at age 20) found that nicotine dependency and more severe forms of marijuana use disorder at age 20 increased the risk of opioid use disorder at age 30, in particular White non-Hispanic adults were at higher risk compared to Black adults. However, there was no significant association between alcohol use and later prescription pain relievers (Thrul et al., 2023). Likewise, a retrospective study found marijuana and cocaine use, but not alcohol use in early emerging adulthood was associated with greater odds of later opioid use disorder diagnosis in a propensity

score-matched sample of people with and without opioid use disorders (Butelman et al., 2018). Thus, individuals who misuse substances during emerging adults do not necessarily age out of substance use after transitioning to adulthood (Butelman et al., 2018).

From a neurobiological perspective, drug use can induce changes in the brain that increase susceptibility to addictive behaviors. During adolescence and emerging adulthood, when neurochemistry is still developing, significant exposure to substances can result in lasting neurobiological changes. These changes can affect the reward-response process to opioid use and may increase the risk of future opioid misuse (Butelman et al., 2018; Stopponi et al., 2014).

Additionally, emerging adults may engage in substance use for recreational and social reasons, as well as to cope with social stress (Hurd et al., 2014). They may also turn to substance use as a way of coping with psychological and physical distress caused by internal instability or past interpersonal traumas (Cooper et al. 2016; Felitti et al, 2019). Research suggests that emerging adults may misuse prescription pain relievers as substitutes for alcohol, marijuana, and nicotine to alleviate their pain (Austin & Shanahan, 2018; Tang et al., 2020). This can be seen as a form of self-medication or a way to manage emotional and physical discomfort.

While numerous research has been conducted to understand risk factors that affect prescription pain reliever misuse, there is a research gap in studying prescription pain reliever misuse within the framework of emerging adulthood theory, particularly in investigating how the theory's constructs contribute to the development of prescription pain reliever misuse into adulthood. While the use of drugs and alcohol is an adult

behavior, it is not clear whether the subjective perception of adulthood during the identity formation process in emerging adulthood significantly influences the misuse of prescription pain relievers. This dissertation examines the role of the subjective feeling of being an adult or the construct of *feeling in-between*, in the associations between substance use during emerging adulthood and prescription pain reliever misuse in adulthood. By investigating these relationships, this work aims to enhance our understanding of how the perception of adulthood contributes to the misuse of prescription pain relievers.

Perceived Adult and Substance use among Emerging Adults

National data has demonstrated that substance use and substance use disorders peak during emerging adulthood and decline with age (SAMHSA, 2023). This decline has often been attributed to the assumption that accepting adult roles such as marriage and employment is incompatible with substance and alcohol use (Gates et al., 2016). However, Arnett proposed in his 2005 paper, *The Developmental Context of Substance Use in Emerging Adulthood*, that constructs specific to emerging adulthood, beyond role transitions, also play a significant role in understanding substance use patterns. Despite this, there is limited empirical evidence available regarding the explanatory power of Arnett's hypotheses for substance use among emerging adults. Smith et al. (2014) conducted a study with a sample of low-income emerging adults aged 18-25 who met the criteria for lifetime alcohol and marijuana use disorder. They examined how Arnett's five normative features of early adulthood (*identity explorations, instability, self-focus, feeling in-between,* and *possibilities/optimism*) were related to substance use. The study revealed that only the construct of *feeling in-between* was positively associated with substance-

related problems, but not with substance use frequency. The authors suggested that the lack of significant relationships between all constructs and substance use could be due to early onset of alcohol and marijuana use during adolescence. These constructs might be more relevant for explaining substance use among those with a late onset of use during emerging adulthood (Smith et al., 2014). Another study focused on college students aged 19-25 and found that those who perceived themselves as adults, compared to those who had not yet defined themselves as adults, reported fewer depressive symptoms and engaged in fewer risk behaviors such as illegal drug use and drunk driving (Nelson & Barry, 2005).

Additionally, one study used national data from the Add Health survey to examine the developmental synchrony between subjective age and psychological maturity in shaping identity among emerging adults aged 18-22. This study found that emerging adults who perceived themselves as older than their actual level of maturation exhibited higher levels of maladaptive and delinquent behavior during adolescence compared to their peers. When examining parent-adolescent relationships, these individuals also experienced lower scores in parent-adolescent closeness and faced blurred generational boundaries (Benson & Elder Jr., 2011).

There is a research gap in understanding how the emerging adulthood constructs impact on prescription pain reliver misuse. By drawing on Arnett's theoretical framework, this dissertation aims to explore the association between the construct of *feeling in-between*, experienced during the early years of emerging adulthood, and the misuse of prescription pain relievers in adulthood.

Childhood Abuse Experience and Consequences in Emerging Adulthood

Numerous epidemiological studies consistently indicate that experiencing physical or sexual abuse during early developmental stages, characterized by high neuronal plasticity in the brain, increases the risk of opioid and prescription pain reliever misuse (Austin & Shanahan, 2018; Austin et al., 2018; Conroy et al., 2009; Davis et al., 2021; Dunn et al., 2022; Gerhardt et al., 2022; Oswald et al., 2021; Santo Jr, Campbell, Gisev, & Degenhardt, 2022). However, recent years have seen an increase in research focusing on understanding the mechanisms that contribute to the pathway from child abuse to prescription pain reliever misuse (Oswald et al., 2021; Santo Jr. et al., 2021).

In this dissertation, *child abuse* exclusively refers to physical and sexual abuse as two forms of maltreatment inflicted by a parent or caregiver[2]. Physical abuse entails intentional acts causing harm to a child, such as beating, shaking, burning, or biting, that is intentionally inflicted on a child by a parent or caregiver (Child Welfare Information Gateway, 2022). Similarly, childhood sexual abuse is defined as the involvement of a child, who lacks developmental maturity and the ability to provide consent, in an unlawful sexual activity that violates societal norms when the child is under 18 years old (World Health Organization [WHO], 1999). WHO emphasizes that such childhood experiences "result in actual or potential harm to the child's health, development, or dignity" (Gonzalez et al., 2022).

Each year, a significant number of children in the United States experience abuse at the hands of their caregivers. The annual Child Maltreatment Report series reported

[2] When I use terms such as adverse childhood experiences, childhood trauma, or childhood maltreatment throughout this dissertation, it means that the cited research used those terms and did not differentiate between different forms of adverse experiences.

that in 2021, there were 588,229 child victims of abuse and neglect in the United States, with 16% being victims of physical abuse and 10.1% victims of sexual abuse (U.S. Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau, 2023). Extensive research has established that the experience of child abuse is associated with an increased likelihood of physical and mental health disorders, suicidal ideation (Dunn et al., 2013; Dunn et al., 2018; Teicher et al., 2009), chronic pain (Austin & Shanahan, 2018), and engagement in health risk behaviors, including early initiation of drug use, alcohol use, and prescription pain reliever misuse during emerging adulthood (Davis et al., 2021; Douglas et al., 2010; Dunn et al., 2022; Quinn et al., 2019).

Childhood Abuse Experience and Misuse of Prescription Pain Relievers

While it is well-documented that the experience of child abuse increases risk for developing alcohol-related problems and substance use disorders, recent attention has focused on the association between child abuse history and opioid misuse (Oswald et al., 2021; Santo Jr. et al., 2021). A meta-analysis of 62 studies conducted between 1990 and 2020 found that 38% of individuals with opioid use disorder had a history of physical abuse, while 41% of women had a history of sexual abuse, and 16% of men had a history of sexual abuse (Santo Jr. et al., 2021). A recent study showed that 65% of individuals with at least one timeline opioid use (n = 310) met the criteria for opioid use disorder, and 93% reported Adverse childhood experiences such as physical, emotional, and sexual abuse (Dunn et al., 2022).

Child abuse history plays a significant role in the consistent pattern of substance use among individuals. Emerging adults with adverse childhood experiences tend to

report higher stability in multiple substance use or more severe substance use over time compared to those without such experiences (Davis et al., 2021). Longitudinal studies have revealed that the use of opioids and prescription opioids remains higher among emerging adults with adverse childhood experiences as they transition into adulthood, whereas it decreases among those without such experiences (Davis et al., 2021). Even among patients prescribed opioids for chronic non-cancer pain, those with adverse childhood experiences are more commonly prescribed opioids and are at greater risk of developing opioid use disorder compared to those without such experiences (Santo Jr. et al., 2022). Childhood trauma not only has a strong and persistent relationship with prescription pain reliever misuse during emerging adulthood but also appears to become stronger as individuals transition into adulthood (Quinn et al., 2016). The misuse of prescription opioids may serve as a coping mechanism for individuals to alleviate the psychological and physical pain associated with early trauma (Austin & Shanahan, 2018; Tang et al., 2020).

Childhood Abuse Experience, Depressive Symptoms, Suicidal Ideation, and Misuse of Prescription Pain Relievers During Emerging Adulthood

The impact of child abuse on the development of depressive symptoms and suicidal ideation in emerging adults has been well-studied (Dunn et al., 2013; Dunn et al., 2018; Teicher et al., 2009). The association between child abuse and depression on emerging adulthood is particularly pronounced when the first exposure to abuse occurs during early childhood, between the ages of 0 and 5 (Dunn et al., 2013). Research indicates that the first exposure to physical abuse during preschool years (ages 3-5) increases the odds of depression among emerging adults by 77%, while the first exposure

to sexual abuse during early childhood (ages 0-5) increases the odds of suicidal ideation by 146% compared to exposure during adolescence (Dunn et al., 2013). One study focusing on emerging adults who experienced childhood sexual abuse without other forms of maltreatment found that 62% of the sample met the criteria for major depression, with an average onset of depressive episodes occurring 9.2 years after exposure to sexual abuse (Teicher et al., 2009).

On the other hand, there is evidence of a high prevalence of depressive disorder among individuals with opioid use disorder. A systematic review of articles published between 1990 and 2021 indicates that the prevalence of depressive disorder among individuals with opioid use disorder is approximately 36%, the highest among mental disorders (Santo Jr, Campbell, Gisev, Martino-Burke et al., 2022). Research found that depressive symptoms, adverse childhood experiences, and pain intensity increase opioid misuse. While depressive symptoms were directly linked to opioid misuse, pain intensity also mediates the relationship between depressive symptoms and opioid misuse (Williams et al., 2020). It has been suggested that individuals with a history of childhood abuse may misuse prescription opioids to suppress their anger and memories resulting from those traumatic experiences (Elhammady et al., 2014). However, a longitudinal study using data from the Add Health survey examined the mediation role of pain and depressive symptoms in the association between childhood abuse and neglect and prescription opioid misuse during emerging adulthood. The study found that only pain in adolescence mediated this association, suggesting that emerging adults may somaticize the negative effects through physical pain rather than depressive symptoms due to the incomplete development of emotional awareness during adolescence (Austin &

Shanahan, 2018). Additionally, research has shown that depression and delinquency can mediate the association between adverse childhood experiences and non-medical prescription opioid use (Douglas et al., 2010; Quinn et al., 2019).

A recent study using longitudinal data from the Add Health survey investigated the association between ten types of adverse childhood experiences and depression trajectories. The study identified three depression trajectories: 1) consistently low, 2) initially high but decreasing, and 3) increasing depression scores. Results indicated that individuals in the initially high but decreasing and increasing depression score groups had higher adverse childhood experience scores. Moreover, individuals with greater adverse childhood experience scores were more likely to belong to the increasing depression trajectory compared to the consistently low trajectory. Among the ten types of adverse childhood experiences, a history of sexual abuse, emotional abuse, and physical abuse had the highest odds of belonging to the increasing depression trajectory. The study also highlighted that the most significant change in depression trajectory occurred during the transition from adolescence to early adulthood (Desch et al., 2023), known as emerging adulthood, which is characterized by significant life events such as leaving the parental home, attending college, starting a career, and marriage. While these changes may increase resilience for some individuals with adverse childhood experiences, leading to a decrease in depressive symptoms over time, they can also accelerate depression for others and increase the risk of engaging in high-risk behaviors such as binge drinking and illicit drug use, which are known to be correlated with depression (Desch et al., 2023).

Childhood Abuse Experience, Criminal Justice Involvement, and Prescription Pain Relievers Misuse

Another notable consequence of childhood abuse is an increased likelihood of criminal justice system involvement during emerging adulthood (Graf et al. 2021; Shin et al., 2016; Testa et al., 2022). Two review studies on the association of adverse childhood experiences and criminal justice system contact concluded researchers mostly focused on juvenile-involved population while research that has focused on emerging adult populations are low in terms of quantity and have low quality in the absence of a comparison group (Graf et al., 2021; Malvaso et al., 2022).

A descriptive analysis of a 10-year follow-up period recidivism of prisoners (2008-2018) across 24 states of the United States found that 55.9% of individuals released in 2008 were between 18 and 24 years old when they were arrested for the first time. In 2008, about 50% of those released when they were 24 or younger were arrested again within one year, and ninety percent were arrested again within 10 years following release (Antenangeli & Durose, 2021). In parallel, because childhood abuse experience may increase the propensity for risky behaviors such as binge drinking and taking illicit drugs, a history of childhood abuse may increase the risk of engaging criminal justice systems. There is limited understanding of what types of adverse childhood abuse are associated with criminal justice involvement among emerging adults; however, using longitudinal data from the Add Health survey, relative to those with no adverse childhood experience, accumulating adverse childhood experience is associated with a higher likelihood of arrest during emerging adulthood (age 24-34). Accumulating four or more

adverse childhood experiences increases the likelihood of arrest, incarceration, recidivism, and longer time incarceration during adulthood (Testa et al., 2022).

Opioid misuse is prevalent among those involved in the criminal justice system (Brinkley-Rubinstein et al., 2018; Pilarinos et al., 2022). Many of these people with opioid use disorder have no access to medication-assisted treatments such as methadone or buprenorphine, which places them at higher risk of post-release overdose (Brinkley-Rubinstein et al., 2018). In the United States, only 19% of those at age 12 and older with past year diagnosed substance use disorder and criminal justice contact have received substance use treatments (Rowell-Cunsolo & Bellerose, 2021). Having a history of being incarcerated, facing discrimination from the medical community due to drug-related issues, and having a low monthly income are associated with reducing the probability that individuals using prescription opioids non-medically never attempt to enroll in a treatment service (Liebling et al., 2016). A systematic review of medications for opioid use disorder among adolescents and emerging adults revealed that because of the absence of opioid treatment services, many of those with opioid use disorder and involved in the criminal justice system relapse shortly after release. However, if they received medication for opioid use disorder before being incarcerated or received a criminal justice referral for medication in U.S. Medicaid expansion states, those adolescents and emerging adults are more likely to receive opioid use treatment in prison (Pilarinos et al., 2022).

Involvement in the criminal justice system and substance use during the critical developmental phase of emerging adulthood whose primary virtue is exploring social identity and preparation for adults' responsibilities can interfere with healthy identity

formation and impede the optimal pathways toward adulthood (Wood et al., 2018). For emerging adults with experience of incarceration, many social opportunities such as income, employment, and attaining education are limited compared to those without such experience (Esposite et al., 2017 [age 15-30], Van Duin et al. 2021).

Childhood Abuse Experience, Life Satisfaction, Emerging Adulthood, and Substance Use

Life satisfaction is defined "the degree to which a person positively evaluates the overall quality of his or her life as a whole. In other words, how much the person likes the life he or she leads" (Veenhoven, 1996). Emerging adulthood is the age of possibilities. It is a time that individuals think that all their dream, hopes and plans are possible (Arnett & Tanner, 2006, p. 13). It is also a time that their society permits them to explore their world to find love, work, and purpose for their life (Arnett & Tanner, 2006, p. 8). Many of them are undecided about their plans for work and love (Arnett, 2007) and live with low income and housing quality, however, identifying a purpose for life and searching for a purpose is normative developmentally and are associated with greater life satisfaction among emerging adults (Cotton-Bronk et al., 2009). This hope to the future mediates this association in which, searching for a purpose and hope to the future increase life satisfaction of individuals during this developmental phase (Cotton-Bronk et al., 2009).

While life satisfaction is generally higher among emerging adults compared to adults (LaBrenz et al., 2021), those with a history of childhood maltreatment tend to report lower life satisfaction (Li et al., 2023). Particularly, exposure to childhood abuse, household dysfunction, and higher counts of adverse childhood experiences is associated with lower life satisfaction in adults (LaBrenz et al., 2021; Mosley-Johnson et al., 2019).

However, the presence of protective factors such as social and emotional support, higher income levels, and marriage can mitigate the negative impact of childhood abuse on life satisfaction (LaBrenz et al., 2021). Social support and life satisfaction can also act as protective factors mediating the relationship between adverse childhood experiences and psychopathological symptoms in adulthood (Kobrinsky & Siedlecki, 2022).

Relationship between substance use and life satisfaction among emerging adults has yielded mixed findings. A longitudinal study involving a sample of emerging adults revealed that life satisfaction was negatively associated with alcohol and marijuana abuse/dependence after controlling for fixed sources of confounding, such as gender, childhood anxiety, and parental attachment. However, when adjusting for time-varying sources or concurrent factors like work hours, having a cohabiting partner, relationship problems, mood, and anxiety disorders, and physical and sexual victimization, the previously significant association between life satisfaction and alcohol or marijuana abuse/dependence disappeared (Swain et al., 2012). Another longitudinal study found a significant negative association between life satisfaction and mental health disorders, including major depression, anxiety disorder, suicidality, and illicit substance dependence among emerging adults. However, no significant association was observed between life satisfaction and alcohol dependency (Fergusson et al., 2015).

Limited research exists on the association between life satisfaction during emerging adulthood and prescription pain reliever misuse. One study found no association between life satisfaction and concurrent polydrug use among emerging adults (age 18-25) who currently also use opioid-related drug after controlling for mental health diagnoses, adverse childhood experiences, and sociodemographic factors (Taylor, 2020).

This is because the perception of well-being and happiness during this developmental phase may be influenced by factors such as relationships with peers and family (Taylor, 2020).

Caregiver-Child Relationship, Non-parental Adult Role Model, Emerging Adulthood, and the Misuse of Prescription Pain Relievers

Although substance use behaviors are prevalent among emerging adults, not all individuals in this age group engage in high-risk substance use. On the other hand, while a history of childhood abuse increases the risk of developing mental health disorders and substance use, not all who have experienced child abuse will necessarily experience these negative outcomes during their emerging adulthood. Protective factors, such as high-quality caregiver-child relationships and the presence of a positive non-parental adult, can help mitigate the risk of engaging in risky behaviors and improve mental health outcomes (Cerdá et al., 2014; Cheney et al., 2015; Hurd et al., 2014; Spoth et al., 2013). Research focuses mostly on the protective role of caregiver-child relationships in preventing of substance use among adolescents, however, limited research exists on the continuing protective role of these factors specifically during emerging adulthood.

During emerging adulthood, individuals strive for independence from their original families and experience changes in the quality of their relationships with their caregivers. The warmth, closeness, and attachment perceived in these relationships during adolescence have been associated with a lower risk of alcohol drinking problems, drug misuse, and nonmedical prescription opioid use during both adolescence and emerging adulthood (Cerdá et al., 2014; Donaldson et al., 2015; Mak & Iacovou, 2019; Su et al., 2021). Parenting practices such as monitoring and warmth also influence

attitudes toward and misuse of prescription opioids for adolescents (Donaldson et al., 2015). Parental control reduces the risk of early substance initiation, while perceived parental warmth during adolescence acts as a protective factor against substance use problems (smoking, drinking problem, and marijuana use) and depressive symptoms during emerging adulthood (Mak & Lacovou, 2019). Conversely, high parental monitoring and low perceived warmth can increase the likelihood of lifetime prescription opioid misuse for adolescents (Donaldson et al., 2015). An intervention program targeting the strengthening families combined with life skills training for youths aged 10-14, has shown effectiveness in reducing 65% prescription opioid misuse among emerging adults aged 21-25, particularly among higher-risk individuals (Spoth et al., 2013).

Gene-environment interaction studies have highlighted the long-term effects of a high-quality parent-child relationship during adolescence on substance use in emerging adulthood. For example, a longitudinal study has shown that the interaction between genetic risk and parent-adolescent relationship quality assessed by warmth and rejection, significantly predicts smoking behavior among emerging adults at age 22, while genetic risk alone predicts marijuana initiation. However, no significant associations were observed between these factors and emerging adults' recent alcohol use (Pasman et al., 2021). Maternal parenting quality during adolescence has been associated with a lower likelihood of belonging to certain trajectories of alcohol use (the persistent heavy and the developmentally limited alcohol use trajectories) from adolescence to emerging adulthood (Su et al., 2019). The interaction between carriers of the short allele of the serotonin-transporter-linked promoter region (5-HTTLPR) genotype[3] and the quality of

[3] Genotype refers to an organism's genetic blueprint, determining the makeup of a set of genes and defining the characteristics of an organism (Nature Education, 2014).

the parent-child relationship can predict whether an individual will belong to the persistent heavy alcohol use trajectory, specifically for emerging adult males but not females (Su et al., 2019).

The quality of the parent-child relationship during emerging adulthood also impacts mental health and substance use outcomes. Greater warmth in maternal relationship reduces the level of cortisol production across the day among emerging adults. Maternal relationship quality during emerging adulthood has also moderated the link between daily hassles, early-morning cortisol, and change in cortisol levels throughout the day (Lucas-Thompson, 2014). Moderate- to high-quality maternal-offspring attachment at mean age 21 has been associated with lower nonmedical prescription opioid use at mean age 26, mediated by depressive symptoms, heavy episodic alcohol use, smoking, marijuana use, and other illicit drug use (Cerdá et al., 2014). Conversely, perceived paternal and maternal rejection can indirectly increase alcohol use among emerging adult women as a coping mechanism rather than a way for sociability due to lower self-esteem (Rundell et al., 2012). However, research specifically focusing on the protective role of caregivers against prescription pain reliever misuse during emerging adulthood is limited.

While research has extensively explored the positive impact of parent-child relationships on delinquency in children and adolescents, there is limited knowledge about the effectiveness of parental support in preventing crime during emerging adulthood. Parental influence does not end in adolescence and that ongoing parental support and involvement have been found to reduce crime during emerging adulthood (Copp et al., 2020; Johnson et al., 2011; Hill et al., 2018; Walters, 2013). Ongoing

parenting support throughout adolescence and emerging adulthood is associated with lower levels of offending among emerging adults (Johnson et al., 2011). Early parental support and monitoring reduce offending indirectly by preventing earlier delinquent involvement and the development of deviant peer networks (Johnson et al., 2011). In one study, researchers followed a group of individuals across five waves (from age 13 to 28) and found that parental closeness[4] was associated with a decline in crime while being part of a network of peers involved in crime was associated with an increase in crime across all waves. Additionally, being female and being married were associated with crime reduction (Copp et al., 2020). Longitudinal research discovered that parenting involvement mediated the relationship between delinquency in adolescence and the likelihood of crime in emerging adulthood, but only for females and not males (Walters, 2013).

Maternal and paternal warmth are also more likely to reduce alcohol, marijuana, and other illicit drug use among individuals' involvement with the criminal justice systems during early emerging adulthood (Robillard et al., 2022). Specifically, maternal and paternal warmth is associated with lower marijuana and other illicit drug use, and paternal warmth is associated with lower alcohol use over time (Robillard et al., 2022). Perceived parental low warmth during adolescence has direct effects on binge drinking in both adolescence and emerging adulthood as evaluated seven years later, which, in turn, increases the likelihood of having an arrest record during emerging adulthood (Donaldson et al., 2016).

[4] Closeness in this study measured using five questions while this measure assessed in this dissertation by only one question.

Furthermore, research indicates that having positive non-parental adults or natural mentors can be another important interpersonal resource for emerging adults, as it can reduce the likelihood of engaging in at-risk behaviors such as binge drinking, marijuana use and cigarette smoking, and promote a successful transition into emerging adulthood (Greeson et al., 2010; Hurd et al., 2014; Oman et al., 2015; Sterrett-Hong et al., 2021). While parental role models are typically more influential during adolescence, as emerging adults move away from their parental homes, non-parental adults may become increasingly significant (Cheney et al., 2015; Hurd et al., 2014; Oman et al., 2015). However, the relationship with non-parental adults is not common among emerging adults (Hurd et al., 2014).

Adolescents and emerging adults who have non-parental adult role models in their lives are more inclined to adopt healthy coping mechanisms when faced with life stressors, more likely to have good education performance, and less likely to resort to unhealthy strategies such as risky sexual behaviors and substance use (Culyba et al., 2015; Dang et al. 2014; Hurd et al., 2014; Oman et al., 2015; Tyler et al., 2018). One study conducted with homeless youth aged 16-22 examined the impact of social environment (e.g. mentor, caseworker, friend, or family) on their mental health outcomes. The study revealed that having someone they could rely on when needed reduced the risk of depressive symptoms, anxiety, and the negative consequences of early stressors among homeless youth (Tyler et al., 2018). Another study found significant associations between parental monitoring and no tobacco use in emerging adults' males (ages 18-22), while non-parental adult and peer role models were associated with no tobacco use among females (Cheney et al., 2015). Non-parental adults may indirectly reduce depressive and

anxiety symptoms as well as the use of alcohol, marijuana, and cigarette among emerging adults (aged 17.1-25.8) by enhancing their sense of life purpose (Hurd at al.,2014). When interacting with non-parental adults, emerging adults may feel more comfortable and confident discussing their perceived role in society and future plans. Having a sense of purpose in life motivates emerging adults to avoid substance use, which could hinder their progress towards achieving their life goals (Hurd at al.,2014). Still, there is little understanding of the association of a non-parental adults' influence with prescription opioid use among emerging adults.

Sociodemographic Differences and Self-perceived Adulthood Status

There is evidence about the influence of sociodemographic factors on the subjective perception of reaching adulthood in emerging adulthood (Arnett, 2003; Benson & Furstenberg, 2006). As emerging adults mature, they gradually acquire adult-like characteristics. Many young Americans no longer consider traditional milestones such as completing education, starting full-time work, or getting married as significant markers of adulthood (Arnett, 2003; Benson & Furstenberg, 2006). Instead, they associate adulthood with individual and social attributes such as accepting personal responsibility, making independent decisions, achieving financial independence, establishing equitable relationships with parents, and showing concern for others while avoiding harmful behavior (Arnett, 1998, 2003). However, these perceptions can slightly differ across racial and ethnic groups due to variations in cultural norms, social expectations, and experiences tied to racial identity (Arnett, 2003; Benson & Furstenberg, 2006). Research suggests that African American emerging adults are more likely to view

themselves as adults compared to White, Hispanic, and Asian American emerging adults (Arnett, 2003; Benson & Furstenberg, 2006).

Ethnic minority groups place a greater emphasis on accepting family obligations, such as the ability to financially support a family, irrespective of traditional gender roles, compared to White emerging adults (Arnett, 2003). Additionally, ethnic minority groups are more inclined to consider adherence to social norms, such as avoiding intoxication and driving safely within the speed limit, as adult-like characteristics compared to Whites. While both White and other ethnic groups recognize the importance of avoiding drunk driving as a criterion for adulthood, Whites are less likely to view "avoiding becoming drunk" as behavior indicative of adulthood (Arnett, 2003).

Emerging adults perceive that not all role transitions signify the attainment of adulthood. Those enrolled in college are less likely to consider themselves fully adult during emerging adulthood compared to their non-college-attending counterparts (Benson & Furstenberg, 2006). Moving out of the parental household and becoming parents are more likely to contribute to the feeling of reaching adulthood. Additionally, young individuals with greater financial responsibility are more likely to experience a sense of adulthood compared to those with less financial responsibility. However, young individuals engaged in full-time employment are less likely to experience a complete sense of adulthood unless they have also made the transition of moving out from their parents' household (Benson & Furstenberg, 2006).

Although emerging adult men and women initially exhibit similar prevalence rates of milestones in the United States during the early years of emerging adulthood, evidence suggests that women tend to reach the feeling of adulthood earlier than men. In

terms of role transitions, emerging adult women are more likely to marry or have children at an earlier age than men (Oesterle et al., 2010). Additionally, emerging adult women are more likely to be single parents raising children outside of marriage compared to men (Oesterle et al., 2010). Having a child increases the sense of feeling like an adult, particularly for emerging adult women (Benson & Furstenberg, 2006). In terms of role transitions, a lower percentage of White emerging adults endorse the notion that full-time employment, marriage, and completion of education are criteria for adulthood compared to minority ethnic groups (Arnett, 2003).

Sociodemographic Differences and Misuse of Prescription Pain Relievers

When examining sociodemographic factors, variations in the prevalence of prescription pain reliever misuse among different groups become apparent. Analysis of data from the 2008-2010 National Survey on Drug Use and Health focused on emerging adults aged 18-22, revealing that nonmedical prescription opioid misuse within the past year was more prevalent among emerging adults without a college education compared to those attending college (Martins et al., 2015). Furthermore, findings from the 2015-2018 National Health and Nutrition Examination Survey indicated that prescription opioid misuse was higher among women than men (Hales et al., 2020). Although women tend to initiate prescription opioid misuse at an older age, they progress more rapidly than men from the onset of use to diagnosable dependency (Back et al., 2011). Treatment outcomes reveal that adolescents and emerging adults, particularly women with opioid use disorder, are less likely than men to receive buprenorphine or naltrexone for treatment (Hadland et al., 2017).

Moreover, evidence suggests that White non-Hispanic individuals are at a higher risk of prescription opioid misuse compared to those of Hispanic and Black racial identities (Bonar et al., 2020). Additionally, among graduate and undergraduate students who engage in nonmedical prescription opioid use, the prevalence of alcohol and illegal drug consumption is higher compared to students who use prescription opioids for medical purposes (Ghandour et al., 2013). Multiple substance use, excluding alcohol, has a higher prevalence among female college students compared to their male counterparts (Chiauzzi et al., 2013).

Purpose of This Study

The existing research on substance use, such as prescription pain reliever misuse among emerging adults, has primarily focused on identifying risk factors. However, there are few studies investigating the long-term effects of these risk and protective factors during emerging adulthood on prescription pain reliever misuse in adulthood. Additionally, little attention has been given to examining the relationship between Arnett's (2000) constructs of emerging adulthood and prescription pain reliever misuse. Understanding these relationships is crucial for comprehending the etiology of substance use disorders in emerging adults, the persistence of substance use, and treatment outcomes (Smith et al., 2014).

To expand our understanding of the etiological factors underlying prescription pain reliever misuse, this dissertation utilizes a structural equation modeling to explore the association between risk and protective factors during emerging adulthood and their potential long-term effects on prescription pain reliever misuse in adulthood. The overall hypothesis of this dissertation posits that a history of childhood abuse and parent-child

relationships during adolescence are associated with prescription pain reliever misuse during emerging adulthood. Childhood abuse experiences and parent-child relationships indirectly influence prescription pain reliever misuse in adulthood through risk factors experienced during emerging adulthood. Specifically, this dissertation suggests that the risk factors encountered during emerging adulthood influence individuals' self-perceived adult status, a construct proposed by Arnett (2000) to characterize this transitional phase of the developmental life course. Subsequently, self-perceived adult status affects prescription pain reliever misuse in adulthood.

First, this dissertation posits that parent-child relationships during adolescence and emerging adulthood impact prescription pain reliever risk factors experienced during emerging adulthood, including depressive symptoms, suicidal ideation, criminal justice involvement, life satisfaction, and binge drinking, smoking, marijuana use, and prescription pain reliever misuse. Second, this dissertation hypothesizes that a history of childhood abuse is associated with the same risk factors mentioned above during emerging adulthood. Third, this dissertation hypothesizes that the risk factors experienced during emerging adulthood are linked to individuals' self-perceived adult status, which is one of the constructs of emerging adulthood. Lastly, this dissertation hypothesizes that self-perceived adult status is associated with prescription pain reliever misuse in the later stages of the developmental life course.

CHAPTER 3

METHOD

Data Source

The present dissertation used data from Waves 1, 3, and 5 of the National Longitudinal Study of Adolescent to Adult Health (Add Health; Harris et al., 2009). Initiated in 1994, Add Health is an ongoing project that explores the causes of health and health-related behaviors of adolescents, using longitudinal data from adolescence into adulthood. Data from Wave 1 was collected during the 1994-1995 school year when participants were in Grades 7-12; data from Wave 3 was collected during 2001-2002 when participants were between 18 and 26 years old; and data from Wave 5 was collected in 2016-2018 when participants were between 32 and 42 years old.

Sample

Add Health is a nationally representative study of U.S. adolescents in Grades 7-12, enrolled in the 1994-1995 academic year, from 134 middle and high schools in 80 communities. Using a stratified sampling technique, 80 high schools were initially selected from a complete list of high schools (Quality Education Database) based on their region, urbanicity, and school type (public vs. private, racial composition, and size). Each of the selected high schools was matched to a feeder school (typically a middle school), with a representative sample being proportional to its contribution to the high school. Therefore, there was one school pair in each of the 80 communities. Of the original high schools, more than 70 percent were eligible and agreed to participate. Additional schools

within each stratum were replaced based on the characteristics of the initial schools that did not participate. In total, 132 schools participated, and 90,118 students completed an in-school survey in 1994. School size varied from fewer than 100 students to more than 3,000 students. Schools were located in urban, suburban, and rural areas throughout the U.S. By stratifying students in each school according to grade and sex, the Add Health team selected a subsample of 12,105 students in grades 7-12 for in-depth interviews at home. Supplemental samples were selected based on ethnicity (Cuban, Puerto Rican, and Chinese), genetic relatedness to siblings, adoption status, and disability. It should be noted that this data oversampled Black or African American adolescents whose parents are college graduates.

Data for Wave 1 included 20,745 adolescents (and 17,670 individuals of one of their parent or parent-like figure) that demonstrated a nationally representative sample of adolescents in the United States in 1994–1995. Individuals from Wave 1 were reinterviewed in 1996 (Wave 2, N = 14,738), 2001-2002 (Wave 3, N = 15,197), 2008–2009 (Wave 4, N = 15,701), and 2016–2018 (Wave 5, N = 12,300). Also, to obtain unbiased estimates of population parameters and standard errors from data analysis, Add Health includes sampling weights for analyses. Further information about the sampling procedures and sampling weights can be found in Chen and Harris (2020).

Participants in this dissertation included all those who responded to the Add Health surveys at Waves 1, 3, and 5. Specifically, this dissertation focused on individuals at Wave 5 who responded about whether they had taken nonprescription pain relievers or opioids, such as Vicodin, OxyContin, Percocet, Demerol, Percodan, or Tylenol with codeine during the past 30 days (n = 9,950). The response rates for Waves 3 and 5 were

77.4% and 71.8%, respectively, based on the Wave 1 sample (the National Longitudinal Study of Adolescent to Adult Health, 2023). This study was reviewed and approved by the University of Georgia's Institutional Review Board (IRB) on March 20, 2023 (approval no. VERSION00002112).

Measures

Prescription Pain Reliever Misuse. The dissertation's primary dichotomous dependent variable was prescription pain reliever misuse, assessed at Wave 5. Participants were asked whether they had taken nonprescription pain relievers or opioids, such as Vicodin, OxyContin, Percocet, Demerol, Percodan, or Tylenol with codeine, within the past 30 days. Responses were coded either as *no* (0) or *yes* (1).

Self-Perceived Adult Status. Self-perceived adult status was assessed using one question at Wave 3: *How often do you think of yourself as an adult?* Participants responded on a 5-point Likert scale ranging from *never* (0), *seldom* (1), *sometimes* (2), *most of the time* (3), and *all of the time* (4). This measure was dichotomized, with a code of 1 assigned to those who reported feeling like an adult *all the time* (1) and a code of 0 assigned to those who selected any other response option. This method of adult-status classification has been used elsewhere (e.g., Benson & Furstenberg, 2006; Benson & Johnson, 2009; Nelson & Barry, 2005). Using Add Health data, prior researchers have examined and confirmed the validity of this measure for studying the relationship with the theoretically relevant developmental characteristics of emerging adulthood (Kirkpatrick-Johnson et al., 2007).

Caregiver-Adolescent Relationship Quality. For Wave 1, five questions captured the quality of parenting that the adolescent perceived with their residential

caregivers: *closeness, warmth, caring, communication, and overall.* Two of the five questions were selected from the *relationship with parents'* subset survey in which adolescents were asked "*how close do you feel to your mother/father figure,"* and "*how much do you think she/he cares about you?"* Responses to these questions ranged from *not at all* (1) to *very much* (5). Three other items were selected from the *personality and family* subset survey which asked to what extent adolescents agree with the statements "*most of the time, your mother/father is warm and loving toward you", "you are satisfied with the way you and your mother/father communicate with each other*," and "*Overall, you are satisfied with your relationship with your mother/father."* Participants responded on a 5-point Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). Responses were recoded from 0 to 4 in which a higher score indicated a more positive perception.

For this dissertation, I used information that the adolescent provided about their relationships with their mother/father figures to create an caregiver-adolescent relationship measure. In Add Health, there are separate items for each of those five scales related to a residential mother figure and a residential father figure. Five questions were asked about the participant's relationship with the mother figure and five questions were asked about their relationship with a father figure. I combined these questions to create the five scales that reflect the quality of adolescent relationships with their caregiver. First, I created ten separate scales (using five questions related to the mother figure and five questions related to the father figure) for the five scales of *closeness, warmth, caring, communication, and overall.* If information about the residential parental figures or caregivers was missing, non-residential caregiver information reported by the adolescents

was used instead. A non-residential caregiver is a person who is not a member of the adolescent's household. However, in the unlikely event that a participant lived alone or in an institution, the Add Health survey's instructions directed participants to skip answering these questions.

I then combined information from both parental figures to create the five scales used in this dissertation to measure the quality of the relationship between adolescents and their caregivers. If participants responded to both parental figures on the relationship measure, their scores were calculated as the mean of the scores they reported for both caregivers. In cases where data was missing for the relationship with either the father or the mother, the score of the available parent was used to maximize the sample size. Prior research using Add Heath data used these scales to measure the caregiver-adolescent relationship (Benson & Elder, 2011; Deptula et al. 2010) and reported high internal reliability (α = .83) for the five items (Benson & Elder, 2011).

Caregiver Warmth. Perceived caregiver warmth by participants during emerging adulthood was measured at Wave 3 by asking the extent to which the participants agreed with the statement that "*most of the time he/she is warm and loving toward you*." When information about the residential caregiver (either mother or father figure) was missing, this dissertation used information for a non-residential caregiver. Responses to this item in Add Health survey ranged from 1 (*strongly agree*) to 5 (*strongly disagree*). For this dissertation, responses to this item were recoded from 0 (*strongly disagree*) to 4 (*strongly agree*) with higher values indicating higher perceived caregiver warmth. When respondents reported on their relationship with both parent figures, their scores reflected the mean of the scores that they reported for both. To maximize the sample size, in cases

where there was a missing value for the relationship with either father or mother, the score of one parent reflected the value of this measure.

Childhood Abuse Experience. Two questions for Wave 3 were merged to create a new dichotomous measure assessing the history of any physical or sexual abuse by caregivers before grade 6. In the Add Health survey, physical abuse was assessed with the question "*how often had your parents or adult caregiver slapped, hit, or kicked you?"* Sexual abuse was assessed with the question "*how often had one of your parents or other adult caregivers touched you in a sexual way, forced you to touch him or her in a sexual way, or forced you to have sexual relations?"* Participants were asked to respond to these questions using six categories ranging from *This never happened* to *More than ten times*. Consistent with previous research using data from Add Health (Austin et al., 2018), these questions were combined to create a dichotomized measure to show any history of child abuse experience *never occurring* (0) or occurring *once or more often* (1) for the survey's respondents.

Depressive Symptoms. Depressive symptoms were measured at Wave 3 using nine statements that prior researchers using Add Health dataset commonly applied (Fish & Pasley, 2015; Johnson & Galambos, 2014; Primack et al., 2009; Schuler et al., 2015). Nine of the statements were from the 20 statements of the Center for Epidemiologic Studies Depression (CES-D) Scale (Radloff, 1977). The CES-D scale is a widely used self-report scale designed to assess the frequency and severity of depressive symptoms in the general population (Radloff, 1977). The scale has been validated in numerous studies and is a commonly used tool in clinical and research settings for evaluating depressive symptoms. Participants responded about how frequently they experienced each symptom

during the past seven days on a 4-point Likert scale ranging from 0 (*rarely or never*) to 3 (*most or all of the time*). The items include "*you were bothered by things that usually don't bother you," "you could not shake off the blues," "you felt that you were just as good as other people," "you had trouble keeping your mind on what you were doing," "you were depressed," "you were sad,"* and *"you felt that people disliked you*." Two positive statements were inversely scored for calculating the total score. Total scores ranged from 0 to 27 in which a higher score indicated a greater risk of depression. Prior research using Add Heath data has used this 9-item scale widely in research and reported high internal reliability for this measure at Wave 3 (e.g. α = .80 in Fish & Pasley, 2015 and Schuler et al., 2015; α = .81 in Primack et al., 2009). Consistent with other Add Health research (Primack et al., 2009; Bayly et al., 2022), this dissertation used scores of 10 and higher for men and 11 and higher for women to create a dichotomous measure that reflected having *low* (0) or *high* (1) depressive symptoms.

Suicidal Ideation. A single-item question for Wave 3 asked participants assessed suicidal ideation, which asked *"during the past months, did you ever seriously think about committing suicide?"* Participants responded *no* (0) or *yes* (1), which was a dichotomous variable for this dissertation.

Criminal Justice Involvement. Criminal justice involvement was assessed using data from Wave 3. Participants were asked "*have you ever been arrested or taken into custody by the police?"* Responses were corded as *no* (0) or *yes* (1).

Life Satisfaction. Life satisfaction during emerging adulthood was assessed using a single item at Wave 3 that asked, "*how satisfied are you with your life as a whole?"*

Participants responded on a 5-point Likert scale from *very satisfied* (0) to *very dissatisfied* (4).

Prescription Pain Reliever Misuse between the W1 and W3 Interviews. Add Health used a single question at Wave 3 about any misuse of prescription pain relievers. Participants were asked if they had taken painkiller drugs such as Darvon, Demerol, Percodan, or Tylenol with codeine since June 1995 without a doctor's permission. Participants responded *yes* (1) or *no* (0), yielding a dichotomous outcome variable for this dissertation.

Binge Drinking. At Wave 3, Add Health asked participants were asked "*during the past two weeks, how many times did you have five or more drinks on a single occasion?"* Answers to this question ranged between 0 and 14. For this dissertation, responses were recoded as *no* (0) indicating zero times and *yes* (1) indicated once or more times.

Smoking. A single-item question at Wave 3 asked participants "*have you ever smoked cigarettes regularly—that is, at least one cigarette every day for 30 days?"* Responses were coded as *no* (0) or *yes* (1).

Marijuana Use. Marijuana use at Wave 3 assessed by a single question asked participants "*during the past 30 days, how many times have you used marijuana?"* Answers to this question ranged from 0 to 500. For this dissertation, a dichotomous variable was made in which *no* (0) indicated no marijuana use, and *yes* (1) indicated any marijuana use in the past 30 days.

Psychological or Substance Use Treatment. Receiving any psychological or substance use treatment in the past year for respondents at Wave 3 was assessed using a

composite of two binary questions including "*in the past 12 months have you received psychological or emotional counseling,"* and "*in the past 12 months have you attended a drug abuse or alcohol abuse treatment program?"* Participant responses to these questions were coded as *no* (0) and *yes* (1). In this dissertation, the questions were combined to create a dichotomous measure showing whether the participant received any psychological or substance use treatment. The new measure was recoded as *no* (0) and *yes* (1).

Having a Mentor after Age 14. Mentoring was assessed by one question at Wave 3 that asked participants *"other than your parents or step-parents, has an adult made an important positive difference in your life at any time since you were 14 years old?"* Participants' responses to this measure were coded as *no* (0) and *yes* (1).

Sociodemographics. The dissertation included six socio-demographic characteristics that participants completed at the Wave 3 interview. Gender was a bivariate variable using *male* (0) and *female* (1). Age was a continuous measure calculated by Add Health researchers from participant's birthdate and Wave 3 interview date. A categorical measure of participants' race/ethnicity was created including White Non-Hispanic (0), Black or African American non-Hispanic (1), Hispanic (2), and Other non-Hispanic (3).

Using several questions, Add Health asked participants about their degrees or diplomas with choices ranging from GED or high school diploma to doctoral degree. For this dissertation, a binary variable was created by defining *GED or high school diploma or below* (0) and *some college education and beyond* (1). Also, a binary variable of participants' current marital status was created in which (0) indicated single or separated

and (1) indicated married. Finally, a binary variable was created to indicate whether participants *primarily worked full-time* (1) or did not work primarily full time (0). To create this measure, three binary questions were asked to determine if participants had ever held a job, worked for pay, and if so, whether they primarily worked full-time or part-time. This approach allowed researchers to differentiate between participants who have mostly worked full-time and those who have not.

Data Analysis Plan

To ensure that the sample remained representative of the population, this dissertation used individual sample weights from Wave 5 (using pw = gsw5) in the analysis. As the dissertation used measures from Waves 1 and 3 and the outcome variable was assessed at Wave 5, the use of sample weights allowed for the appropriate adjustment of the data to account for any potential biases that may arise due to changes in the composition of the sample over time. The application of sample weights can enhance the accuracy and generalizability of the dissertation's findings to the broader population.

Descriptive analyses were conducted, including measures of central tendency, measures of dispersion, missingness, and characteristics associated with prescription pain reliever misuse among respondents from Add Health data.

The structural equation model, in two steps, was used to examine the conceptual model presented in this dissertation and identify factors associated with the misuse of prescription pain relievers in adults using Stata version (16). In the first step, a measurement model including a confirmatory factor analysis (CFA) was conducted to examine whether the measure of the quality of the caregivers-adolescent relationship fits to create one latent factor. The reliability of the measurement was calculated and reported

in the results section. In the second step, the structural equation model analyses combined the latent and observed variables of three waves (W1, W3, W5) to examine the model fit and the significance of the structural paths specified among the variables in the dissertation's suggested model. To account for the binary nature of the outcome variable in this dissertation, a generalized structural equation model was employed using the *gsem* command. Structural equation model allows for the inclusion of both observed and unobserved variables in the model, enhancing the understanding of the relationships among the variables and the prediction of the binary outcome.

This dissertation also used the maximum likelihood (ML) method to estimate the suggested model. The maximum likelihood method is the most common estimation method used to fit structural equation models. Using this method, estimations for parameters are obtained by considering different sets of values and selecting the set of parameters that minimizes the difference between the model-implied covariance matrix and the observed covariance matrix (Ferron & Hess, 2007). Therefore, the selected model presents the best estimation of population parameters with the greatest replicability (Thompson, 2004). Also, given using weighted data and the generalized structural equation model in this dissertation, the maximum likelihood method is an appropriate and only method to estimate the dissertation's model (StataCorp. 2013; 2017).

Global model fit was measured using the comparative fit index (CFI), and Root Mean Square Error of Approximation (RMSEA; Hu & Bentler, 1999; Thompson, 2004). Researchers have suggested acceptable fit values close to .95 for the CFI, and the acceptable cutoff value close to .08 for RMSEA (Thompson, 2004). The reported fit indices allow for assessing the accuracy and appropriateness of the model in explaining

the relationships among the variables. As Stata does not provide fit indices when using the weighted data along with *gsem* command, this dissertation reported the fit indexes for an unweighted data model using the *sem* command. Although the unweighted data model may not perfectly reflect the population characteristics, it still provides valuable information for assessing the model's overall performance.

CHAPTER 4

RESULTS

Sample Description

The missing data for measures in this dissertation were minimal. The measure of suicidal ideation had the highest rate of missingness which was 2.31% (*n* = 230). As this rate was below the 10% threshold that would require further treatment, this dissertation considered the missingness as missing at random (MAR; Dong & Peng, 2013).

The sociodemographic characteristics of participants at Wave 3 and their associations among individuals who misused and did not misuse prescription pain relievers at Wave 5 are presented in Table 1. Mean age at W5 was 37.28 years old (*M* = 37.28, *SD* = 0.12, range = 32-42. Among individuals at Wave 5, 7.4% (*n* = 736) reported misuse of prescription pain relievers in the last 30 days. At Wave 3, the mean age of participants was 21.76 (*SD* = 1.83, range = 18-27). Among individuals at Wave 3, 20.5% reported misuse of prescription pain relievers between Wave 1 and Wave 3 that were interviewed. The majority of the sample at Wave 3 were female (50.93%), White non-Hispanic (66.91%), single (82.44%), with a high school diploma or GED or below (82.75%) and had full-time job experience (63.12 %).

At Wave 3 of the study, 40.98% of participants endorsed thinking of themselves as an adult all the time. The mean of perceiving the caregiver's warmth was 3.46 (*SD* = 0.03, range = 0-4). Also, 28.90% of respondents endorsed the experience of having physical or sexual abuse before the 6th grade, 76.74% reported having a mentor after age

fourteen, 7.17% of respondents endorsed suicidal ideation, 8.47% of respondents reported a high level of depressive symptoms, and the mean score for life satisfaction was 3.09 (*SD* = 0.82, range = 0-4). In terms of alcohol and substance use during emerging adulthood, any misuse of prescription pain relievers between the Waves 1 and 3 interview was reported by 20.50% of respondents, 35.10% endorsed having binge drinking experience at least once within the last two weeks, 35.28% of respondents reported smoking every day in the past 30 days, and 23.28% reported marijuana use in the past 30 days. Also, 11.34% of respondents reported criminal justice involvement, and 9.11% of respondents reported receiving any psychological or substance use treatment in the past year.

Table 1 also presents the associations between the measures assessed at Wave 3 and the misuse of prescription pain relievers at Wave 5. Regarding sociodemographic measures, among individuals who reported no misuse of prescription pain relievers at Wave 5, 45.22% identified as male and 47.39% as female during their interview at Wave 3. In contrast, among those with misuse of prescription pain relievers, 3.79% identified as male and 3.60% as female.

Regarding race and ethnicity, among individuals with no misuse of prescription pain relievers at Wave 5, 62.16% identified as White, 13.64% as African American, 9.94% as Hispanic, and 6.87% as belonging to other non-Hispanic racial categories during their interview at Wave 3. Among those with prescription pain reliever misuse, 4.75% identified as White, 1.27% as African American, 0.74% as Hispanic, and 0.61% as belonging to other non-Hispanic racial categories.

Table 1.

Characteristics associates between respondents at W3 with sample misuse of PPR and with no misuse of PPR at W5

Characteristic	Overall % or (M)	No misuse of PPR % or (M)	Misuse of PPR % or (M)
Wave 5			
Age	(37.28)		
Misuse of PPR in past 30 days	100	92.60	7.40
Wave 3			
Age	(21.76)	(21.73)	(21.79)
Gender			
Male	49.07	45.22	3.79
Female	50.93	47.39	3.60
Race			
White none-Hispanic	66.91	62.16	4.75
African American non-Hispanic	14.91	13.64	1.27
Hispanic	10.70	9.96	0.74
Other non-Hispanic	7.48	6.87	0.61
Marital status			
Single	82.44	76.39	6.05
Married	17.56	16.30	1.26
Education			
High school diploma or GED or below	82.75	76.07	6.68
Some college education and beyond	17.25	16.56	0.70
Employment status			
Unemployed or part time	36.88	34.33	2.55
Full time	63.12	58.27	4.85
History of having child abuse			
Never accrued	71.10	66.50	4.46
Once or more time accrued	28.90	26.19	2.70
Perceived parental warmth	(3.46)	(3.49)	(3.40)
Depression			
No	91.53	85.02	6.51
Yes	8.47	7.55	0.91
Suicidal ideation			
No	92.83	86.53	6.31
Yes	7.17	6.20	0.97
Criminal justice involvement			
No	88.66	82.51	6.15
Yes	11.34	10.10	1.24

Characteristic	Overall % or (M)	No misuse of PPR % or (M)	Misuse of PPR % or (M)
Life satisfaction	(3.09)	(3.19)	(2.98)
Misuse of PPR since 1994			
No	79.50	74.66	4.84
Yes	20.50	17.98	2.52
Binge drinking in past 2 weeks			
No	64.90	60.50	4.40
Yes	35.10	32.14	2.96
Smoking in past 30 days			
No	64.72	60.83	3.89
Yes	35.28	31.77	3.51
Marijuana use in past 30 days			
No	76.60	71.83	4.77
Yes	23.40	20.80	2.60
Receiving treatment			
No	90.89	84.49	6.39
Yes	9.11	8.11	1.01
Mentor after age 14			
No	23.26	21.54	1.73
Yes	76.74	71.05	5.69
Self-perceived adult status			
otherwise	59.02	55.15	3.87
All the time	40.98	37.44	3.54

Note. N = 9,950 (weighted Sample). PPR = prescription pain relievers

Furthermore, among individuals who reported no misuse of prescription pain relievers at Wave 5, 76.39% were single and 16.30% were married during their interview at Wave 3. However, among respondents with prescription pain reliever misuse, only 6.05% were single and 1.26% were married.

In terms of education, among individuals with no misuse of prescription pain relievers at Wave 5, 76.07% reported having a high school diploma, GED, or below, and 16.56% reported having some college education and beyond during their interview at Wave 3. Among respondents with prescription pain reliever misuse, 6.68% had a high school diploma or GED or below, and 0.70% had some college education and beyond.

For employment status, among individuals who reported no misuse of prescription pain relievers at Wave 5, 34.33% had been unemployed or had part-time jobs, and 58.27% had full-time job experience during their response to the survey at Wave 3. However, among respondents with prescription pain reliever misuse at Wave 5, only 2.55% had been unemployed or had a part-time job, and 4.85% had full-time job experience during their response to the survey at Wave 3.

In terms of childhood abuse experience, among individuals with no misuse of prescription pain relievers at Wave 5, 66.50% reported no history of childhood abuse, and 26.19% reported having childhood abuse experience during their response to the survey at Wave 3. Among those with prescription pain reliever misuse at Wave 5, 4.46% reported no childhood abuse experience, and 2.70% reported having childhood abuse experience.

Among individuals with no misuse of prescription pain relievers at Wave 5, the mean for perceiving the caregiver's warmth was 3.49 (*SD* = 0.64, range = 0-4), when they responded to the survey at Wave 3. Among those with prescription pain reliever misuse at Wave 5, the mean for perceiving the caregiver's warmth was 3.40 (*SD* = 0.68, range = 0-4).

Among individuals with no misuse of prescription pain relievers at Wave 5, 85.02% of respondents reported a low level of depressive symptoms, and 7.55% reported a high level of depressive symptoms during their interview at Wave 3. Among those with prescription pain reliever misuse at Wave 5, 6.51% reported a low level of depressive symptoms, and 0.91% reported a high level of depressive symptoms.

Among individuals with no misuse of prescription pain relievers at Wave 5, 86.53% reported no suicidal ideation and 7.20% reported having suicidal ideation during their interview at Wave 3. Among those with prescription pain reliever misuse at Wave 5, 6.31% reported no suicidal ideation and 0.97% reported having suicidal ideation.

Among individuals who reported no misuse of prescription pain relievers at Wave 5, 82.51% of respondents had no criminal justice involvement and 10.10% had criminal justice involvement when they were interviewed at Wave 3. However, among those with prescription pain reliever misuse, 6.15% reported having no criminal justice involvement and 1.26% reported having criminal justice involvement.

Additionally, among individuals with no misuse of prescription pain relievers at Wave 5, the mean of life satisfaction was 3.19 (SD = 0.01) during their interview at Wave 3, and the mean of life satisfaction was 2.98 (SD = 0.05) for those who reported prescription pain reliever misuse later at Wave 5.

In terms of substance use, of individuals who reported no misuse of prescription pain relievers at Wave 5, 47.66% reported no prescription pain reliever misuse since they were interviewed in Wave 1, and 17.98% reported prescription pain reliever misuse during this time when they had responded to the survey at Wave 3. Among those with prescription pain reliever misuse in Wave 5, 4.84% reported no misuse of prescription pain relievers and 2.52% reported the misuse of prescription pain relievers when they were interviewed at Wave 3.

Among individuals who reported no misuse of prescription pain relievers at Wave 5, 60.50% had not engaged in binge drinking in the past two weeks during their response to the survey at Wave 3. In contrast, 32.14% had engaged in binge drinking during their

response to the survey at Wave 3. However, among those with prescription pain reliever misuse at Wave 5, 4.40% of respondents reported not engaging in binge drinking in the past two weeks during their response to the survey at Wave 3. Conversely, 2.96% of respondents reported engaging in binge drinking during their response to the survey at Wave 3. Of individuals who reported no misuse of prescription pain relievers at Wave 5, 60.83% of respondents reported no smoking and 31.77% of respondents reported smoking in the past month when they were interviewed in Wave 3, and among those with prescription pain reliever misuse at Wave 5, 3.89% of respondents reported smoking and 3.51% did not report smoking.

Among individuals who reported no misuse of prescription pain relievers at Wave 5, 71.83% of respondents reported no marijuana use and 20.80% of respondents reported marijuana use in the past 30 days when they had responded to the survey at Wave 3, and among respondents with prescription pain reliever misuse at Wave 5, 4.77% of respondents reported no marijuana use and 2.60% of respondents reported marijuana use in the past 30 days.

For individuals who reported no misuse of prescription pain relievers at Wave 5, 84.49% of respondents did not receive psychological or substance use treatments, while 8.11% of respondents had received these treatments during their response to the survey at Wave 3. Among those with prescription pain reliever misuse, 6.39% of respondents did not receive psychological or substance use treatments, and 1.01% of respondents had received these treatments.

In terms of mentorship, among individuals who reported no misuse of prescription pain relievers at Wave 5, 21.54% of respondents reported having no mentor after age 14,

and 71.05% of respondents reported having a mentor after age 14 during their response to the survey at Wave 3. However, among those with prescription pain reliever misuse, 1.73% of respondents reported having no mentor after age 14, and 5.69% of respondents reported having a mentor after age 14. Last, of individuals who reported no misuse of prescription pain relievers at Wave 5, 55.15% reported that they had the feeling of being in-between and 37.44% reported that they always felt being an adult when they had responded to the survey at Wave 3, and among respondents with prescription pain reliever misuse, 3.87% reported they did not feel being an adult and 3.54% reported that they felt being an adult.

Structure Equation Modeling

Measurement Model. Table 2 shows the list of indicators and correlation among the indicators of the latent factor which assess the quality of the caregiver-adolescent relationship. The correlations between all five indicators are above .30 which shows the five indicators are factorable. The lowest correlation was .38 which was between being satisfied of communication and perceive caring from caregiver. The highest correlation was .82 which was between overall satisfaction with the relationship and being satisfied of communication.

Table 2 also shows mean and standard deviation scores of the quality of caregiver-adolescent relationship indicators for individuals who reported the misuse of prescription pain relievers in adulthood and those who did not. Results show that among individuals with no misuse of prescription pain relievers, the highest mean score is observed in feeling caring with the lowest standard deviation score (M = 3.81, SD = 0.47, range = 0-4), and the lowest mean score is observed in the satisfaction of communication

with the highest standard deviation score (M = 3.01, SD = 0.91, range = 0-4). Among individuals with misuse of prescription pain relievers, the highest mean score is observed in feeling caring with the lowest standard deviation score (M = 3.78, SD = 0.51, range = 0-4), and the lowest mean score is observed in the feeling warmth from the relationship with caregiver with the highest standard deviation score (M = 2.92, SD = 0.85, range = 0-4) among the five indicators. Table 2 also shows the difference in means of the five indicators between the individuals with misuse of prescription pain relievers and individuals with no misuse. The results show a consistent pattern of the mean scores slightly higher on the group with no misuse than the group with misuse of prescription pain relievers; however, significant differences exist between these two groups only in feeling closeness (F = 4.54, p = .05) and perceived warmth relationship (F = 4.91, p = .05).

A confirmatory factor analysis was performed to assess the reliability of the latent factor, using unweighted sample[5]. Table 3 and 4 has shown the confirmatory factor analysis results. As in Table 3 has been shown, the factor analysis of indicators identified one main factor with eigenvalue over one (3.36) which cumulatively explains 67% of the proportional variance out of the total variance in the entire of the sample. Thirty three percent variance is explained by other factors.

[5] Stata does not provide factor analysis when using the weighted data. Researchers use sem command for conducting factor analysis using weighted sample. In this dissertation, I report results of both methods.

Table 2.

Correlation, Mean, and Standard Deviation of quality of caregiver-adolescent relationship between participants with PPR misuse and with no PPR misuse

Observed indicators	1	2	3	4	5
1. Closeness	1.00				
2. Caring	.56	1.00			
3. Warmth	.58	.49	1.00		
4. Satisfied with communication	.60	.38	.64	1.00	
5. Overall satisfaction of relationship	.65	.44	.69	.82	1.00
No misuse of PPR in W5					
M	3.44	3.81	3.28	3.01	3.22
SD	0.75	0.47	0.74	0.91	0.82
Misuse of PPR in W5					
M	3.36	3.78	3.19	2.92	3.21
SD	0.80	0.51	0.76	0.85	0.74
F	4.54*	1.76	4.91*	2.60	0.16

Note. N = 9,672. *$p < .05$, all measures ranges between 0 to 4, PPR = prescription pain relievers, W = Wave

Table 3.

Factor analysis results

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1	3.36	2.64	.67	0.67
Factor 2	0.73	0.32	.15	0.82
Factor 3	0.40	0.06	.08	0.90
Factor 4	0.34	0.17	.07	0.97
Factor 5	0.17	.	.03	1.00

Note. N = 9,672. Method = principal-component factors. Rotation = (unrotated). Number of params = 5; $x^2(10) = 2.8e.04$, $p = .01$

Table 4 shows results of factor loadings and uniqueness using unweighted sample. In unrotated solution, the uniqueness values have a range between 0.21 and 0.55 which are partially consistent.

Table 4

Factor loadings (pattern matrix) and unique variances using unweighted sample

Indicator	Factor 1	Uniqueness
Closeness	0.83	0.31
Caring	0.67	0.55
Warmth	0.83	0.30
Satisfied with communication	0.86	0.27
Overall satisfaction of relationship	0.89	0.21

The residual matrix, is shown in Table 5, shows that the residual values are all less than one which confirms the factor analysis model with one factor is a good model.

Table 5

Row residual of correlations between five indicators of the latent factor of caregiver-adolescent relationship quality

Indicator	1	2	3	4	5
1. Closeness	0				
2. Caring	.01	0			
3. Warmth	-.11	-.07	0		
4. Satisfied with communication	-.11	-.19	-.08	0	
5. Overall satisfaction of relationship	-.09	-.17	-.06	.06	0

Table 6 shows unstandardized and standardized coefficients of the latent factor's indicators resulting from testing the measurement model using weighted sample. All five paths from the latent factor to the indicators were statistically significant. The results show the five indicators were confirmed to create one latent factor. These results show that the latent factor of the caregiver-adolescent relationship quality is associated with high odds of the caring ($b = 0.53$, $p < .01$), closeness ($b = 0.73$, $p < .01$), warmth ($b = 0.77$, $p < .01$), satisfaction of communication ($b = 0.86$, $p < .01$) and overall satisfaction

of relationship (b = 0.92, p < .01). The internal reliability for the five indicators of the latent variable was high (α = .87).

Table 6.

Measurement Model for the quality of caregiver-adolescent relationship using weighted sample

Latent variable	Observed variable	Unstandardized	SE	Standardized
		Measurement Model		
Quality of caregiver-adolescent relationship				
	Caring	1	(constrained)	0.53**
	Closeness	2.23**	0.08	0.73**
	Warmth	2.27**	0.10	0.77**
	Satisfied with communication	3.13**	0.16	0.86**
	Overall satisfaction of relationship	2.99**	0.15	0.92**
Variance				
	Caring	0.16	0.01	0.72
	Closeness	0.27	0.01	0.47
	Warmth	0.22	0.01	0.41
	Satisfied with communication	0.21	0.01	0.25
	Overall satisfaction of relationship	0.10	0.01	0.15
	caregiver-adolescent relationship quality	0.06	0.01	1.00

Note. N = 9,471. **p < .01

Structural Equation Modeling. Table 7 shows the correlation between the observed variables and the sociodemographic measures in the conceptual model. The correlations ranged between .001 and .36. The results of the correlation between measures show that a higher score in perceived parental warmth is significantly

correlated with higher score in life satisfaction (r = .24, p < .01), having a mentor after age 14 (r = .04, p < .01), and educational level (r = .10, p < .01).

However, perceived parental warmth has a significant negative correlation with childhood abuse experience (r = -.22, p < .01), depressive symptoms (r = -.14, p < .01), suicidal ideation (r = -.08, p < .01), criminal justice involvement (r = -.04, p < .01), any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews (r = -.06, p < .01), marijuana use (r = -4, p < .01), smoking (r = -.11, p < .01), receiving counseling or substance use treatments (r = -.06, p < .01), prescription pain reliever misuse in adulthood (r = -.03, p < .01), gender (r = -.03, p < .01), and race and ethnicity (r = -.06, p < .01).

Life satisfaction has significant positive correlations with perceived adult status (r = .06, p < .01), having a mentor after age 14 (r = .05, p < .01), marital status (r = -.12, p < .01), educational level (r = .09, p < .01), and employment status (r = .02, p < .01). However, life-satisfaction has significant negative correlations with childhood abuse experience (r = -.13, p < .01), depressive symptoms (r = -.36, p < .01), suicidal ideation (r = -.23, p < .01), criminal justice involvement (r = -.07, p < .01), any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews (r = -.09, p < .01), binge drinking (r = -.03, p < .01), marijuana use (r = -.13, p < .01), smoking (r = -.13, p < .01), receiving counseling or substance use treatments (r = -0.13, p < .01), prescription pain reliever misuse in adulthood (r = -.07, p < .01), gender (r = -.02, p < .01), and race and ethnicity (r = -.05, p < .01).

Table 7.

Input data (correlations) for analyzing a structural equation model of PPR misuse at W5.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. Parental warmth	1																		
2. Life-satisfaction	.24*	1																	
3. Child abuse	-.22*	-.13*	1																
4. Depression	-.14*	-.36*	.08*	1															
5. Suicidal ideation	-.08*	-.23*	.10*	.21*	1														
6. Criminal Justice Involvement	-.04*	-.07*	.07*	.04*	.08*	1													
7. Any PPR misuse	-.06*	-.09*	.09*	.05*	.13*	.16*	1												
8. Binge drinking	.01	-.03*	.03*	.01	.06*	.18*	.14*	1											
9. Marijuana use	-.04*	-.13*	.07*	.05*	.09*	.25*	.27*	.30*	1										
10. Smoking	-.11*	-.13*	.06*	.07*	.10*	.18*	.15*	.22*	.30*	1									
11. Perceived Adult status	-.01	.06*	-.01	-.02	-.03*	.02*	-.04*	-.06*	-.01	.05	1								
12. Treatment	-.06*	-.13*	.05*	.14*	.21*	.12*	.09*	.05*	.08*	.11*	-.02*	1							
13. Mentor after age 14	.04*	.05*	.04*	-.02*	.03*	.02	.03*	.05*	.004	-.01	-.01	.04*	1						
14. PPR misuse	-.03*	-.07*	.05*	.05*	.07*	.05*	.10*	.03*	.08*	.07*	.04*	.04*	-.001	1					
15. Gender	-.03*	-.02*	-.02*	.05*	.01	-.22*	.04*	-.20*	-.12*	-.03*	.03*	.03*	.04*	-.01	1				
16. Age	.002	.01	.04*	-.01	-.05*	.01	-.06*	-.05*	-.08*	-.01	.14*	-.02	-.05*	.01	-.05*	1			
17. Race	-.06*	-.05*	.06*	.05*	.001	-.004	-.04*	-.11*	-.05*	-.10*	.01	-.04*	-.05*	.01	.003	.03*	1		
18. Marital status	-.01	.12*	.01	-.03*	-.04*	-.06*	-.04*	-.15*	-.15*	-.02*	.15*	-.04*	-.02*	-.003	.10*	.23*	-.01	1	
19. Education	.10*	.09*	-.01	-.06*	-.03*	-.06*	-.04*	-.01	-.07*	-.12*	-.04*	-.02*	.08*	-.06*	.05*	.31*	-04*	.01	1
20. Employment status	-.004	.02*	.03*	-.06*	-.01	.01	.29	.04*	-.01	.03*	.01	-.02	.02*	-.004	-.06*	.23*	-.06*	.03*	.09*

Note. N = 9,083. *$p < .01$, PPR = Prescription pain relievers

Childhood physical or sexual abuse experiences have significant positive correlations with depressive symptoms ($r = .08$, $p < .01$), suicidal ideation ($r = .10$, $p < .01$), criminal justice involvement ($r = .07$, $p < .01$), any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews ($r = .09$, $p < .01$), binge drinking ($r = .03$, $p < .01$), marijuana use ($r = .7$, $p < .01$), smoking ($r = .06$, $p < .01$), receiving counseling or substance use treatments ($r = .05$, $p < .01$), having a mentor after age 14 ($r = .04$, $p < .01$), prescription pain reliever misuse in adulthood ($r = .05$, $p < .01$), age ($r = .04$, $p < .01$), race and ethnicity ($r = .06$, $p < .01$), and employment status ($r = .03$, $p < .01$). There is a significant negative correlation between childhood physical and sexual abuse experience and gender ($r = -.02$, $p < .01$).

Having depressive symptoms has significant positive correlations with suicidal ideation ($r = .21$, $p < .01$), criminal justice involvement ($r = .04$, $p < .01$), any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews ($r = .05$, $p < .01$), marijuana use ($r = .05$, $p < .01$), smoking ($r = .07$, $p < .01$), receiving counseling or substance use treatments ($r = .14$, $p < .01$), prescription pain reliever misuse in adulthood ($r = .05$, $p < .01$), gender ($r = .05$, $p < .01$), and race and ethnicity ($r = .05$, $p < .01$). However, having depressive symptoms has significant negative correlations with having a mentor after age 14 ($r = -.02$, $p < .01$), marital status ($r = -.03$, $p < .01$), high educational level ($r = -.06$, $p < .01$), and employment status ($r = -.06$, $p < .01$).

Suicidal ideation shows significant positive correlations with criminal justice involvement ($r = .08$, $p < .01$), any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews ($r = .13$, $p < .01$), binge drinking ($r = .06$, $p < .01$), marijuana use ($r = .09$, $p < .01$), smoking ($r = .10$, $p < .01$), receiving counseling or substance use

treatments (r = .21, p < .01), having a mentor after age 14 (r = .03, p < .01), and prescription pain reliever misuse in adulthood (r = .07, p < .01). However, having suicidal ideation has significant negative correlations with perceived adulthood status (r = -.03, p < .01), age (r = -.05, p < .01), marital status (r = -.04, p < .01), and high educational level (r = -.03, p < .01).

Criminal justice involvement has significant positive correlations with any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews (r = .16, p < .01), binge drinking (r = .18, p < .01), marijuana use (r = .25, p < .01), smoking (r = .18, p < .01), perceived adulthood status (r = .02, p < .01), receiving counseling or substance use treatments (r = .12, p < .01), and prescription pain reliever misuse in adulthood (r = .05, p < .01). However, criminal justice involvement has significant negative correlations with gender (r = -.22, p < .01), marital status (r = -.06, p < .01), and high educational level (r = -.06, p < .01).

Any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews has significant positive correlations with binge drinking (r = .14, p < .01), marijuana use (r = .27, p < .01), smoking (r = .15, p < .01), receiving counseling or substance use treatments (r = .09, p < .01), having a mentor after age 14 (r = .03, p < .01), prescription pain reliever misuse in adulthood (r = .10, p < .01), and gender (r = .04, p < .01). However, any misuse of prescription pain relievers between Wave 1 and Wave 3 of interviews has significant negative correlations with perceived adulthood status (r = -.04, p < .01), age (r = -.06, p < .01), marital status (r = -.04, p < .01), and high educational level (r = -.04, p < .01).

Binge drinking has significant positive correlations with marijuana use (r = .30, p < .01), smoking (r = .22, p < .01), receiving counseling or substance use treatments (r = .05, p < .01), having a mentor after age 14 (r = .05, p < .01), prescription pain reliever misuse in adulthood (r = .03, p < .01), and employment status (r = .04, p < .01). However, binge drinking has significant negative correlations with perceived adulthood status (r = -.06, p < .01), gender (r = -.20, p < .01), age (r = -.05, p < .01), race and ethnicity (r = -.11, p < .01), and marital status (r = -.15, p < .01).

Marijuana use has significant positive correlations with smoking (r = .30, p < .01), receiving counselling or substance use treatments (r = .08, p < .01), and prescription pain reliever misuse in adulthood (r = .08, p < .01). However, marijuana use has significant negative correlations with gender (r = -.12, p < .01), age (r = -.08, p < .01), race and ethnicity (r = -.05, p < .01), and marital status (r = -.15, p < .01), and high educational level (r = -.07, p < .01).

Smoking has significant positive correlations with receiving counseling or substance use treatments (r = .11, p < .01), prescription pain reliever misuse in adulthood (r = .07, p < .01), and employment status (r = .03, p < .01). However, smoking has significant negative correlations with gender (r = -.03, p < .01), race and ethnicity (r = -.10, p < .01), marital status (r = -.02, p < .01), and high educational level (r = -.12, p < .01).

Perceived adulthood status has significant positive correlations with prescription pain reliever misuse in adulthood (r = .04, p < .01), gender (r = .03, p < .01), and age (r = -.14, p < .01). However, perceived adulthood status has significant negative correlations

with receiving counseling or substance use treatments (r = -.02, p < .01), and high educational level (r = -.04, p < .01).

Receiving counseling or substance use treatments has significant positive correlations with having a mentor after age 14 (r = .04, p < .01), prescription pain reliever misuse in adulthood (r = .04, p < .01), and gender (r = .03, p < .01). However, receiving counselling or substance use treatments has significant negative correlations with race and ethnicity (r = -.04, p < .01), and marital status (r = -.04, p < .01), and high educational level (r = -.02, p < .01).

Having a mentor after age 14 has significant positive correlations with gender (r = .04, p < .01), high educational level (r = .08, p < .01), and employment status (r = .02, p < .01). However, having a mentor after age 14 has significant negative correlations with age (r = -.05, p < .01), race and ethnicity (r = -.05, p < .01), and marital status (r = -.02, p < .01).

Prescription pain reliever misuse in adulthood also shows significant negative correlations with high educational level (r = -.06, p < .01).

Gender has significant positive correlations with marital status (r = .10, p < .01), and high educational level (r = .05, p < .01). However, gender has significant negative correlations with age (r = -.05, p < .01), and employment status (r = -.06, p < .01).

Age has significant positive correlations with race and ethnicity (r = .03, p < .01), marital status (r = .23, p < .01), high educational level (r = .31, p < .01), and employment status (r = .23, p < .01). Race/ethnicity has significant negative correlations with high educational level (r = -.04, p < .01), and employment status (r = -.06, p < .01). Marital status has significant positive correlations with employment status (r = .03, p < .01). The

high educational level also has significant positive correlations with employment status (r = .09, $p < .01$).

Table 8 represents the hypotheses on the associations between individual and social risk and protective factors during adolescence and emerging adulthood, as proposed in this dissertation, and their associations to the misuse of prescription pain relievers in adulthood (M_{age} = 37.28, SD = 0.12, range = 32-42). The measurement model used to the latent variable in the structural equation model demonstrates that all indicators significantly load onto the latent factor ($p < .01$).

Overall, the model accounted for 73% of the variance in misuse of prescription pain relievers at W5. The model shows an acceptable fit to the data (GFI = .73, χ^2 = 9869.190, $p > .01$, df = 65, RMSEA = .072, CFI = .732 using unweighted data). To estimate a model with good fit indices, I examined several models and found no significant change in the value of model parameters and fit indices between the hypothesized model and the other models. In an alternative model, I examined direct paths from all sociodemographic measures to prescription pain reliever misuse. The fit indices of this model did not show a significant change from the hypotheses model (χ^2 = 10207.99, $p > .01$, df = 65, RMSEA = .073, CFI = .722 using unweighted data). In another alternative model, I examined the hypotheses model without the path from childhood abuse experience to perceived parental warmth and did not observe any significant change in the fit indices (χ^2 = 285298.8, $p > .01$, df = 64, RMSEA = .073, CFI = .725 using unweighted data). Comparing the fit indices of the saturated model (χ^2 = 13013.66, $p > .01$, df = 108, RMSEA = .081, CFI = .673 using unweighted data) with the

hypothesized model showed that the later model was a good model. Therefore, I chose the hypothesized model as it was theoretically sensible.

These results show that the model was identified, which means that the structural equation modeling was the only set of model parameters that could be compared (Thompson, 2004). The RMSEA is a fit index that assesses the fit of a model based on its chi-square statistic, degrees of freedom, and sample size. RMSEA is more useful when the sample size is large and suited to more confirmatory contexts (Rigdon, 1996). The CFI tests fit by comparing χ^2 statistics and degrees of freedom of a model with the baseline model. When the values of the CFI do not change significantly between different models, and the absolute value of CFI is not very high, it suggests that the baseline model is not significantly worse than the subsequent model in terms of fit (Rigdon, 1996). Lacking a significant change in the model parameters and fit indices between the hypothesized model and the other models indicates that there is not enough covariance to be explained by the model when compared with the baseline model. Based on the RMSEA value of less than .08, a subtle change in CFI values between models, theoretical considerations, and interpretability (practical consideration) it appears that the structural equation model examined in this dissertation fits the data well (Thompson, 2004).

Paths from the Quality of Caregiver-Adolescent Relationship to Risk and Protective Factors in Emerging Adulthood. Table 8 shows the results of the dissertation's structural equation model. These show that the high quality of the caregiver-adolescent relationship in adolescence is associated with high perceived caregiver warmth during emerging adulthood (*OR* = 1.86, $p < .01$). In turn, high caregiver warmth during emerging adulthood is associated with high odds of life satisfaction (*OR* =

1.32, $p < .01$). While high caregiver warmth during emerging adulthood is associated with low odds of depressive symptoms ($OR = 0.57$, $p < .01$), suicidal ideation ($OR = 0.72$, $p < .01$), misuse of prescription pain relievers between W1 and W3 ($OR = 0.85$, $p < .01$), marijuana use ($OR = 0.89$, $p < .05$), and smoking ($OR = 0.73$, $p < .01$). Caregiver warmth during emerging adulthood does not show a significant association with binge drinking and criminal justice involvement reported during emerging adulthood.

Paths from History of Childhood Abuse Experience to Risk and Protective Factors in Emerging Adulthood. As shown in Table 8, model results show that experience of child abuse before grade 6 is associated with lower odds of perceived caregiver warmth ($OR = 0.77$, $p < .01$) and life-satisfaction ($OR = 0.87$, $p < .01$) during emerging adulthood. In addition, child abuse experience before grade 6 is associated with higher odds of depressive symptoms ($OR = 1.41$, $p < .01$), suicidal ideation ($OR = 2.05$, $p < .01$), experience of criminal justice involvement ($OR = 1.52$, $p < .01$), misuse of prescription pain reliever between W1 and W3 ($OR = 1.52$, $p < .01$), binge drinking ($OR = 1.19$, $p < .01$), marijuana use ($OR = 1.32$, $p < .01$), and smoking ($OR = 1.16$, $p < .05$) reported during emerging adulthood.

Table 8.

Maximum likelihood estimates for a structural equation model of PPR misuse at W5

Path to	Path from	Unstandardized Coef.	SE	Standardized exp (b)
			Structural Model	
Caring	Quality of caregiver-adolescent relationship	1.00	(constrained)	2.72
Closeness	Quality of caregiver-adolescent relationship	2.17**	0.08	8.77**
Warmth	Quality of caregiver-adolescent relationship	2.26**	0.10	9.62**
Satisfied with communication	Quality of caregiver-adolescent relationship	3.13**	0.16	22.83**
Overall satisfaction of relationship	Quality of caregiver-adolescent relationship	2.97**	0.15	19.54**
Parental warmth	History of child abuse	-0.26**	0.02	0.77**
	perceived parenting quality	0.62**	0.05	1.86**
Life-satisfaction	Parental warmth	0.28**	0.02	1.32**
	Child abuse (yes)	-0.14**	0.03	0.87**
Depression(yes)	Parental warmth	-0.57**	0.07	0.57**
	Child abuse (yes)	0.35**	0.12	1.41**
Suicidal ideation(yes)	Parental warmth	-0.32**	0.07	0.72**
	Child abuse (yes)	0.72**	0.11	2.05**
Criminal justice involvement (yes)	Parental warmth	-0.14	0.08	0.87
	Child abuse (yes)	0.42**	0.11	1.52**
PPR misuse between W1 and W3 (yes)	Parental warmth	-0.16**	0.05	0.85**
	Child abuse (yes)	0.42**	0.42	1.52**
Binge drinking (yes)	Parental warmth	0.06	0.05	1.06
	Child abuse (yes)	0.17**	0.06	1.19**
Marijuana use (yes)	Parental warmth	-0.11*	0.05	0.89*
	Child abuse (yes)	0.28**	0.07	1.32**
Smoking (yes)	Parental warmth	-0.32**	0.05	0.73**
	Child abuse (yes)	0.15*	0.07	1.16*

Path to	Path from	Unstandardized Coef.	SE	Standardized exp (b)
		Structural Model		
Self-perceived adult status (always)	Depression(yes)	-0.03	0.14	0.97
	Suicidal ideation(yes)	-0.02	0.14	0.98
	criminal justice Involvement (yes)	0.18	0.10	1.20
	Life satisfaction	0.22**	0.04	1.25**
	Any PPR misuse (yes)	-0.14	0.09	0.87
	Binge drinking	-0.21**	0.08	0.81**
	Marijuana use	0.13	0.09	1.14
	Smoking	0.30**	0.07	1.36**
	Having a mentor after age 14 (yes)	0.05	0.08	1.05
	Gender (female)	0.21**	0.06	1.23**
	Age	0.14**	0.02	1.15**
	Race			
	Black non-Hispanic	0.70**	0.09	1.97**
	Hispanic	0.10	0.11	1.11
	Others non-Hispanic	-0.16	0.13	0.86
	Education	-0.45**	0.09	0.64**
	Employment status	0.28	0.07	1.32
Past 30 days PPR misuse-W5 (yes)	Self-perceived adult status (always)	0.31**	0.11	1.36**
	Treatment (yes)	0.51**	0.16	1.66**
Measurement error variances				
Quality of caregiver-adolescent relationship		0.06	0.01	
Closeness		0.16	0.01	
Caring		0.28	0.01	
Warmth		0.23	0.01	
Satisfied of communication		0.21	0.01	
Overall satisfaction of relationship		0.10	0.01	
Parental warmth		0.37	0.01	
Life-satisfaction		0.59	0.02	

Note. N = 10,006. Model fit statistics: Using unweighted data (GFI = .73, χ^2 = 9869.19, *df* = 65, *p* > .001, RMSEA = .072, CFI = .732). *p < .05, **p < .01, PPR = prescription pain relievers

Paths from Sociodemographic and Risk and Protective Factors to Self-Perceived Adulthood Status in Emerging Adulthood. Examining the structural equation model presented in Table 8 also shows that among risk and protective factors, life satisfaction and smoking is associated with higher odds of self-perception as an adult (*OR* = 1.25, $p < .01$; *OR* = 1.36, $p < .01$, respectively). However, binge drinking is associated with lower odds of self-perception as an adult (*OR* = 0.81, $p < .01$). Depressive symptoms, suicidal ideation, criminal justice involvement, prescription pain reliever misuse between W1 and W3, marijuana use, and having a mentor after age 14 show no significant association with self-perception as an adult.

Among sociodemographic factors, being female (*OR* = 1.23, $p < .01$), identifying with African American non-Hispanic race (*OR* = 1.97, $p < .01$), older age (*OR* = 1.15, $p < .01$), being married (*OR* = 1.77, $p < .01$), and mostly employed in a full-time job (*OR* = 1.33, $p < .01$) are associated with higher adds of self-perception as an adult. However, a higher level of education is significantly associated with lower odds of self-perception as an adult (*OR* = 0.64, $p < .01$) during emerging adulthood.

Paths from Self-perceived Adulthood Status and Receiving Treatment to PPRs Misuse in Middle Adulthood. As shown in Table 8, the results of the structural equation model indicate that self-perception as an adult during emerging adulthood is associated with higher odds of prescription pain reliever misuse in adulthood (*OR* = 1.36, $p < .01$). Also, receiving psychological and substance use counseling is significantly associated with higher odds of prescription pain reliever misuse in adulthood (*OR* = 1.66, $p < .01$).

Indirect Paths from Quality of Caregiver-adolescent Relationship and Childhood Abuse Experience to Prescription Pain Reliever Misuse in Adulthood. Figure 2 illustrates the full indirect and direct paths from the dissertation measures to prescription pain reliever misuse in adulthood. Table 9 presents only the results of significant indirect paths for the structural equation model of prescription pain reliever misuse in adulthood. Examining the structural equation model shows that child abuse experience (*OR* = 0.77, $p < .01$) and quality of caregiver-adolescent relationship (*OR* = 1.86, $p < .01$) is associated with higher odds of caregiver warmth. In turn, caregiver warmth is associated with higher odds of life satisfaction (*OR* = 1.32, $p < .01$), but lower odds of smoking (*OR* = 0.73, $p < .01$). Life satisfaction and smoking are associated with higher odds of self-perception as an adult during emerging adults (*OR* = 1.24, $p < .01$; *OR* = 1.36, $p < .01$, respectively) and, in turn, self-perception as an adult is associated with higher odds of prescription pain reliever misuse in adulthood (*OR* = 1.36, $p < .01$).

Indirect paths from childhood abuse to prescription pain reliever misuse in adulthood show that childhood abuse is associated with lower odds of life-satisfaction (*OR* = 0.87, $p < .01$) but higher odds of binge drinking (*OR* = 1.18, $p < .01$) and smoking (*OR* = 1.16, $p < .01$). In turn, life satisfaction and smoking are associated with higher odds of self-perception as an adult (*OR* = 1.24, $p < .01$; *OR* = 1.36, $p < .01$, respectively). Self-perception as an adult is associated with higher odds of prescription pain reliever misuse in adulthood (*OR* = 1.36, $p < .01$).

Age (*OR* = 1.15, $p < .01$), gender (*OR* = 1.23, $p < .01$), race (only African American compared with White none-Hispanic, *OR* = 2.02, $p < .01$), marital status (*OR* = 1.76, $p < .01$), and employment status (*OR* = 1.33, $p < .01$) are associated with higher

odds of self-perception as an adult. In turn, self-perception as an adult is associated with higher odds of PPR misuse in adulthood (*OR* = 1.36, $p < .01$). Education is associated with lower odds of self-perception as an adult (*OR* = 0.64, $p < .01$). In turn, self-perception as an adult is associated with higher odds of PPR misuse in adulthood (*OR* = 1.36, $p < .01$). Figure 2 visualizes the structural equation model and model parameter estimates.

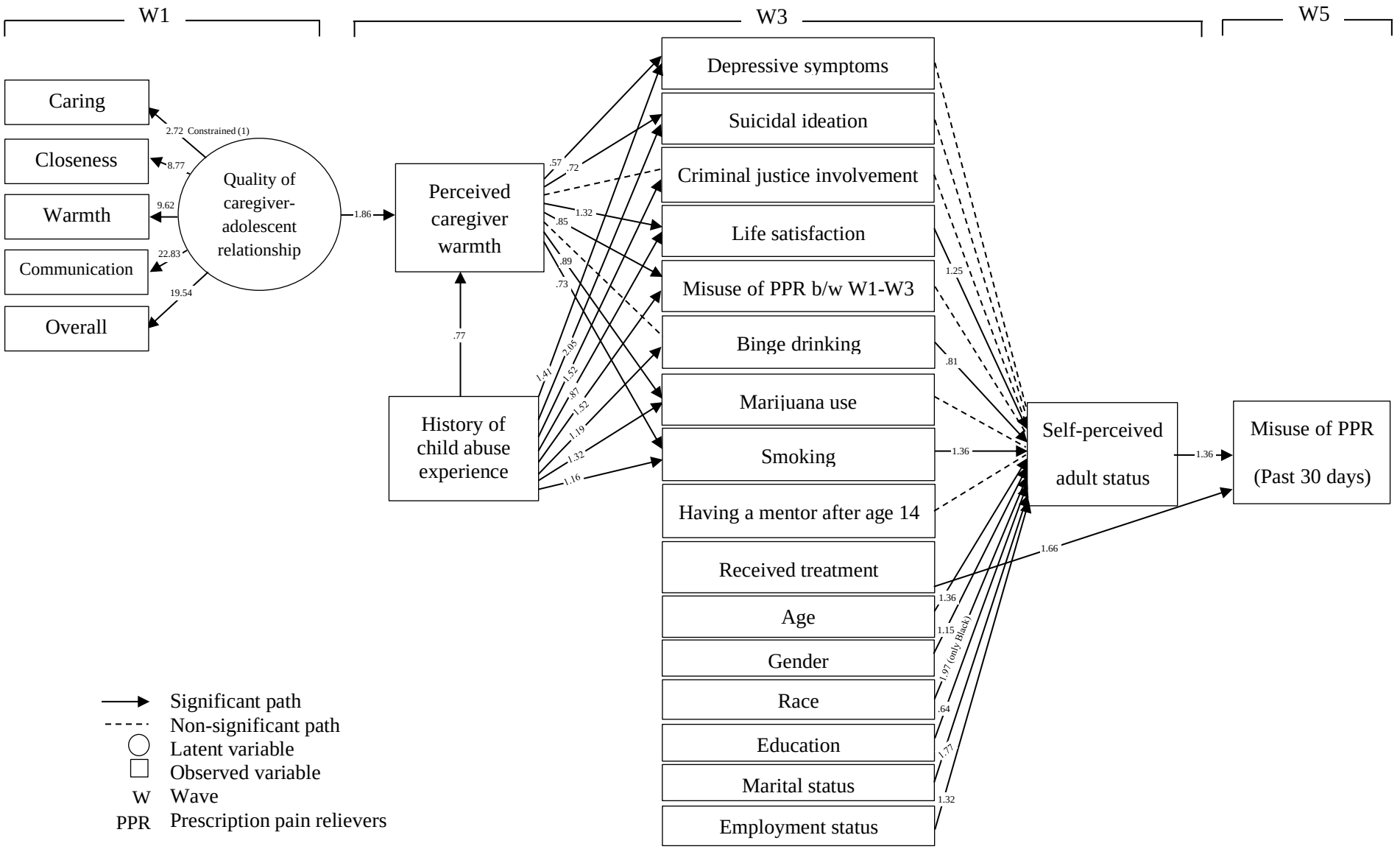
Table 9.

Significant indirect paths for a structural equation model of PPR misuse at W5

Path	*p*
Caregiver relationship quality → Caregiver warmth → Life satisfaction → Self-perceived adult status → PPR misuse (W5)	Significant
Caregiver relationship quality → Caregiver warmth → Smoking → Self-perceived adult status → PPR misuse (W5)	Significant
Childhood abuse experience → Caregiver relationship quality → Caregiver warmth → Life-satisfaction → Self-perceived adult status → PPR misuse (W5)	Significant
Childhood abuse experience → Caregiver relationship quality → Caregiver warmth → Smoking → self-perceived adult status → PPR misuse (W5)	Significant
Childhood abuse experience → Life satisfaction → Self-perceived adult status → PPR misuse (W5)	Significant
Childhood abuse experience → Binge drinking → Self-perceived adult status → PPR misuse (W5)	Significant
Childhood abuse experience → Smoking → Self-perceived adult status → PPR misuse (W5)	Significant
Age → Self-perceived adult status → PPR misuse (W5)	Significant
Gender → Self-perceived adult status → PPR misuse (W5)	Significant
Race (only African American) → Self-perceived adult status → PPR misuse (W5)	Significant
Marital status → Self-perceived adult status → PPR misuse (W5)	Significant
Education → Self-perceived adult status → PPR misuse (W5)	Significant
Employment status → Self-perceived adult status → PPR misuse (W5)	Significant

Note. PPR = prescription pain relievers, W5 = Wave 5

Figure 2: Structural equation model for prescription pain reliever misuse



CHAPTER 5

DISCUSSION

Opioid dependency is a well-recognized national public health emergency in the United States, and understanding the factors associated with it has become a research priority in the field of social work substance use. According to the Substance Abuse and Mental Health Services Administration a significant number of individuals in the U.S. have experienced opioid misuse. In 2022, approximately 8.9 million people aged 12 and older reported opioid misuse in the past year. Among these, 8.5 million (94.3%) misused prescription pain relievers, with 7.9 million (88.2%) exclusively misusing prescription pain relievers. The data also reveals that 1.1 million (3.2%) emerging adults aged 18 to 25 and 7.0 million (3.1%) adults aged 26 or older misused prescription pain relievers in the past year (SAMHSA, 2023).

Researchers have identified several factors that contribute to the misuse of prescription pain relivers. Recent research has indicated that substance misuse, particularly tobacco, alcohol, and marijuana during emerging adulthood, increases the likelihood of developing opioid use disorders (Hudgins et al., 2019; Thrul et al., 2023). Furthermore, evidence suggests a link between depression, suicidal thoughts, involvement in the criminal justice system, and prescription pain reliever misuse (Brinkley-Rubinstein et al., 2018; Pilarinos et al., 2022; Santo Jr, Campbell, Gisev, Martino-Burke et al., 2022; Williams et al., 2020). However, the role of developmental constructs during the emerging adulthood phase in the associations between these risk

factors and the likelihood of prescription pain relievers misuse remains unclear. Further investigation is needed to fully comprehend these relationships and potential interventions.

In addition to the above factors, research has highlighted the high prevalence of physical and sexual abuse among individuals with opioid use disorder (Santo Jr. et al., 2021). However, there are still gaps in understanding the mechanisms that either mitigate or exacerbate this association. It has been found, for example, that a history of childhood abuse is also linked to an increased likelihood of depression, suicidal ideation, chronic pain, involvement in the criminal justice system, and engagement in health risk behaviors such as early initiation of drug use and excessive alcohol and substance use during early adulthood (Austin & Shanahan, 2018; Davis et al. 2021; Douglas et al., 2010; Dunn et al. 2022; Dunn et al., 2013; Dunn et al., 2018; Quinn et al., 2019; Teicher et al. 2009). Nevertheless, despite these findings, it is not known how the experience of these risk factors during emerging adulthood influences individual self-perceptions of adulthood and how their perceived adulthood status during this developmental stage contributes to their propensity for prescription pain relievers misuse during the transition to the next developmental phase.

This dissertation aims to address these research gaps. Its objectives are to examine how risk and protective factors experienced during adolescence and emerging adulthood are associated with the misuse of prescription pain relievers in adulthood, with a particular emphasis on factors experienced during emerging adulthood. This dissertation uses data from the Add Health dataset (Harris et al., 2009), which is one of the few available datasets that has longitudinally followed individuals from adolescence to

adulthood. Structural equation modeling was used to analyze the relationships between observed and latent variables within the conceptual model developed for this dissertation. This technique allows researchers to examine the structural associations between observed variables and underlying constructs by combining factor analysis and path analysis (Klem, 2004, p. 227).

Caregiver-child Relationships Quality and Emerging Adulthood Risk and Protective Factors

This dissertation examined how the quality of caregiver-child relationship established during adolescence affects keeping the relationship of emerging adults with their caregivers warm, and how this warm relationship can protect emerging adults from risk factors of mental health and engagement in risky behaviors.

The study's findings indicate that the quality of caregiver-child relationships established during adolescence has an impact on the warmth of the relationship between emerging adults and their caregivers. This aligns with life course theories, which suggest that the quality of parent-child relationships formed in childhood continues into adulthood and predicts the quality of subsequent relationships between emerging adults and their parents (Padilla-Walker et al., 2017, p. 213). The study found that adolescents who perceived a higher quality relationship with their caregivers during adolescence were more likely to perceive greater warmth in their relationship during emerging adulthood.

After examining the association between the caregiver-child relationship and various risk factors during emerging adulthood, we found that emerging adults who perceived greater warmth from their caregivers reported higher life satisfaction compared to those who perceived less warmth. Additionally, a higher perception of warmth in the

caregiver-child relationship during emerging adulthood was associated with lower levels of depressive symptoms, reduced likelihood of suicidal ideation, lower rates of cigarette smoking, marijuana use, and prescription pain reliever misuse. The results are consistent with research suggesting that a moderate to high quality of maternal-offspring attachment in emerging adults is associated with a lower likelihood of prescription opioid misuse (Cerdá et al., 2014). While researchers have suggested that parental warmth during adolescence reduces the risk of early initiation, smoking, marijuana use, and depression during emerging adulthood (Mak & Lacovou, 2019; Pasman et al., 2023; Robillard et al., 2022), the findings of this dissertation demonstrate that the protective role of the caregiver-child relationship does not end with adolescence but continues into emerging adulthood.

The results, however, did not show a significant association between perceived warmth in the caregiver-child relationship and binge drinking during emerging adulthood. This may be attributed to the more socially acceptable nature of alcohol consumption during this developmental phase compared to behaviors such as cigarette smoking and marijuana use (Pasman et al., 2023). Studies on college students suggest that parental misperceptions about social norms regarding alcohol consumption may influence their children's risky behavior, with parents underestimating their child's alcohol consumption and overestimating the acceptance of drinking by other parents (Earle & LaBrie, 2016; LaBrie et al., 2016). These factors might diminish the protective effect of a positive caregiver-child relationship on engaging in binge drinking.

Furthermore, research on the impact of parental warmth and the quality of the parent-child relationship on reducing the risk of underage alcohol consumption has

yielded inconsistent findings (Mak & Lacovou, 2019; Pasman et al., 2023), possibly due to factors such as individual usage patterns, gender, and genotype (Su et al., 2019). For instance, a longitudinal study conducted on individuals' alcohol drinking patterns from adolescence to emerging adulthood, aged 13-32, identified three distinct patterns of alcohol use and suggested that the greater quality of maternal parenting during adolescence was linked to a reduced likelihood of belonging to the persistent heavy and developmentally limited alcohol use trajectories. However, it did not show an association with the late-onset heavy drinking trajectory (Su et al., 2019). The effect of maternal parenting quality was observed only among males belonging to the persistent heavy alcohol use trajectory, which was further influenced by the interaction with the 5-HTTLPR genotype (Su et al., 2019). However, this research examined the effect of the maternal relationship quality during adolescence on alcohol use during emerging adulthood (Su et al., 2019), while we assessed only one aspect of this relationship, the perceived warm relationship during emerging adulthood. The variation in measures and the time of the assessment can result in variation between results presented here and prior research. Given this difference, further research is needed to understand the role of the caregiver-child relationship during emerging adulthood in protecting individuals from underage alcohol use and alcohol use disorder in adulthood.

The present study's findings also indicate no significant relationship between the perception of warmth in the relationship between caregivers and their children during emerging adulthood and the probability of being involved in the criminal justice system. This finding contrasts with previous studies and may be attributed to variations in the measures used to examine this association across different studies. In this dissertation,

perceived caregiver warmth was assessed using a single question about the extent to which respondents perceived warmth in their relationship with their caregivers during emerging adulthood. However, other studies have used different measures, such as parental social support (Hill et al., 2018), closeness (Copp et al., 2020), or parental involvement (Walters, 2013). For example, Johnson et al. (2011) employed multiple measures, including *parenting support*, *monitoring*, and *overt conflict*, to assess the quality of the parent-child relationship. Their study found that parental monitoring during adolescence and ongoing parental support from adolescence to emerging adulthood were associated with lower levels of offending during emerging adulthood.

Additionally, these results can be attributed to the lack of using an exact measure to assess respondents' involvement in criminal justice system. In this dissertation, involvement in the criminal justice system was assessed by asking respondents whether they had ever been arrested or not, while previous studies often examined the association between parent-child relationship quality and conducting delinquency (e.g., Hill et al., 2018; Walters, 2013), antisocial behaviors (e.g., Neighbors et al.,1997), and crime (e.g., Copp et al., 2020; Johnson et al., 2011). It is possible that individuals may be arrested by law enforcement agencies without being found guilty of criminal offenses. However, research in this area is limited, and further investigation is needed to understand the potential protective role of the caregiver-child relationship in emerging adults' involvement in the criminal justice system.

Childhood Abuse History and Emerging Adulthood Risk and Protective Factors

This dissertation used a path model to investigate the relationship between childhood abuse experiences and various outcomes during emerging adulthood. The

findings indicated that individuals with a history of childhood physical or sexual abuse were at a heightened risk for experiencing depressive symptoms, suicidal ideation, involvement in criminal justice systems, prescription pain reliever misuse, binge drinking, cigarette smoking, and marijuana use during emerging adulthood, compared to those without a history of abuse. These results are consistent with a body of literature indicating that childhood abuse increases susceptibility to mental health difficulties and engagement in risk behaviors among emerging adults (Desch et al., 2023; Dunn et al., 2013; Dunn et al., 2018; Dunn et al., 2022; Santo Jr. et al., 2021; Thornberry et al., 2010).

Path model analysis indicates that individuals with a history of childhood abuse exhibited the highest risk for misusing prescription pain relievers compared to other substances such as binge drinking, marijuana use, and smoking. Recent research has proposed that emerging adults with a history of childhood abuse may turn to misuse of prescription pain relievers as a coping mechanism to alleviate the psychological and physical pain associated with early trauma (Austin & Shanahan, 2018; Tang et al., 2020). Indeed, it has been observed that individuals primarily misuse prescription pain relievers to alleviate all pain (SAMHSA, 2023), and the findings of this study align with this explanation.

Comparing the standardized coefficients revealed that emerging adults who have experienced childhood abuse face the highest risk for three specific outcomes than the other outcomes: suicidal ideation ($b = 2.05$, $p < .01$), involvement in the criminal justice system ($b = 1.52$, $p < .01$), and misuse of prescription pain relievers ($b = 1.52$, $p < .01$), respectively. These outcomes represent self-destructive behaviors in which individuals may engage, either directly or indirectly, resulting in personal harm and adverse

consequences. This finding underscores the critical need for treatment among individuals with a history of childhood abuse.

The findings also show that emerging adults who experienced childhood abuse reported lower levels of life satisfaction compared to those without such a history. While emerging adulthood is a distinct developmental phase where individuals typically seek to establish a sense of purpose in life and harbor hope for the future, more so than in adulthood (Cotton Bronk et al., 2009), this finding suggests that emerging adults who have experienced childhood abuse may have less hope for the future and have lower life satisfaction that may place them at a heightened vulnerability for self-destructive thoughts and behaviors. Further research is needed to explore association between hope and life satisfaction among emerging adults with history of childhood abuse.

The study also indicates that emerging adults with a history of childhood abuse perceived less warmth in their relationship with their caregivers during emerging adulthood. This finding calls for further exploration and interpretation. From a developmental life course perspective, "the effects of early experiences may be amplified, neutralized, or reversed by later experiences" (Arnett & Tanner, 2006; p. 150), and specific developmental transitions, such as marriage, college experiences, or moving away from the parental home, may alter unhealthy dynamics between parents and children, and potentially neutralizing or reversing the negative outcomes (Arnett & Tanner, 2006). Thus, the negative association between a history of childhood abuse and perceived caregiver warmth may indicate that individuals who experienced childhood abuse perceive less warmth from their caregivers; the absence of caregiver support can amplify the effects of early experiences on individuals' outcomes during emerging

adulthood and increase their susceptibility to substance misuse and mental health disorders. On the other hand, the transitional stage of emerging adulthood may present opportunities for discontinuity in mental health and psychopathology (Arnett & Tanner, 2006), which suggests that emerging adults who were abused by their caregivers may experience a less warm relationship but may also have the chance to break the cycle of negative outcomes.

Emerging Adulthood Risk and Protective Factors, Perceived Adult Status, and Misuse of Prescription Pain Relievers

The present study examined the pathways through which nine risk factors during emerging adulthood were linked to self-perceived adult status. The nine risk factors were depressive symptoms, suicidal ideation, criminal justice systems involvement, prescription pain reliever misuse between Wave 1 and Wave 3, binge drinking, cigarette smoking, marijuana use, life satisfaction, and having a mentor after age 14. It also explored the association between self-perceived adult status during emerging adulthood and prescription pain reliever misuse in adulthood.

The results demonstrated that among the four substances assessed during emerging adulthood, individuals who engaged in binge drinking were more likely to perceive *feeling in-between* about their adulthood status, while those with cigarette smoking were more likely to perceive themselves as adult-like. No significant association were found between misuse of prescription pain relievers between W1 and W3 or past month marijuana use and self-perceived adult status. Feeling of reaching adulthood showed a significant positive association with prescription pain reliever misuse during adulthood.

The path in which emerging adults who engage in binge drinking are more likely to experience a sense of *being in-between* during this stage of life aligns with a previous study of college students, which found that the *feeling in-between* was associated with a higher frequency of heavy drinking episodes (Rinker et al., 2015). Emerging adults with binge drinking may consider their behavior normative for their age. On the other hand, their society also tolerates their behaviors and does not inhibit them because this is acceptable behavior for emerging adults (Smith et al., 2010). However, the findings of this dissertation revealed that when binge drinking is accompanied by *feeling in-between*, emerging adults become at greater risk for prescription pain reliever misuse. This finding is remarkable and can explain the mixed evidence regarding the association between alcohol use during emerging adulthood and the misuse of prescription pain relievers. Furthermore, this model may also help shed light on the underlying mechanism connecting a history of childhood abuse to the later misuse of prescription pain relievers. When emerging adults with childhood abuse experiences turn to alcohol use as a means of coping with unresolved pain or unpleasant feelings (Cooper et al., 2016), this risky behavior may be more tolerated by society, and binge drinking may be less discouraged. However, while they still think this risky behavior is normative, alcohol use may exacerbate their problems, leading to drugs such as prescription pain relievers as a form of self-medication.

However, the path model analyses demonstrated that emerging adults who smoke cigarettes are more likely to perceive a subjective feeling of adulthood. This subjective feeling of adulthood showed a positive association with the probability of prescription pain reliever misuse in adulthood. Therefore, when smoking is coupled with a sense of

reaching adulthood during emerging adulthood, the risk for prescription pain reliever misuse is likely to increase. The relationship between cigarette smoking and prescription pain reliever misuse is consistent with previous studies indicating that smoking is significantly associated with opioid misuse (Lee & Thrul, 2021; Parker et al., 2020; Rajabi et al., 2019). Specifically, a recent study found that nicotine dependency at age 20 can enhance susceptibility to prescription pain reliever misuse later at age 30 (Thrul et al., 2022). To explain this association, neurobiological studies suggest that nicotine in the cigarette activates the brain's reward system, which produces feelings of relaxation and euphoria (Pomerleau & Pomerleau, 1984). This can be appealing to stressed emerging adults who continue to smoke to experience these feelings. However, prolonged exposure to nicotine may impair the normal functions of the brain's reward system and potentially increases risk for heavy smoking and opioid use. Our study contributes new insights to the literature by highlighting the role of the *feeling in-between* construct in the association between smoking and prescription pain reliever misuse. Also, these findings suggest that there may be differences in the mechanisms linking binge drinking during emerging adulthood to the misuse of prescription pain relievers in adulthood compared to smoking and the other substances.

At the interpersonal level, our results align with prior research showing that individuals with a history of childhood abuse are at a higher risk for smoking during emerging adulthood. Research suggests that these individuals may have difficulty to quit smoking (Cammack et al., 2019; Felitti et al, 2019; Roberts et al., 2008) and use cigarettes as an immediate coping mechanism to alleviate negative internal feelings (Felitti et al, 2019). The rapid action of nicotine in activating the brain's reward system

and its diverse neurological effects works as an effective daily coping mechanism and a socially accepted behavior for adults (Pomerleau & Pomerleau, 1984) dealing with daily life stress. Additionally, individuals with physical and sexual childhood abuse experiences have lower pain threshold and report higher chronic pain compared to those without these experiences (Lamhoot et al., 2021; Nanavaty et al., 2023; Santo Jr. et al., 2022). Pain and cigarette smoking may reinforce each other through a positive feedback loop, resulting in greater pain and increased smoking (Ditre et al., 2011) and potentially contributing to increased opioid use (John et al., 2019). Neurobiological studies have identified pain is one of the shared risk factors for both nicotine and opioid use (Lichenstein et al., 2019). However, the association between smoking and opioid use increases when the age at onset of smoking is under 14 years old (Rajabi et al., 2019). Our study revealed that smoking to likely alleviate stress and pain resulting from childhood abuse experience may increase the risk of prescription pain reliever misuse, specifically for those who have a subjective feeling of being an adult during emerging adulthood. Furthermore, the dissertation aligns with prior research indicating that childhood adversity influences the stability and transitions of substance use patterns among emerging adults (Davis et al., 2021). A longitudinal study revealed that emerging adults with adverse childhood experiences were more likely to belong to a high-risk class of substance users, engaging in significant substance use and displaying a reduced likelihood of transitioning out of this class over time, in comparison to those without such experiences (Davis et al., 2021).

Cigarette smoking may serve as a coping mechanism for emerging adults as they navigate through the challenges, stresses, and instability associated with the process of

identity formation. Smoking alleviates stress during the transition to further education, employment or leaving home (Poole et al., 2022). Moreover, peer pressure and societal norms during this transitional period can contribute to the perception that smoking is an indicator of adulthood within their social networks. A previous study found that emerging adults whose peers smoked were more likely to initiate smoking and perceived that smoking was a norm as many their peers smoke even so their estimation was not correct (Green et al. 2008). For many, smoking becomes a way to gain acceptance in new peer groups, especially in the presence of alcohol (Poole et al., 2022). However, little evidence exists to support the positive association between smoking and the subjective feeling of being an adult among emerging adults, as found in this dissertation. Previous research has suggested that emerging adults who perceived themselves as older than their level of maturation had reported higher levels of maladaptive behaviors during adolescence and lower closeness in their parent-child relationships (Benson & Elder Jr, 2011). Our results build upon previous research finding, suggesting that a low quality of caregiver-child relationship during adolescence reduces perceived warmth between caregivers and children during emerging adulthood, and lower perceived warmth during this period is associated with higher likelihood of smoking. Although when cigarette smoking is combined with a feeling of being like-adult, the risk for prescription pain reliever misuse increases, a warm relationship with parents during emerging adulthood may weaken this association.

As for associations between substance use and subjective feelings of adulthood, no significant associations were found between marijuana use or prescription pain reliever misuse and subjective feelings of adulthood. These findings suggest that the

construct of *feeling in-between* may not serve as an underlying mechanism in the associations between marijuana use during emerging adulthood and prescription pain reliever misuse in adulthood, as well as misuse of prescription pain reliever in the time between the Wave 1 and W3 interviews reported by emerging adults and subsequent use in adulthood. An alternative explanation could be attributed to measurement bias. For instance, the lack of association between prescription pain reliver misuse in the time between Wave 1 and 3 interviews and the construct of *feeling in-between* may stem from the fact that the Add Health survey does not assess recent prescription pain reliever misuse within the past 30 days at Wave 3. Instead, reliance was placed on any misuse in the time between the Wave 1 and Wave 3 interviews. As this measure does not assess misuse of pain relivers in the window time of emerging adulthood, this measure may not accurately capture the association between prescription pain reliever misuse and self-perceived adulthood status during this specific period. Additionally, although we did not find a significant association between marijuana use and subjective feelings of adulthood, there is the likelihood that other constructs within the emerging adulthood theory contribute to the relationship between marijuana use during emerging adulthood and later prescription pain reliever misuse during adulthood. For example, a prior study found that Hispanic emerging adults aged 18 to 24 who believed that emerging adulthood is a time for focusing on others were less likely to report marijuana use (Allem et al., 2013). Conversely, those who perceived emerging adulthood as a time for experimentation and possibilities had a higher likelihood of using marijuana in the past month. Consistent with our results, this study also found no association between marijuana use and considering that emerging adulthood was a time of *feeling in-between* (Allem et al., 2013). Further

research is needed to explore whether other constructs within the emerging adulthood theory contribute to the association between prescription pain reliever misuse or marijuana use during emerging adulthood and subsequent misuse during adulthood.

The structural equation model also demonstrated a pathway linking life satisfaction, the perception of adulthood, and prescription pain reliever misuse in adults. According to the model, emerging adults with higher levels of life satisfaction are more likely to perceive themselves as adults during this developmental stage. Our study suggests that when a high level of life satisfaction is accompanied by a subjective feeling of being an adult, there is an increased likelihood of later misuse of prescription pain relievers. Research has recognized that life satisfaction tends to be higher among emerging adults compared to adults (LaBrenz et al., 2021). During this stage, emerging adults have the freedom to explore their environment and discover their interests without being constrained by parental restrictions, yet they are not fully committed to adult roles (Arnett & Tanner, 2006, p. 8). They have high life expectations and often display higher optimism about the future compared to other age group (Arnett, 2000). This status may make them have high life satisfaction. They may underestimate the risks associated with substance use, particularly if they strongly identify as adults rather than feeling in-between. They may believe they have control over their substance use and can stop at any time. However, over time, they may find it difficult to discontinue their use and may transition to prescription pain reliever misuse.

An alternative explanation is that a high level of life satisfaction coupled with a strong sense of feeling like adults may increase stress levels in the long term. Emerging adults with high expectations for themselves may believe that all their dreams, hopes, and

plans are achievable. However, when they encounter challenges and realize they cannot fulfill these high expectations, they may experience increased stress. Prescription pain reliever misuse may then become a coping mechanism to relax and deal with the negative affect and the stress of daily life. Further research is needed to examine association between life satisfaction, self-perceived adulthood status, substance use, and their impact on prescription pain reliever misuse later in adulthood.

It is also worth noting that prior findings on the relationship between substance use and life satisfaction among emerging adults are mixed and that there is limited knowledge specifically about the association between self-satisfaction in emerging adulthood and prescription pain reliever misuse. A recent study found no association between life satisfaction and concurrent polydrug use among emerging adults with opioid and other drug use, after controlling for various factors such as mental health diagnoses, adverse childhood experiences, and sociodemographic factors (Taylor, 2020). Overall, the pathway described in the structural equation model suggests that a combination of high life satisfaction and a strong sense of adulthood may contribute to increased susceptibility to prescription pain reliever misuse in adulthood. Although, more research is needed to better understand these relationships and the underlying mechanisms involved.

The path model in this study did not reveal any significant associations between four measures: depressive symptoms, suicidal ideation, involvement in justice systems, and the construct of *feel in-between* during emerging adulthood. While there is evidence linking depressive symptoms, suicidal ideation, and justice system involvement to opioid use and prescription pain reliever misuse, the findings of this dissertation suggest that

these associations do not occur through the construct of *feeling in-between* experienced during emerging adulthood. To better understand the role of emerging adulthood constructs in the association between these three risk factors and prescription pain reliever misuse, further research should investigate whether depressive symptoms, suicidal ideation, and criminal justice system involvement have significant associations with other constructs of emerging adulthood, such as identity exploration, instability, self-focus, possibilities, and prescription pain reliever misuse.

Furthermore, the study examined the potential protective role of having a mentor concerning the sense of reaching adulthood and its association with prescription pain reliever misuse in adulthood. While research has emphasized the positive impact of mentors on the success, well-being, transition to adulthood, and reducing substance use among emerging adults (Boeder et al., 2022; Greeson et al., 2010; Siringil Perker & Chester, 2021), this study founds no significant association between having a mentor and self-perceived adulthood status. It is important to note that the measure we used to assess whether participants had a mentor was a general question, lacking a specific definition of what constitutes a mentor and how it differentiates from role model. It is also worth considering that the measure used in this study may not accurately capture the full extent of the protective role of having a mentor in the context of substance use. For instance, the quality of the mentor-mentee relationship, the presence of positive role models, or the influence of trained mentors could potentially contribute to individuals' experience with mentors. Further research is needed to gain a better understanding of how having a mentor during emerging adulthood may protect against prescription pain reliever misuse.

This study revealed that individuals who received counseling or substance use treatment during emerging adulthood were more likely to misuse prescription pain relievers in adulthood. Several explanations could account for this association. Certain mental health and substance use disorders may be persistent and require long-term treatment. Relapse is common among individuals with a history of substance use disorder, and emerging adults are more likely to discontinue treatment compared to other age groups, due to various barriers such as psychological, interpersonal, and structural barriers that hinder their treatment process (Andersson et al., 2018). Additionally, recovery plans often fail to address the unique developmental needs of emerging adults, as they are typically designed for adults in general. Concerns about the potential side effects of medication-assisted treatment on the developing brains of young individuals may also contribute to the lower likelihood of receiving such treatment (Hadland et al., 2017; Neighbors et al., 2019) and increased rates of relapse among emerging adults. Moreover, emerging adults who work long hours to support themselves and attend college may struggle to find treatment options that offer the necessary flexibility, leading to incomplete treatment (Bowers et al., 2017). It is important to note that the measurement used in this study, which relied on a binary question about receiving any psychological or substance use treatment in the past 12 months, may introduce measurement bias. This measurement does not capture treatment completion or outcomes, and further research is needed to investigate this association more comprehensively.

Sociodemographic Factors, Perceived Adult Status, and Misuse of Prescription Pain Relievers

The present study also considered six sociodemographic measures in its structural equation modeling to examine their associations with self-perceived adult status during emerging adulthood. Additionally, the study investigated the association between self-perceived adult status and prescription pain reliever misuse in adulthood. The sociodemographic measures included age, gender, race and ethnicity, marital status, educational level, and employment status. Its findings align with previous research on the association between sociodemographic disparities and perceived adult status among emerging adults. Consistent with previous studies (Lowe et al., 2013), the majority of respondents (59%) during emerging adulthood reported *feeling in-between*, and older individuals were more likely to perceive themselves as adults.

In line with prior research (Benson & Furstenberg, 2006), individuals with some college education or higher were less likely to perceive themselves as always adults compared to those with lower levels of college education. Also, individuals with a sense of adult-like feelings during emerging adulthood were more likely to misuse prescription pain relievers in adulthood. These results support previous research suggesting that enrolling in college may extend the time to reach adulthood and serve as a protective factor against prescription opioid misuse (Martins et al., 2015). Thus, the findings of this dissertation indicate that the feeling of *being in-between* plays a significant role in the negative relationship between college enrollment and prescription pain reliever misuse during this developmental phase. One possible explanation is that college enrollment provides opportunities for students to learn about the risks associated with alcohol and

drug misuse, potentially protecting emerging adults from prescription pain reliever misuse. Additionally, college students may be less inclined to misuse opioids and pain relievers due to the lower prevalence of opioid misuse among this population and less peer pressure influence prescription pain reliever misuse.

Path analysis revealed that women were more likely than men to feel a sense of reaching adulthood during emerging adulthood. However, the model also showed that this feeling of reaching adulthood increased the risk for prescription pain reliever misuse in adulthood. These findings are significant considering that the prevalence of pain reliever misuse is higher among women than men in the general population (Hales et al., 2020). There are several possible explanations for why emerging adult women are more likely to feel a sense of reaching adulthood than men. One possibility is that girls may develop some aspects of their social cognitive and emotional abilities at a faster rate than boys during prior developmental stages (Gur et al., 2012; Thompson & Voyer, 2014; Van der Graaff et al. 2014). This difference in reaching developmental milestones may also lead emerging adult women to perceive reaching adulthood earlier than men. Another possibility is related to differences in the pathways from adolescence to adulthood between men and women. Research has identified similar prevalent characteristics in the pathways that emerging adult men and women in the United States take from adolescence to adulthood. However, emerging adult women are more likely to be married and live with children earlier than men, and they are also more likely to be single parents (Oesterle et al., 2010). They often take on more responsibility for caring for their children, which may contribute to their feeling of reaching adulthood. However, living with children has less association with reaching adulthood for emerging adult men

(Benson & Furstenberg, 2006). Cultural expectations and gender stereotypes may also play a role, as young women may feel pressured to grow up faster and assume adult roles more quickly than men.

This study indicates that emerging adult women who perceive themselves as adults early on are at a higher risk of misusing prescription pain relievers than men. However, despite this, there remains a lack of comprehensive understanding regarding the underlying mechanisms and processes through which this association occurs. Previous research has indicated that misuse of prescription pain relievers is higher among women than men in the United States for several reasons (National Institute on Drug Abuse [NIDA], 2022). Women are more sensitive to pain and are more likely to experience chronic pain than men. These factors may contribute to the elevated prevalence of being prescribed opioid medications among emerging adult women. Additionally, women may have a higher propensity to misuse prescription opioids to manage pain, even when pain levels are similar between genders. Women are more likely to take prescription opioids without a prescription as a means of self-treatment for coping with other problems such as anxiety or tension (NIDA, 2022). The finding of this dissertation that identifying as female is associated with feeling a sense of reaching adulthood and can increase the risk for prescription pain reliever misuse in adulthood, is a new finding and further research is needed to explore this relationship.

Furthermore, analysis of this study's structural equation modeling revealed that African Americans were more likely to feel a sense of reaching adulthood than non-Hispanic Whites during emerging adulthood. This finding aligns with previous research suggesting higher levels of subjective feelings of adulthood among African American

emerging adults compared to their White counterparts (Arnett, 2003; Benson & Furstenberg, 2006; Kirkpatrick-Johnson et al. 2007). However, the finding that the feeling of reaching adulthood may potentially contribute to an increased risk for misuse of prescription pain relievers later in adulthood among African Americans compared to emerging adult White Americans is understudied. This finding is new and requires further investigation. Previous research has identified that transitions to adult roles differ based on sociodemographic characteristics such as race and ethnicity, socioeconomic status, and family structure (Arnnet, 2003; Benson & Furstenberg, 2006; Oesterle et al., 2010). African American individuals are often perceived as older than their chronological age since childhood compared to their White non-Hispanic counterparts (Goff et al., 2014). Factors such as early exposure to racial discrimination and responsibilities can contribute to an accelerated sense of adulthood among African American emerging adults (Kirkpatrick-Johnson et al. 2007). They are more likely to have a child at a younger age than White non-Hispanic emerging adults (Schoen et al., 2009). African American emerging adults are more likely to grow up in families with lower socioeconomic status and experience more barriers in accessing post-secondary education. They are more likely to quickly find a full-time job and move toward financial independence. These rapid role transitions during emerging adulthood, coupled with their cultural norms, may lead African American emerging adults to perceive independence and responsibility as adults earlier than White non-Hispanic emerging adults. However, they may experience greater stress during this transition phase, and prescription pain reliever misuse may contribute to reducing their stress.

Additionally, analysis of the structural equation modeling showed that being married and having full-time employment status was associated with feeling a sense of reaching adulthood. However, the results also suggested that feeling a sense of reaching adulthood during emerging adulthood may increase the risk for prescription pain reliever misuse later in adulthood. While marriage and full-time employment are considered protective factors against engaging in risky behaviors such as prescription pain reliever misuse (Matthews et al., 2022), this effect likely depends on other factors such as living in safe neighborhood, higher education level, and older age. Therefore, it is possible that being married or having a full-time job can be protective factors for prescription pain reliever misuse when combined with other factors. For example, using data from the 2019 National Survey of Drug and Health, a study conducted on the general population revealed that individuals with full-time jobs had higher odds of opioid misuse compared to unemployed individuals. However, those who were in school or undergoing training had lower odds of opioid misuse than the fulltime employed individuals (Matthews et al., 2022). Further research is needed to better understand the underlying factors that influence the association between sociodemographic factors and prescription pain reliever misuse.

Limitations

While this dissertation offers valuable insights into understanding the risk and protective factors among emerging adults for prescription pain reliever misuse in adulthood and resolving some of the discrepancies in research concerning the association between prior substance use in emerging adulthood and later prescription pain reliever misuse, there are important limitations that are in need of address.

Emerging adulthood theory is developed to describe characteristics of emerging adults and help researchers better understand psychological changes among these population. However, this theoretical framework has limitations in explaining how psychopathologies develop, due to its focus more on individual agency and less on environmental factors. Incorporating alternative models that consider multilevel interactions and the influence of environmental factors can enhance our understanding of prescription pain reliever misuse among emerging adults. The transactional model of development (Sameroff, 2009) and the cascade model (Masten & Cicchetti, 2010), which emphasize the interaction of biological, psychological, and social factors, offer useful frameworks for studying the development of psychopathologies such as substance use disorders. These models also support interventions focused on resiliency and strength-based services. As these models consider person-environment interactions, they are compatible with social work values. However, applying a comprehensive multilevel framework requires complicated statistic methods and precise measurement (Sameroff, 2009b, p. 23). On the other hand, applying the theoretical framework of emerging adulthood in studying substance use disorders allows for the identification of developmental predictors and helps differentiate the distinct needs of emerging adults from adults. This theoretical framework provides an understanding of the specific needs and challenges faced by individuals at the highest risk for substance use disorders during this developmental phase (Davis et al. 2018). While the theoretical framework of emerging adulthood is valuable, incorporating alternative models that account for multilevel interactions and the influence of environmental factors can enhance our understanding of prescription pain reliever misuse among emerging adults.

Additionally, the measures used in this dissertation have limitations. The scales based on the constructs of emerging adulthood theory have not been extensively tested. To date, two scales have been developed based on the constructs of emerging adulthood theory and applied in research on substance use disorders. One scale is the inventory of the dimensions of emerging adulthood (IDEA), developed by Reifman et al. in 2007, which assesses the five constructs of the theory. However, a meta-Analysis study examining 12 studies that used IDEA to assess substance use among emerging adults found that this measure is less effective in studying substance use disorders, particularly in non-college samples (Davis et al., 2018). The other scale is the emerging adult reasons for substance use (EARS), recently developed by Smith et al. (2020) and tested in a small sample size (n = 750). Add Health has only one question that adopts the constructs of the theory, specifically *feeling in-between*. This measure broadly has been used by prior researchers and validated to study its relationship with the theoretically relevant developmental characteristics of emerging adulthood (Kirkpatrick-Johnson et al., 2007). However, it only captures one of the five constructs defined in the emerging adulthood theory, while Arnett (2005) hypothesized that all four constructs other than *optimists* or *age of possibilities* would be related with substance use. Future research interested in examining the impacts of developmental characteristics of this phase among individuals with substance use disorders should examine the effectiveness of EARS, which is designed to reflect a range of the theory's constructs for a better understanding of substance use among emerging adults.

Furthermore, this study used nationally representative longitudinal data. However, as with all secondary data resources, there are limitations in the measures included in this

dissertation. While secondary datasets often cover a broad range of topics, the number of available measurements is limited. Therefore, the research questions are limited by the measurements available in the dataset's survey. Add Health measures are inconsistent across waves 1, 3, 4, and 5. For example, The measurement of prescription pain reliever misuse is inconsistent across waves. In Wave 3, Add Health asks about the misuse of prescription pain relievers since 1995, when participants completed the survey in Wave 1. In Wave 4, Add Health asks about lifetime misuse of prescription pain relievers; in Wave 5, the survey asks about prescription pain reliever misuse in the past 30 days. Consequently, using a time-varying effect model or a longitudinal model to measure prescription pain reliever misuse across waves 3, 4, and 5 was impossible. Consistency in repeated measures adequately portrays the trajectory of prescription pain reliever misuse over time. However, we used measures from Wave 1 and 5 with a different time window to address the inconsistency across waves and excluded Wave 4 from our model. This inconsistency makes it challenging to analyze the trajectory of prescription pain reliever misuse over time. In another example, the measures of alcohol and substance use in Wave 3 also differ across time windows. Binge drinking was assessed within in the past two weeks while cigarette smoking and marijuana were assessed in the past 30 days, and prescription pain relievers misuse was assessed from Wave 1 to Wave 3. Future research should aim to have consistent repeated measures and address these measurement limitations.

Additionally, in this dissertation, the time window for assessing substance use was often the past 30 days and not over a longer period of time such as 1 year. Also, no measures of alcohol and substance use provided a more detailed assessment of

respondents' use, such as frequency and quantity. Thus, the findings of this dissertation cannot be generalized to emerging adults and adults diagnosed with alcohol and substance use disorders.

The measure used to assess the misuse of prescription pain relievers is not precise because it consists of a single question asking about the misuse of a range of painkillers such as Darvon, Demerol, Percodan, or Tylenol with codeine in Wave 3, and Vicodin, OxyContin, Percocet, Demerol, Percodan, or Tylenol with codeine in Wave 5. While they are all opioids, these pain relievers may have different biochemical effects on the brain and have different functions. However, this is a standard measure that commonly used in research to evaluate the misuse of prescription pain relievers. Unfortunately, longitudinal research that can address these measurement limitations is currently unavailable. Future research conducting longitudinal analyses and addressing these measurement limitations would provide a more accurate portrait of the nature and impact of risk and protective factors on prescription pain relieve misuse.

Last the structural equation model used in this dissertation does not examine whether emerging adult respondents misuse a single substance or multiple substances. Research has suggested that it is common for emerging adult to use various substances. As previous studies have found a significant association between polydrug and prescription opioid use among emerging adults (Chiauzzi et al., 2013; Ghandour et al., 2013; Hudgins et al., 2019), future research is needed to examine difference between single and multiple substance users. By investigating these distinct paths, researchers can shed light on the specific relationships and dynamics between childhood abuse, multiple substance use, self-perceived adulthood, and the misuse of prescription pain relievers.

Despite these limitations, the findings of this dissertation are of great importance in the field of social work. The findings of this dissertation can inform policies and interventions aimed at reducing prescription pain reliever misuse.

Importance of the Study of Social Work and Application in Practice and Policy

The misuse of prescription pain relievers has become a significant issue in the United States, directly affecting millions of Americans. In 2022, it was estimated that 8.5 million Americans were impacted by this epidemic, with 5.6 million individuals aged 12 and older diagnosed with a prescription pain reliever use disorder. Among them, 410,000 were emerging adults (18-25 years old), and 4.9 million were adults aged 26 or older (SAMHSA, 2023). These numbers do not account for the impact on family members or the socioeconomic burden on society.

The consequences of the opioid crisis are far-reaching. Misuse of prescription pain relievers can lead to dependency, overdose, and various health complications due to physical and neurobiological changes (Schrager et al., 2014; Hsu et al. 2017; Christie, 2021). It can also result in behavioral and psychological problems, disrupt interpersonal relationships and family dynamics, contribute to social isolation, and diminish an individual's overall quality of life (Biancuzzi et al., 2022; Crowley et al., 2019; Christie, 2021; Goplerud et al., 2017). At a societal level, the prescription opioid epidemic leads to increasing healthcare costs, decreased productivity, the burden of public resources, and involvement in the criminal justice system (Biancuzzi et al., 2022; Goplerud et al., 2017; Hsu et al. 2017).

Recognizing the multidimensional consequences of prescription pain reliever misuse highlights the need for social workers to better understand the risk and protective

factors associated with this issue. Social workers bring a unique perspective and skill set to investigate the opioid epidemic from different angles. With their ability to fulfill various roles and work in interdisciplinary teams, social workers can effectively collaborate with other professionals and organizations to address the crisis (Lombardi et al., 2019; Mowbray & Fatehi, 2021). This study holds importance for social work as it addresses issues related to mental health, child welfare, substance use, and emerging adult population.

The objective of this dissertation was to provide a comprehensive understanding of the key factors that make emerging adults susceptible to prescription pain reliever misuse. The findings from this study can be utilized by social workers in the fields of mental health and substance use to enhance policies aimed at tackling the prescription opioid epidemic. Given the use of longitudinal data, these findings can also inform future policies that adopt a proactive approach to reduce the number of affected individuals.

The study contributes new knowledge for social workers interested in the mental health and substance use of emerging adults. National data from the 2022 NSDUH has indicated that emerging adults have the highest prevalence of binge drinking and marijuana. The prevalence of cigarette smoking among emerging adults is high, although slightly lower compared to adults (SAMHSA, 2023). Recent research suggests that the use of these substances increases the risk of prescription pain reliever misuse (Hudgins et al., 2019; Thrul et al., 2023). This dissertation demonstrates how the association between these substances and the misuse of prescription pain relivers is likely influenced by social constructs and the psychological needs of individuals during the emerging adulthood phase.

Furthermore, despite emerging adults aged 18-25 having the highest prevalence of mental health disorders, they are the least likely to receive mental health services compared to other age groups (NIH, 2023). This low treatment rate can be attributed, in part, to the lack of interventions tailored to the psychological needs of emerging adults. The findings of this dissertation can help social workers in practice understand the mechanisms through which the developmental characteristics of emerging adulthood interact with substance use risk factors, increasing susceptibility to prescription pain reliever misuse. For instance, social workers in practice may benefit from the results of this dissertation by considering discussions with their young clients with substance misuse, on perceived adulthood status and stress related to the transition to adulthood. Social workers can inform them about healthy coping strategies that can replace the misuse of substance. It is crucial to inform emerging adults with alcohol misuse and cigarette smoking habits that such misuse may put them at risk of prescription pain reliever misuse. Additionally, the findings of this dissertation highlight the important of interpersonal trauma assessment among emerging adults with metal health and substance misuse. Social workers in practice need to consider the protective role of the caregiver-child relationship during emerging adulthood. By helping their young clients process the separation from their primary caregivers, social workers can support them in establishing new and healthy relationships with their caregivers. Tailoring substance use services to the psychological needs of emerging adults can increase treatment outcomes and potentially reduce the risk of prescription pain reliever misuse in future.

The study also aims to enhance the knowledge of social workers in the field of child welfare regarding the cascade effect of childhood abuse experiences on risk factors

for prescription pain reliever misuse. Alongside risk factors, this study highlights protective factors, such as warm relationships between caregivers and emerging adults, which can have a positive cascade effect on their outcomes and reduce the likelihood of prescription pain reliever misuse in adulthood. This information can guide social workers in developing effective treatment plans for emerging adults with prescription pain reliever misuse.

By adopting a longitudinal and holistic approach, this study provides a deeper understanding of the cascade effects of risk and protective factors that contribute to an individual's risk for prescription pain reliever misuse. This knowledge can inform service providers, policymakers, and future researchers in their efforts to address the prescription opioid epidemic.

Future Directions

The Importance of Developmental Constructs for Prescription Pain Reliever Misuse

Emerging adulthood is a developmental phase characterized by an increased prevalence of alcohol and substance use, making it a critical period for the onset of substance use disorders (SAMHSA, 2023). To effectively address this public health concern, it is crucial to identify the psychological factors that differentiate emerging adulthood from other life phases and their associations with substance use disorders. This dissertation specifically focused on self-perceived adulthood status, one of the constructs defined by the emerging adulthood theory and explored its influence on the risk factors for prescription pain reliever misuse. However, there is a significant knowledge gap regarding the role of the other constructs of emerging adulthood in the prevalence of prescription pain reliever misuse, and further research is needed to investigate these

relationships. It is plausible that the remaining constructs contribute differently to the risk for and protection against prescription pain reliever misuse, but no studies have examined this aspect yet. One of the reasons for this knowledge gap is the absence of a validated measure to assess these associations. However, Smith et al. (2020) recently developed the Emerging Adult Reasons for Substance Use (EARS) scale, which demonstrates validity, reliability, and associations with substance use in a small sample. Therefore, utilizing this scale in future research will help shed light on how the constructs of emerging adulthood contribute to the prevalence of substance use, including alcohol abuse, smoking, marijuana use, and prescription pain reliever misuse.

Additionally, results from this dissertation indicate that race and gender differences, when combined with self-perceived adulthood status, can influence prescription pain reliever misuse. Future research needs to address how gender and race, in conjunction with self-perceived adulthood status, impact, prescription pain reliever misuse, alcohol use, smoking, and marijuana use during emerging adulthood, and subsequently, the misuse of prescription pain relievers in adulthood. Specifically, it is important to examine whether these pathways examined in this dissertation, from emerging adulthood risk factors to self-perceived adulthood status and to prescription pain reliever misuse in adulthood differ between men and women or individuals of different racial backgrounds. Results of these examinations have the potential to reveal the contribution of the individual, social, and cultural differences in the prevalence of opioid misuse. Furthermore, a comprehensive understanding of prescription pain reliever misuse among emerging adults can be achieved by examining the developmental

constructs alongside other well-established risk factors, such as peer influence, social networks, social norms, and co-occurring mental health problems (Davis et al., 2018).

Development of Theory-Informed Intervention

Emerging adults aged 18-25 represent the highest percentage (29.3%) of individuals needing substance use disorder treatment compared to adolescents (11.5%) and adults (18.7%; SAMHSA, 2023). However, they are the least likely to seek treatment (Bergman et al., 2016), with only around 4.8% (or 1.7 million) receiving any substance use treatment during 2022 (SAMHSA, 2023). Despite efforts to intervene and provide treatment for opioid use disorders, emerging adults with such disorders are more prone to testing positive for illicit opioids, experiencing relapses, or dropping out of treatment (Schuman-Olivier et al., 2014). This study aligns with previous research and demonstrates that receiving counseling or substance use treatment during emerging adulthood is associated with a likelihood of reporting prescription pain reliever misuse in adulthood. Consequently, results from this dissertation supports policies that require service providers to conduct mental health and trauma assessments alongside substance use assessments. Additionally, the findings of this study support the implementation of innovative interventions that consider the distinct developmental needs of emerging adults in addressing substance misuse.

To enhance the theoretical knowledge of social work students interested in the field of substance use, it is important to educate them about the emerging adulthood theory and its application in understanding the high prevalence of substance use among this population. This knowledge will enable them to build therapeutic rapport more effectively with emerging adult clients who have substance use disorders. Furthermore,

the implementation of policies that promote theory-informed interventions can facilitate further research aimed at creating and evaluating treatment approaches tailored to the specific biological, psychological, and social characteristics of emerging adults. For instance, although researchers suggest the efficacy of using digital recovery support services to assist emerging adults with substance use disorders, there is a lack of experimental evidence demonstrating the benefits of these digital interventions (Ashford et al., 2020). Given the propensity of emerging adults to utilize digital technology (SAMHSA, 2015), further research on the effectiveness of using technology in recovery support services could contribute to our understanding of strategies to reduce substance misuse among emerging adults and mitigate its transition to hard substance and other associated consequences. The research findings on the emerging adult population will guide policymakers in establishing effective policies to reduce prescription pain reliever misuse.

REFERENCES

Allem, J. P., Lisha, N. E., Soto, D. W., Baezconde-Garbanati, L., & Unger, J. B. (2013). Emerging adulthood themes, role transitions and substance use among Hispanics in Southern California. *Addictive behaviors, 38*(12), 2797-2800. https://doi.org/10.1016/j.addbeh.2013.08.001

Andersson, H. W., Steinsbekk, A., Walderhaug, E., Otterholt, E., & Nordfjærn, T. (2018). Predictors of dropout from inpatient substance use treatment: a prospective cohort study. *Substance abuse: research and treatment, 12*, 1178221818760551. https://doi.org/10.1177/1178221818760551

Antenangeli, L., & Durose, M. R. (2021). *Recidivism of prisoners released in 24 states in 2008: A 10-year follow-up period (2008-2018)*. US Department of Justice, Office of Justice Programs, Bureau of Justice Statistics. Retrieved from: https://bjs.ojp.gov/sites/g/files/xyckuh236/files/media/document/rpr24s0810yfup0818.pdf

Arnett, J. J. (2000). Emerging adulthood: A theory of development from the late teens through the twenties. *American Psychologist, 55*(5), 469-480. https://psycnet.apa.org/doi/10.1037/0003-066X.55.5.469

Arnett, J. J. (2003). Conceptions of the transition to adulthood among emerging adults in American ethnic groups. *New directions for child and adolescent development, 2003*(100), 63-76. Retrieved from: https://onlinelibrary.wiley.com/doi/epdf/10.1002/cd.75

Arnett, J. J. (2004). *Emerging adulthood: The winding road from the late teens through the twenties*. New York: Oxford University Press.

Arnett, J. J. (2005). The developmental context of substance use in emerging adulthood. *Journal of drug issues, 35*(2), 235-254.

Arnett, J. J. (2007). Emerging adulthood: What is it, and what is it good for? *Child development perspectives, 1*(2), 68-73. https://doi.org/10.1111/j.1750-8606.2007.00016.x

Arnett, J. J., & Tanner, J. L. (Eds.). (2006). *Emerging adults in America: Coming of age in the 21st century* (p. 3). Washington, DC: American Psychological Association.

Arnett, J. J. (1998). Learning to stand alone: the contemporary American transition to adulthood in cultural and historical context. *Human Development, 41,* 295-315.

Arria, A. M., Caldeira, K. M., Vincent, K. B., O'Grady, K. E., & Wish, E. D. (2008). Perceived harmfulness predicts nonmedical use of prescription drugs among college students: Interactions with sensation seeking. Prevention Science, 9, 191–201. https://doi.org/10.1007/s11121-008-0095-8

Ashford, R. D., Bergman, B. G., Kelly, J. F., & Curtis, B. (2020). Systematic review: Digital recovery support services used to support substance use disorder recovery. *Human Behavior and Emerging Technologies, 2*(1), 18-32. https://doi.org/10.1002/hbe2.148

Austin, A. E., & Shanahan, M. E. (2018). Association of childhood abuse and neglect with prescription opioid misuse: Examination of mediation by adolescent depressive symptoms and pain. *Children and youth services review, 86,* 84-93. https://doi.org/10.1016/j.childyouth.2018.01.023

Austin, A. E., Shanahan, M. E., & Zvara, B. J. (2018). Association of childhood abuse and prescription opioid use in early adulthood. *Addictive Behaviors*, *76*, 265-269.

Back, S. E., Lawson, K. M., Singleton, L. M., & Brady, K. T. (2011). Characteristics and correlates of men and women with prescription opioid dependence. *Addictive behaviors*, *36*(8), 829-834. https://doi.org/10.1016/j.addbeh.2011.03.013

Barman-Adhikari, A., Hsu, H. T., Brydon, D., Petering, R., Santa Maria, D., Narendorf, S., Shelton, J., Bender, K., & Ferguson, K. (2019). Prevalence and correlates of nonmedical use of prescription drugs (NMUPD) among young adults experiencing homelessness in seven cities across the United States. *Drug and alcohol dependence*, *200*, 153-160. https://doi.org/10.1016/j.drugalcdep.2019.03.015

Bayly, B. L., Hung, Y. W., & Cooper, D. K. (2022). Age-varying associations between child maltreatment, depressive symptoms, and frequent heavy episodic drinking. *Journal of youth and adolescence*, *51*(5), 927-939. https://doi.org/10.1007/s10964-021-01522-z

Beane, A. N. (2020). *Health and Academic Achievement in College and University Students* (Order No. 28271100). Available from ProQuest Central; ProQuest Dissertations & Theses A&I; ProQuest Dissertations & Theses Global; Social Science Premium Collection. (2456454942). https://www.proquest.com/dissertations-theses/health-academic-achievement-college-university/docview/2456454942/se-2

Benson, J. E., & Elder Jr, G. H. (2011). Young adult identities and their pathways: a developmental and life course model. *Developmental psychology*, 47(6), 1646. https://doi.org/10.1037/a0023833

Benson, J. E., & Furstenberg Jr, F. F. (2006). Entry into adulthood: Are adult role transitions meaningful markers of adult identity? *Advances in life course research*, *11*, 199-224. https://doi.org/10.1016/S1040-2608(06)11008-4

Benson, J. E., & Johnson, M. K. (2009). Adolescent family context and adult identity formation. *Journal of Family Issues*, *30*(9), 1265-1286. https://doi.org/10.1177/0192513X09332967

Bergman, B. G., Kelly, J. F., Nargiso, J. E., & McKowen, J. W. (2016). " The Age of Feeling in-Between": Addressing Challenges in the Treatment of Emerging Adults With Substance Use Disorders. *Cognitive and behavioral practice*, *23*(3), 270-288. https://doi.org/10.1016/j.cbpra.2015.09.008

Biancuzzi, Helena, Francesca Dal Mas, Valerio Brescia, Stefano Campostrini, Marco Cascella, Arturo Cuomo, Lorenzo Cobianchi et al. "Opioid misuse: a review of the main issues, challenges, and strategies." *International journal of environmental research and public health* 19, no. 18 (2022): 11754. https://doi.org/10.3390/ijerph191811754

Boeder, J., Fruiht, V., Hwang, S., Blanco, G., & Chan, T. (2022). Learning to Love, Work, and Live Your Best Life: Mentoring in Emerging Adulthood Predicts Later Flourishing and Subjective Well-Being. *Emerging Adulthood*, *10*(5), 1222-1234. https://doi.org/10.1177/21676968211012879

Bonar, E. E., Coughlin, L., Roche, J. S., Philyaw-Kotov, M. L., Bixler, E. A., Sinelnikov, S., Kolosh, A., Cihal, M. J., Cunningham, R. M., & Walton, M. A. (2020). Prescription opioid misuse among adolescents and emerging adults in the United States: A scoping review. *Preventive medicine*, *132*, 105972. https://doi.org/10.1016/j.ypmed.2019.105972

Bowers, A., Cleverley, K., Di Clemente, C., & Henderson, J. (2017). Transitional-aged youth perceptions of influential factors for substance-use change and treatment seeking. *Patient preference and adherence*, *11*, 1939. https://doi.org/10.2147/PPA.S145781

Brinkley-Rubinstein, L., Zaller, N., Martino, S., Cloud, D. H., McCauley, E., Heise, A., & Seal, D. (2018). Criminal justice continuum for opioid users at risk of overdose. *Addictive behaviors*, *86*, 104-110. https://doi.org/10.1016/j.addbeh.2018.02.024

Browne, C. J., Godino, A., Salery, M., & Nestler, E. J. (2020). Epigenetic mechanisms of opioid addiction. *Biological psychiatry*, *87*(1), 22-33. https://doi.org/10.1016/j.biopsych.2019.06.027

Butelman, E. R., Maremmani, A. G., Bacciardi, S., Chen, C. Y., Correa da Rosa, J., & Kreek, M. J. (2018). Non-medical cannabis self-exposure as a dimensional predictor of opioid dependence diagnosis: A propensity score matched analysis. *Frontiers in psychiatry*, *9*, 283. https://doi.org/10.3389/fpsyt.2018.00283

Cammack, A. L., Haardörfer, R., & Suglia, S. F. (2019). Associations between child maltreatment, cigarette smoking, and nicotine dependence in young adults with a

history of regular smoking. *Annals of epidemiology*, *40*, 13-20. https://doi.org/10.1016/j.annepidem.2019.10.003

Center for Behavioral Health Statistics and Quality (2022). 2021 National Survey on Drug Use and Health (NSDUH): Methodological summary and definitions. Substance Abuse and Mental Health Services Administration. https://www.samhsa.gov/data/sites/default/files/reports/rpt39442/2021NSDUHMethodSummDefs100422.pdf

Centers for Disease Control and Prevention (June 1, 2022). The drug overdose Epidemic: Behind the numbers. Retrieved from: https://www.cdc.gov/opioids/data/index.html

Cerdá, M., Bordelois, P., Keyes, K. M., Roberts, A. L., Martins, S. S., Reisner, S. L., Austin, S/B., Corliss, H. L., & Koenen, K. C. (2014). Family ties: Maternal-offspring attachment and young adult nonmedical prescription opioid use. *Drug and alcohol dependence*, 142, 231-238. https://doi.org/10.1016/j.drugalcdep.2014.06.026

Chan, K. T., Winston, P., Jennings, R., Trant, J., & Moller, M. (2019). Age differences in the association of nonmedical prescription opioid use and suicidality. *Journal of Opioid Management*, *15*(1), 5-10. https://doi.org/10.5055/jom.2019.0480

Chen, P., & Harris, K. M. (2020). Guidelines for analyzing add health data (pp. 1–56). Chapel Hill, NC: Carolina Population Center at the University of North Carolina at Chapel Hill. https://addhealth.cpc.unc.edu/wp-content/uploads/docs/user_guides/GuidelinesforAnalysisofAddHealthData_202004.pdf

Cheney, M. K., Oman, R. F., Vesely, S. K., Aspy, C. B., & Tolma, E. L. (2015). The prospective association of youth assets with tobacco use in young adulthood. *American Journal of Health Education*, *46*(6), 329-337. https://doi.org/10.1080/19325037.2015.1077177

Chiauzzi, E., DasMahapatra, P., & Black, R. A. (2013). Risk behaviors and drug use: a latent class analysis of heavy episodic drinking in first-year college students. *Psychology of addictive behaviors*, *27*(4), 974. https://doi.org/10.1037/a0031570

Child Welfare Information Gateway. (2022). Definitions of child abuse and neglect. U.S. Department of Health and Human Services, Administration for Children and Families, Children's Bureau. https://www.childwelfare. gov/ topics/systemwide/laws-policies/statutes/define/

Christie, N. C. (2021). The role of social isolation in opioid addiction. *Social cognitive and affective neuroscience*, *16*(7), 645-656. https://doi.org/10.1093/scan/nsab029

Clarke, J. L., Skoufalos, A., & Scranton, R. (2016). The American opioid epidemic: Population health implications and potential solutions. Report from the National Stakeholder Panel. *Population health management*, *19*(S1), S-1. https://doi.org/10.1089/pop.2015.0144

Clary, K. L., Goffnett, J., Bennett, K., & Smith, D. (2022). A comparison of developmental reasons for substance use between sexual minority and heterosexual emerging adults. *Journal of Gay & Lesbian Social Services*, *34*(3), 360-380. https://doi.org/10.1080/10538720.2021.1984358

Conroy, E., Degenhardt, L., Mattick, R. P., & Nelson, E. C. (2009). Child maltreatment as a risk factor for opioid dependence: Comparison of family characteristics and

type and severity of child maltreatment with a matched control group. *Child Abuse & Neglect*, *33*(6), 343-352. https://doi.org/10.1016/j.chiabu.2008.09.009

Cooper, M. L., Kuntsche, E., Levitt, A., Barber, L. L., & Wolf, S. (2016). Motivational models of substance use: A review of theory and research on motives for using alcohol, marijuana, and tobacco. In K. J. Sher's (Ed.) *The Oxford handbook of substance use and substance use disorders, 1.* Oxford Press. https://doi.org/10.1093/oxfordhb/9780199381678.013.017

Copp, J. E., Giordano, P. C., Longmore, M. A., & Manning, W. D. (2020). Desistance from crime during the transition to adulthood: The influence of parents, peers, and shifts in identity. *Journal of Research in Crime and Delinquency*, *57*(3), 294-332.

Cotton Bronk, K., Hill, P. L., Lapsley, D. K., Talib, T. L., & Finch, H. (2009). Purpose, hope, and life satisfaction in three age groups. *The Journal of Positive Psychology*, *4*(6), 500-510. https://doi.org/10.1080/17439760903271439

Crowley, D. M., Connell, C. M., Jones, D., & Donovan, M. W. (2019). Considering the child welfare system burden from opioid misuse: research priorities for estimating public costs. *The American journal of managed care*, *25*(13 Suppl), S256.

Culyba, A. J., Ginsburg, K. R., Fein, J. A., Branas, C. C., Richmond, T. S., & Wiebe, D. J. (2016). Protective effects of adolescent–adult connection on male youth in urban environments. *Journal of Adolescent Health*, *58*(2), 237-240. https://doi.org/10.1016/j.jadohealth.2015.10.247

Dang, M. T., Conger, K. J., Breslau, J., & Miller, E. (2014). Exploring protective factors among homeless youth: The role of natural mentors. *Journal of health Care for*

the Poor and Underserved, *25*(3), 1121-1138. https:doi.org/10.1353/hpu.2014.0133

Davis, J. P., Dumas, T. M., Briley, D. A., & Sussman, S. (2018). A meta-analysis of the association between substance use and emerging adult development using the IDEA scale. *The American journal on addictions*, *27*(3), 166-176. https://doi.org/10.1111/ajad.12707

Davis, J. P., Tucker, J. S., Stein, B. D., & D'Amico, E. J. (2021). Longitudinal effects of adverse childhood experiences on substance use transition patterns during young adulthood. *Child Abuse & Neglect*, *120*, 105201. https://doi.org/10.1016/j.chiabu.2021.105201

Deptula, D. P., Henry, D. B., & Schoeny, M. E. (2010). How can parents make a difference? Longitudinal associations with adolescent sexual behavior. *Journal of family psychology*, *24*(6), 731-739. https://doi.org/10.1037/a0021760

Desch, J., Mansuri, F., Tran, D., Schwartz, S. W., & Bakour, C. (2023). The association between adverse childhood experiences and depression trajectories in the Add Health study. *Child Abuse & Neglect*, *137*, 106034. https://doi.org/10.1016/j.chiabu.2023.106034

Ditre, J. W., Brandon, T. H., Zale, E. L., & Meagher, M. M. (2011). Pain, nicotine, and smoking: research findings and mechanistic considerations. *Psychological bulletin*, *137*(6), 1065. https://doi.org/10.1037/a0025544

Donaldson, C. D., Handren, L. M., & Crano, W. D. (2016). The enduring impact of parents' monitoring, warmth, expectancies, and alcohol use on their children's

future binge drinking and arrests: A longitudinal analysis. *Prevention science*, *17*(5), 606-614. https://doi.org/10.1007/s11121-016-0656-1

Donaldson, C. D., Nakawaki, B., & Crano, W. D. (2015). Variations in parental monitoring and predictions of adolescent prescription opioid and stimulant misuse. *Addictive behaviors*, *45*, 14-21. https://doi.org/10.1016/j.addbeh.2015.01.022

Dong, Y., & Peng, C. Y. J. (2013). Principled missing data methods for researchers. *SpringerPlus*, *2*(1), 222. https://doi.org/10.1186/2193-1801-2-222

Douglas, K. R., Chan, G., Gelernter, J., Arias, A. J., Anton, R. F., Weiss, R. D., Brady, K., Poling, J., Farrer, L., & Kranzler, H. R. (2010). Adverse childhood events as risk factors for substance dependence: partial mediation by mood and anxiety disorders. *Addictive behaviors*, *35*(1), 7-13. https://doi.org/10.1016/j.addbeh.2009.07.004

Drug Enforcement Administration Museum (2021). *Opium Order Form*. https://museum.dea.gov/museum-collection/collection-spotlight/artifact/opium-order-form#:~:text=Decades%20before%20DEA's%20founding%2C%20Congress,regulate%20whole%20classes%20of%20drugs.

Drug Overdose Death Rates (June 30, 2023). Retrieved July 10, 2023, from https://nida.nih.gov/research-topics/trends-statistics/overdose-death-rates

Dunn, E. C., McLaughlin, K. A., Slopen, N., Rosand, J., & Smoller, J. W. (2013). Developmental timing of child maltreatment and symptoms of depression and suicidal ideation in young adulthood: results from the National Longitudinal

Study of Adolescent Health. *Depression and anxiety*, *30*(10), 955-964. https://doi.org/10.1002/da.22102

Dunn, E. C., Nishimi, K., Gomez, S. H., Powers, A., & Bradley, B. (2018). Developmental timing of trauma exposure and emotion dysregulation in adulthood: Are there sensitive periods when trauma is most harmful? *Journal of affective disorders*, *227*, 869-877. https://doi.org/10.1016/j.jad.2017.10.045

Dunn, K. E., Turner, G. M., & Oswald, L. M. (2022). Effects of early life trauma on risks for adult opioid use disorder are mediated by stress and occur independent of depression and anxiety. *Journal of addiction medicine*, *16*(6), 709-715. https://doi.org/10.1097/ADM.0000000000001011

Earle, A. M., & LaBrie, J. W. (2016). The upside of helicopter parenting: Engaging parents to reduce first-year student drinking. *Journal of student affairs research and practice*, *53*(3), 319-330. https://doi.org/10.1080/19496591.2016.1165108

Elhammady, M., Awara, M., Aty, A. A., Yousef, S., & Moselhy, H. F. (2014). Self-reported child sexual abuse, physical abuse, and parental history of drug misuse in opioid dependence syndrome. *Addictive Disorders & Their Treatment*, *13*(4), 151-158. https:/doi.org/10.1097/ADT.0b013e31829bb3b9

Esposito, M. H., Lee, H., Hicken, M. T., Porter, L. C., & Herting, J. R. (2017). The consequences of contact with the criminal justice system for health in the transition to adulthood. *Longitudinal and life course studies*, *8*(1), 57. https://doi.org/10.14301/llcs.v8i1.405

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M.P., & Marks, J. S. (2019). Reprint of: relationship of childhood abuse

and household dysfunction to many of the leading causes of death in adults: the adverse childhood experiences (ACE) study. *American journal of preventive medicine*, *56*(6), 774-786. https://doi.org/10.1016/j.amepre.2019.04.001

Fergusson, D. M., McLeod, G. F. H., Horwood, L. J., Swain, N. R., Chapple, S., & Poulton, R. (2015). Life satisfaction and mental health problems (18 to 35 years). *Psychological medicine*, *45*(11), 2427-2436. https://doi.org/10.1017/S0033291715000422

Fiellin, L. E., Tetrault, J. M., Becker, W. C., Fiellin, D. A., & Hoff, R. A. (2013). Previous use of alcohol, cigarettes, and marijuana and subsequent abuse of prescription opioids in young adults. *Journal of Adolescent Health*, *52*(2), 158-163. https://doi.org/10.1016/j.jadohealth.2012.06.010

Fish, J. N., & Pasley, K. (2015). Sexual (minority) trajectories, mental health, and alcohol use: A longitudinal study of youth as they transition to adulthood. *Journal of youth and adolescence*, *44*(8), 1508-1527.

Florence, C., Luo, F., & Rice, K. (2021). The economic burden of opioid use disorder and fatal opioid overdose in the United States, 2017. *Drug and alcohol dependence*, *218*, 108350. https://doi.org/10.1016/j.drugalcdep.2020.108350

Ferron, J. M., & Hess, M. R. (2007). Estimation in SEM: A concrete example. *Journal of Educational and Behavioral Statistics, 32*(1), 110-120. https://doi.org/ 10.3102/1076998606298025

Frank, D., Mateu-Gelabert, P., Guarino, H., Bennett, A., Wendel, T., Jessell, L., & Teper, A. (2015). High risk and little knowledge: overdose experiences and knowledge

among young adult nonmedical prescription opioid users. *International Journal of Drug Policy*, *26*(1), 84-91. https://doi.org/10.1016/j.drugpo.2014.07.013

Gates, J. R., Corbin, W. R., & Fromme, K. (2016). Emerging adult identity development, alcohol use, and alcohol-related problems during the transition out of college. Psychology of addictive behaviors, 30(3), 345. https://dx.doi.org/10.1037/adb0000179

Gerhardt, S., Eidenmueller, K., Hoffmann, S., Bekier, N. K., Bach, P., Hermann, D., Koopmann, A., Sommer, W. H., Kiefer, F., & Vollstädt-Klein, S. (2022). A history of childhood maltreatment has substance-and sex-specific effects on craving during treatment for substance use disorders. *Frontiers in psychiatry*, *13*. https://doi.org/10.3389/fpsyt.2022.866019

Ghandour, L. A., El Sayed, D. S., & Martins, S. S. (2013). Alcohol and illegal drug use behaviors and prescription opioids use: how do nonmedical and medical users compare, and does motive to use really matter? *European addiction research*, *19*(4), 202-210. http://doi.org/10.1159/000345445.

Gilmore, K. (2019). Is emerging adulthood a new developmental phase? *Journal of the American Psychoanalytic Association*, *67*(4), 625-653. https://doi.org/10.1177/0003065119868680

Goff, P. A., Jackson, M. C., Di Leone, B. A. L., Culotta, C. M., & DiTomasso, N. A. (2014). The essence of innocence: consequences of dehumanizing Black children. *Journal of personality and social psychology*, *106*(4), 526. https://doi.org/10.1037/a0035663

Gonzalez, D., Bethencourt Mirabal, A., & McCall, J. D. (2022). Child Abuse and Neglect. In: *StatPearls* [Internet]. StatPearls Publishing. Available from: https://www.ncbi.nlm.nih.gov/books/NBK459146/

Goplerud, E., Hodge, S., & Benham, T. (2017). A substance use cost calculator for US employers with an emphasis on prescription pain medication misuse. *Journal of occupational and environmental medicine*, *59*(11), 1063. https://doi.org/10.1097/JOM.0000000000001157

Graf, G. H. J., Chihuri, S., Blow, M., & Li, G. (2021). Adverse childhood experiences and justice system contact: A systematic review. *Pediatrics*, *147*(1). https://doi.org/10.1542/peds.2020-021030

Green, K. J., Hunter, C. M., Bray, R. M., Pemberton, M., & Williams, J. (2008). Peer and role model influences for cigarette smoking in a young adult military population. *Nicotine & tobacco research*, *10*(10), 1533-1541.

Greeson, J. K., Usher, L., & Grinstein-Weiss, M. (2010). One adult who is crazy about you: Can natural mentoring relationships increase assets among young adults with and without foster care experience? *Children and Youth Services Review*, *32*(4), 565-577. https://doi.org/10.1016/j.childyouth.2009.12.003

Guarino, H., Mateu-Gelabert, P., Teubl, J., & Goodbody, E. (2018). Young adults' opioid use trajectories: From nonmedical prescription opioid use to heroin, drug injection, drug treatment and overdose. *Addictive behaviors*, *86*, 118-123. https://doi.org/10.1016/j.addbeh.2018.04.017

Gur, R. C., Richard, J., Calkins, M. E., Chiavacci, R., Hansen, J. A., Bilker, W. B., Loughead, J., Connolly, J. J., Qiu, H., Mentch, F. D., Abou-Sleiman, P. M.,

Hakonarson, H., & Gur, R. E. (2012). Age group and sex differences in performance on a computerized neurocognitive battery in children aged 8-21. *Neuropsychology, 26*(2), 251–265. https://doi.org/10.1037/a0026712

Hudgins, J. D., Porter, J. J., Monuteaux, M. C., & Bourgeois, F. T. (2019). Prescription opioid use and misuse among adolescents and young adults in the United States: A national survey study. *PLoS medicine, 16*(11), e1002922. https://doi.org/10.1371/journal.pmed.1002922

Hadland, S. E., Wharam, J. F., Schuster, M. A., Zhang, F., Samet, J. H., & Larochelle, M. R. (2017). Trends in receipt of buprenorphine and naltrexone for opioid use disorder among adolescents and young adults, 2001-2014. *JAMA pediatrics, 171*(8), 747-755. https://doi.org/10.1001/jamapediatrics.2017.0745

Hales, C. M., Martin, C. B., & Gu, Q. (2020). Prevalence of prescription pain medication use among adults: United States, 2015–2018. https://stacks.cdc.gov/view/cdc/89707

Harris, K. M., Halpern, C. T., Whitsel, E., Hussey, J., Tabor, J., Entzel, P., & Udry, J. R. (2009). The National Longitudinal Study of Adolescent to Adult Health: Research design. Available from: http://www.cpc.unc.edu/projects/addhealth/design [accessed September 13, 2022]

Hayley, A. C., Stough, C., & Downey, L. A. (2017). DSM-5 cannabis use disorder, substance use and DSM-5 specific substance-use disorders: Evaluating comorbidity in a population-based sample. *European Neuropsychopharmacology, 27*(8), 732-743. https://doi.org/10.1016/j.euroneuro.2017.06.004

Hill, J. M., Blokland, A. A. J., Van der Geest (2018). Risk factors for self-reported delinquency in emerging adulthood. *European Journal of Criminology. 15*(5) 544-566. https://doi.org/10.1177/1477370817749495

Holtsman-Pharm, M. & Fishman, S (2005). Opioid receptors. In Benzon, H. T., Raja, S. N., Molloy, R. E., Liu, S. S., & Fishman, S. M. (Ed.), *Essentials of Pain Medicine and Regional Anesthesia* (2nd., pp. x-x). Churchill Livingstone. https://doi.org/10.1016/B978-0-443-06651-1.X5001-1

Hsu, D. J., McCarthy, E. P., Stevens, J. P., & Mukamal, K. J. (2017). Hospitalizations, costs and outcomes associated with heroin and prescription opioid overdoses in the United States 2001–12. *Addiction*, *112*(9), 1558-1564. https://doi.org/10.1111/add.13795

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural equation modeling: a multidisciplinary journal*, *6*(1), 1-55. https://doi.org/10.1080/10705519909540118

Hudgins, J. D., Porter, J. J., Monuteaux, M. C., & Bourgeois, F. T. (2019). Prescription opioid use and misuse among adolescents and young adults in the United States: A national survey study. *PLoS medicine*, *16*(11), e1002922. https://doi.org/10.1371/journal.pmed.1002922

Hurd, N. M., Stoddard, S. A., Bauermeister, J. A., & Zimmerman, M. A. (2014). Natural mentors, mental health, and substance use: Exploring pathways via coping and purpose. *American Journal of Orthopsychiatry*, *84*(2), 190–200. https://doi.org/10.1037/h0099361

John, W. S., Zhu, H., Mannelli, P., Subramaniam, G. A., Schwartz, R. P., McNeely, J., & Wu, L. T. (2019). Prevalence and patterns of opioid misuse and opioid use disorder among primary care patients who use tobacco. *Drug and alcohol dependence*, *194*, 468-475. https://doi.org/10.1016/j.drugalcdep.2018.11.011

Johnson, M. D., & Galambos, N. L. (2014). Paths to intimate relationship quality from parent–adolescent relations and mental health. *Journal of Marriage and Family*, *76*(1), 145-160. https://doi.org/10.1111/jomf.12074

Johnson W.L., Giordano P.C., Manning W.D., Longmore M.A. (2011). Parent--child relations and offending during young adulthood. *Journal of Youth Adolescence. 40*(7):786-99. https://doi.org/10.1007/s10964-010-9591-9.

Jones, M. R., Viswanath, O., Peck, J., Kaye, A. D., Gill, J. S., & Simopoulos, T. T. (2018). A brief history of the opioid epidemic and strategies for pain medicine. *Pain and therapy*, *7*, 13-21. https://doi.org/10.1007/s40122-018-0097-6

Kandel, D. B., Yamaguchi, K., & Chen, K. (1992). Stages of progression in drug involvement from adolescence to adulthood: further evidence for the gateway theory. *Journal of studies on alcohol*, *53*(5), 447-457. https://doi.org/10.15288/jsa.1992.53.447

Kirkpatrick Johnson, M., Allen Berg, J., & Sirotzki, T. (2007). Differentiation in self-perceived adulthood: Extending the confluence model of subjective age identity. *Social Psychology Quarterly*, *70*(3), 243-261. https://www.jstor.org/stable/20141787

Klem, L. (2004). Structural equation modeling. In L.G Grimm, & P. R. Yarnonld (Eds.), *Reading and understanding more multivariate statistics* (4th ed., pp. 227- 283). American Psychological Association.

Kobrinsky, V., & Siedlecki, K. L. (2022). Mediators of the Relationship Between Adverse Childhood Experiences (ACEs) and Symptoms of Anxiety, Depression, and Suicidality among Adults. *Journal of Child & Adolescent Trauma*, 1-14. https://doi.org/10.1007/s40653-022-00510-0

Kosten, T. R., & George, T. P. (2002). The neurobiology of opioid dependence: implications for treatment. *Science & practice perspectives*, *1*(1), 13-20. https://doi.org/10.1151/spp021113

LaBrenz, C. A., Dell, P. J., Fong, R., & Liu, V. (2021). Happily ever after? Life satisfaction after childhood exposure to violence. *Journal of interpersonal violence*, *36*(13-14), NP6747-NP6766. https://doi.org/10.1177/0886260518820706

LaBrie, J. W., Earle, A. M., Boyle, S. C., Hummer, J. F., Montes, K., Turrisi, R., & Napper, L. E. (2016). A parent-based intervention reduces heavy episodic drinking among first-year college students. *Psychology of Addictive Behaviors, 30*(5), 523–535. https://doi.org/10.1037/adb0000187

Lamhoot, T., Adelson, M., Sason, A., Schreiber, S., & Peles, E. (2021). Post-traumatic stress disorder due to sexual abuse and its relation to pain sensitivity among patients in methadone maintenance treatment. *Psychiatry Research*, *298*, 113828. https://doi.org/10.1016/j.psychres.2021.113828

Lankenau, S. E., Teti, M., Silva, K., Bloom, J. J., Harocopos, A., & Treese, M. (2012). Initiation into prescription opioid misuse amongst young injection drug users. *International Journal of Drug Policy*, *23*(1), 37-44. https://doi.org/10.1016/j.drugpo.2011.05.014

Lee, J., & Thrul, J. (2021). Trends in opioid misuse by cigarette smoking status among US adolescents: Results from National Survey on Drug Use and Health 2015–2018. *Preventive Medicine*, *153*, 106829. https://doi.org/10.1016/j.ypmed.2021.106829

Li, A., Wang, S., & Liu, X. (2023). Childhood psychological maltreatment and life satisfaction among Chinese young adults: The mediating role of internalizing problems and the buffering role of social support. *Current Psychology*, *42*(9), 7701-7711. https://doi.org/10.1007/s12144-021-02126-3

Lichenstein, S. D., Zakiniaeiz, Y., Yip, S. W., & Garrison, K. A. (2019). Mechanisms and Clinical Features of Co-occurring Opioid and Nicotine Use. *Current Addiction Reports*, *6* (2): 114–25. https://doi.org/10.1007/s40429-019-00245-3

Liebling, E. J., Yedinak, J. L., Green, T. C., Hadland, S. E., Clark, M. A., & Marshall, B. D. (2016). Access to substance use treatment among young adults who use prescription opioids non-medically. *Substance Abuse Treatment, Prevention, and Policy*, *11*, 1-12. https://doi.org/10.1186/s13011-016-0082-1

Lombardi, B. M., Zerden, L. D. S., Guan, T., & Prentice, A. (2019). The role of social work in the opioid epidemic: Office-based opioid treatment programs. *Social work in health care*, *58*(3), 339-344. https://doi.org/10.1080/00981389.2018.1564109

Lord, S., Brevard, J., & Budman, S. (2011). Connecting to young adults: an online social network survey of beliefs and attitudes associated with prescription opioid misuse among college students. *Substance use & misuse*, *46*(1), 66-76. https://doi.org/10.3109/10826084.2011.521371

Lowe, S. R., Dillon, C. O., Rhodes, J. E., & Zwiebach, L. (2013). Defining adult experiences: Perspectives of a diverse sample of young adults. *Journal of Adolescent Research*, *28*(1), 31-68. https://doi.org/10.1177/0743558411435854

Lucas-Thompson, R. G. (2014). Relationship quality with parents, stressful life events, and cortisol production in emerging adulthood. *Emerging Adulthood*, *2*(2), 92-104. https://doi.org/10.1177/2167696813503313

Lyden, J., & Binswanger, I. A. (2019, April). The United States opioid epidemic. In *Seminars in perinatology* (Vol. 43, No. 3, pp. 123-131). WB Saunders.

Mak, H. W., & Iacovou, M. (2019). Dimensions of the parent–child relationship: Effects on substance use in adolescence and adulthood. *Substance use & misuse*, *54*(5), 724-736. https://doi.org/10.1080/10826084.2018.1536718

Malvaso, C. G., Cale, J., Whitten, T., Day, A., Singh, S., Hackett, L., Delfabbro, P. H., & Ross, S. (2022). Associations between adverse childhood experiences and trauma among young people who offend: A systematic literature review. *Trauma, Violence, & Abuse*, *23*(5), 1677-1694. https://doi.org/10.1177/15248380211013132

Martins, S. S., Kim, J. H., Chen, L. Y., Levin, D., Keyes, K. M., Cerdá, M., & Storr, C. L. (2015). Nonmedical prescription drug use among US young adults by

educational attainment. *Social psychiatry and psychiatric epidemiology*, *50*(5), 713-724. https://doi.org/10.1007/s00127-014-0980-3

Masten, A. S., & Cicchetti, D. (2010). Developmental cascades. *Development and psychopathology*, *22*(3), 491-495. https://doi.org/10.1017/S0954579410000222

Matthews, T. A., Sembajwe, G., von Känel, R., & Li, J. (2022). Associations of employment status with opioid misuse: Evidence from a nationally representative survey in the US. *Journal of psychiatric research*, *151*, 30-33. https://doi.org/10.1016/j.jpsychires.2022.04.001

McCabe, S. E., Schulenberg, J. E., Schepis, T. S., McCabe, V. V., & Veliz, P. T. (2022). Longitudinal analysis of substance use disorder symptom severity at age 18 years and substance use disorder in adulthood. *JAMA Network Open*, *5*(4), e225324-e225324. https://doi.org/10.1001/jamanetworkopen.2022.5324

Morgan, J. P. (1985). American opiophobia: customary underutilization of opioid analgesics. *Advances in alcohol & substance abuse*, *5*(1-2), 163-172. https://doi.org/10.1300/J251v05n01_11

Mosley-Johnson, E., Garacci, E., Wagner, N., Mendez, C., Williams, J. S., & Egede, L. E. (2019). Assessing the relationship between adverse childhood experiences and life satisfaction, psychological well-being, and social well-being: United States Longitudinal Cohort 1995–2014. *Quality of Life Research*, *28*(4), 907-914. https://doi.org/10.1007/s11136-018-2054-6

Mowbray, O., & Fatehi, M. (2021). Longitudinal trends in opioid-related mortality. *Journal of Social Work Practice in the Addictions*, *21*(2), 149-161. https://doi.org/10.1080/1533256X.2021.1893965

Nanavaty, N., Thompson, C. G., Meagher, M. W., McCord, C., & Mathur, V. A. (2023). Traumatic life experience and pain sensitization: meta-analysis of laboratory findings. *The Clinical Journal of Pain*, *39*(1), 15-28. https://doi.org/10.1097/AJP.0000000000001082

National Drug Control Budget FY 2024 Funding Highlights (March 2023). Retrieved July 10, 2023, from https://www.whitehouse.gov/wp-content/uploads/2023/03/FY-2024-Budget-Highlights.pdf

National Institute of Mental Health (March 2023). Mental illness. Retrieved from: https://www.nimh.nih.gov/health/statistics/mental-illness#part_2539

National Institute on Drug Abuse (April 2022). Substance use in women research report: sex and gender differences in substance use. Retrieved from: https://nida.nih.gov/publications/research-reports/substance-use-in-women/sex-gender-differences-in-substance-use

National Longitudinal Study of Adolescent to Adult Health (May 2023). Frequently asked questions: Questions about field work. Retrieved from: https://addhealth.cpc.unc.edu/documentation/frequently-asked-questions/

Nature Education (2014). *Genotype*. https://www.nature.com/scitable/definition/genotype-234/

Neighbors, B. D., Forehand, R., & Bau, J. J. (1997). Interparental conflict and relations with parents as predictors of young adult functioning. *Development and Psychopathology*, *9*(1), 169-187. http://doi.org/10.1017/S0954579497001120

Neighbors, C. J., Choi, S., Healy, S., Yerneni, R., Sun, T., & Shapoval, L. (2019). Age related medication for addiction treatment (MAT) use for opioid use disorder

among Medicaid-insured patients in New York. *Substance abuse treatment, prevention, and policy*, *14*(1), 1-7. https://doi.org/10.1186/s13011-019-0215-4

Nelson, L. J., & Barry, C. M. (2005). Distinguishing features of emerging adulthood: The role of self-classification as an adult. *Journal of adolescent research*, *20*(2), 242-262. https://doi.org/10.1177/0743558404273074

Oesterle, S., David Hawkins, J., Hill, K. G., & Bailey, J. A. (2010). Men's and women's pathways to adulthood and their adolescent precursors. *Journal of Marriage and Family*, *72*(5), 1436-1453. https://doi.org/10.1111/j.1741-3737.2010.00775.x

Oesterle, S., David Hawkins, J., Hill, K. G., & Bailey, J. A. (2010). Men's and women's pathways to adulthood and their adolescent precursors. *Journal of Marriage and Family*, *72*(5), 1436-1453. https://doi.org/10.1111/j.1741-3737.2010.00775.x

Oman, R. F., Vesely, S. K., Aspy, C. B., & Tolma, E. L. (2015). Prospective associations among assets and successful transition to early adulthood. *American journal of public health*, *105*(1), e51-e56. https://doi.org/10.2105/AJPH.2014.302310

Oswald, L. M., Dunn, K. E., Seminowicz, D. A., & Storr, C. L. (2021). Early life stress and risks for opioid misuse: review of data supporting neurobiological underpinnings. *Journal of Personalized Medicine*, *11*(4), 315. https://doi.org/10.3390/jpm11040315

Padilla-Walker, L. M., Memmott-Elison, M. K., & Nelson, L. J. (2017). Positive relationships as an indicator of flourishing during emerging adulthood. In L. M. Padilla-Walker & L. J. Nelson (Eds.), *Flourishing in emerging adulthood: Positive development during the third decade of life* (pp. 212–236). Oxford University Press.

Parker, M. A., Weinberger, A. H., & Villanti, A. C. (2020). Quit ratios for cigarette smoking among individuals with opioid misuse and opioid use disorder in the United States. *Drug and alcohol dependence, 214*, 108164. https://doi.org/10.1016/j.drugalcdep.2020.108164

Pasman, J. A., Smit, K., Vollebergh, W. A., Nolte, I. M., Hartman, C. A., Abdellaoui, A., Verweij, K. j. h., Maciejewski, D., & Vink, J. M. (2023). Interplay between genetic risk and the parent environment in adolescence and substance use in young adulthood: a TRAILS study. *Development and psychopathology*, *35*(1), 396-409. https://doi.org/10.1017/S095457942100081X

Peachey, J. E. (1989). Drugs of misuse and dependence including the opioid agonists and antagonists. *Current Opinion in Psychiatry*, *2*(3), 395-401.

Pilarinos, A., Bromberg, D. J., & Karamouzian, M. (2022). Access to medications for opioid use disorder and associated factors among adolescents and young adults: a systematic review. *JAMA pediatrics*. https://doi.org/10.1001/jamapediatrics.2021.4606

Pomerleau, O. F., & Pomerleau, C. S. (1984). Neuroregulators and the reinforcement of smoking: towards a biobehavioral explanation. *Neuroscience and biobehavioral reviews*, *8*(4), 503–513. https://doi.org/10.1016/0149-7634(84)90007-1

Poole, R., Carver, H., Anagnostou, D., Edwards, A., Moore, G., Smith, P., Wood, F., & Brain, K. (2022). Tobacco use, smoking identities and pathways into and out of smoking among young adults: a meta-ethnography. *Substance Abuse Treatment, Prevention, and Policy, 17*(1), 1-19. https://doi.org/10.1186/s13011-022-00451-9

Primack, B. A., Swanier, B., Georgiopoulos, A. M., Land, S. R., & Fine, M. J. (2009). Association between media use in adolescence and depression in young adulthood: a longitudinal study. *Archives of general psychiatry*, *66*(2), 181-188. https://doi.org/10.1001/archgenpsychiatry.2008.532

Quinn, K., Boone, L., Scheidell, J. D., Mateu-Gelabert, P., McGorray, S. P., Beharie, N., Cottler, L. B., & Khan, M. R. (2016). The relationships of childhood trauma and adulthood prescription pain reliever misuse and injection drug use. *Drug and alcohol dependence*, *169*, 190-198. https://doi.org/10.1016/j.drugalcdep.2016.09.021

Quinn, K., Frueh, B. C., Scheidell, J., Schatz, D., Scanlon, F., & Khan, M. R. (2019). Internalizing and externalizing factors on the pathway from adverse experiences in childhood to non-medical prescription opioid use in adulthood. *Drug and alcohol dependence*, 197, 212-219. https://doi.org/10.1016/j.drugalcdep.2018.12.029

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied psychological measurement*, *1*(3), 385-401. https://doi.org/10.1177/014662167700100306

Rajabi, A., Dehghani, M., Shojaei, A., Farjam, M., & Motevalian, S. A. (2019). Association between tobacco smoking and opioid use: a meta-analysis. *Addictive behaviors*, *92*, 225-235. https://doi.org/10.1016/j.addbeh.2018.11.043

Reifman, A., Arnett, J. J., & Colwell, M. J. (2007). Emerging adulthood: Theory, assessment and application. *Journal of Youth Development, 2*(1), 37-48. https://doi.org/10.5195/jyd.2007.359

Rigdon, E. E. (1996). CFI versus RMSEA: A comparison of two fit indexes for structural equation modeling, Structural Equation Modeling. *Structural Equational Modeling: A Multidisciplinary Journal*, *3*(4), 369-379. https://doi.org/10.1080/10705519609540052

Rinker, D. V., Walters, S. T., Wyatt, T. M., & DeJong, W. (2015). Do incoming first-year college students who think of themselves as adults drink more responsibly after starting college? *Emerging Adulthood*, *3*(5), 359-363. https://doi.org/10.1177/2167696815581978

Roberts, M. E., Fuemmeler, B. F., McClernon, F. J., & Beckham, J. C. (2008). Association between trauma exposure and smoking in a population-based sample of young adults. *Journal of Adolescent Health*, *42*(3), 266-274. https://doi.org/10.1016/j.jadohealth.2007.08.029

Robillard, C. L., Balakrishnan, C., Craig, S. G., & Turner, B. J. (2022). A Two-Way Street? Reciprocal Associations Between Parental Warmth and Hostility with Substance Use Among Justice-Involved Adolescents. *Journal of Youth and Adolescence*, *51*(7), 1442-1456. https://doi.org/10.1007/s10964-022-01611-7

Rose, D. N., & Bond, M. J. (2008). Identity, stress and substance abuse among young adults. *Journal of Substance Use*, *13*(4), 268-282.

Rowell-Cunsolo, T. L., & Bellerose, M. (2021). Utilization of substance use treatment among criminal justice-involved individuals in the United States. *Journal of Substance Abuse Treatment*, *125*, 108423. https://doi.org/10.1016/j.jsat.2021.108423

Rundell, L., Brown, C. M., & Cook, R. E. (2012). Perceived parental rejection has an indirect effect on young women's drinking to cope. *Psychology*, *3*(11), 935-939.

Sameroff, A. (2009). The transactional model. In A. Sameroff (Ed.), *The transactional model of development: How children and contexts shape each other* (pp. 3–32). American Psychological Association. https://doi.org/10.1037/11877-001

Sansone, R. A., Whitecar, P., & Wiederman, M. W. (2009). The prevalence of childhood trauma among those seeking buprenorphine treatment. *Journal of addictive diseases*, *28*(1), 64-67. https://doi.org/10.1080/10550880802545101

Santaella-Tenorio, J., Martins, S. S., Cerdá, M., Olfson, M., & Keyes, K. M. (2022). Suicidal ideation and attempts following nonmedical use of prescription opioids and related disorder. *Psychological Medicine*, *52*(2), 372–378. http://doi.org/10.1017/S0033291720002160

Santo Jr, T., Campbell, G., Gisev, N., & Degenhardt, L. (2022). Exposure to childhood trauma increases risk of opioid use disorder among people prescribed opioids for chronic non-cancer pain. *Drug and alcohol dependence*, *230*, 109199. https://doi.org/10.1016/j.drugalcdep.2021.109199

Santo Jr, T., Campbell, G., Gisev, N., Martino-Burke, D., Wilson, J., Colledge, S., Colledge-Frisby, S., Clark, B., Tran, L.T., & Degenhardt, L. (2022). Prevalence of mental disorders among people with opioid use disorder: A systematic review and meta-analysis. *Drug and Alcohol Dependence*, *238*, 109551. https://doi.org/10.1016/j.drugalcdep.2022.109551

Santo Jr, T., Campbell, G., Gisev, N., Tran, L. T., Colledge, S., Di Tanna, G. L., & Degenhardt, L. (2021). Prevalence of childhood maltreatment among people with

opioid use disorder: A systematic review and meta-analysis. *Drug and alcohol dependence*, *219*, 108459. https://doi.org/10.1016/j.drugalcdep.2020.108459

Schoen, R., Landale, N. S., Daniels, K., & Cheng, Y. H. A. (2009). Social background differences in early family behavior. *Journal of Marriage and Family*, *71*(2), 384-395. https://doi.org/10.1111/j.1741-3737.2009.00606.x

Schrager, S. M., Kecojevic, A., Silva, K., Jackson Bloom, J., Iverson, E., & Lankenau, S. E. (2014). Correlates and consequences of opioid misuse among high-risk young adults. *Journal of addiction*, *2014*. https://doi.org/10.1155/2014/156954

Schulenberg, J., Maslowsky, J., & Jager, J. (2018). Substance use and abuse during adolescence and the transition to adulthood are developmental phenomena: Conceptual and empirical considerations. In H. E. Fitzgerald & L. I. Puttler (Eds.), *Alcohol use disorders: A developmental science approach to etiology* (pp. 199–222). Oxford University Press.

Schuman-Olivier, Z., Weiss, R. D., Hoeppner, B. B., Borodovsky, J., & Albanese, M. J. (2014). Emerging adult age status predicts poor buprenorphine treatment retention. *Journal of substance abuse treatment*, *47*(3), 202-212. http://dx.doi.org/10.1016/j.jsat.2014.04.006

Schuler, M. S., Vasilenko, S. A., & Lanza, S. T. (2015). Age-varying associations between substance use behaviors and depressive symptoms during adolescence and young adulthood. *Drug and alcohol dependence*, *157*, 75-82. https://doi.org/10.1016/j.drugalcdep.2015.10.005

Schwartz, S. J., Beyers, W., Luyckx, K., Soenens, B., Zamboanga, B. L., Forthun, L. F., Hardy, S. A., Vazsonyi, A. T., Ham, L. S., Kim, S. Y., Whitbourne, S. K. O &

Waterman, A. S. (2011). Examining the light and dark sides of emerging adults' identity: A study of identity status differences in positive and negative psychosocial functioning. *Journal of youth and adolescence*, *40*(7), 839-859. https://doi.org/10.1007/s10964-010-9606-6

Schwartz, S. J., Côté, J. E., & Arnett, J. J. (2005). Identity and agency in emerging adulthood: Two developmental routes in the individualization process. *Youth & Society*, *37*(2), 201-229. https://doi.org/10.1177/0044118X05275965

Shin, S. H., Cook, A. K., Morris, N. A., McDougle, R., & Groves, L. P. (2016). The different faces of impulsivity as links between childhood maltreatment and young adult crime. *Preventive medicine*, *88*, 210-217. https://doi.org/10.1016/j.ypmed.2016.03.022

Siringil Perker, S., & Chester, L. E. (2021). The justice system and young adults with substance use disorders. *Pediatrics*, *147*(Supplement 2), S249-S258. https://doi.org/10.1542/peds.2020-023523H

Smith, D. C. (2017). Why should we focus on emerging adults with substance use disorders? In D. C. Smith (Ed.). (2017), *Emerging adults and substance use disorder treatment: developmental considerations and innovative approaches*, (pp. 1-15). Oxford University Press.

Smith, D. C., Bahar, O. S., Cleeland, L. R., & Davis, J. P. (2014). Self-perceived emerging adult status and substance use. *Psychology of Addictive Behaviors*, *28*(3), 935. https://doi.org/10.1037/a0035900.

Smith, D. C., Cleeland, L., & Dennis, M. L. (2010). Reasons for quitting among emerging adults and adolescents in substance-use-disorder treatment. *Journal of*

studies on alcohol and drugs, *71*(3), 400-409. https://doi.org/10.15288/jsad.2010.71.400

Smith, D. C., Davis, J. P., Shen, S., & Garcia Claro, H. (2020). The emerging adult reasons for substance use (EARS): preliminary support for multidimensionality, validity and reliability. *Substance Use & Misuse*, *56*(2), 297-307. https://doi.org/10.1080/10826084.2020.1862233

Spoth, R., Trudeau, L., Shin, C., Ralston, E., Redmond, C., Greenberg, M., & Feinberg, M. (2013). Longitudinal effects of universal preventive intervention on prescription drug misuse: three randomized controlled trials with late adolescents and young adults. *American journal of public health*, *103*(4), 665-672.

StataCorp. (2013). *Stata structural equation modeling reference manual release 13*. Stata Press.

StataCorp. (2016). *Stata: Release 16*. Statistical Software. College Station, TX: StataCorp LP

StataCorp. (2017). *Stata survey data reference manual release 17*. Stata Press.

Sterrett-Hong, E. M., Birkett, M., Kuhns, L., Zhang, D., & Mustanski, B. (2021). The impact of closeness to non-parental adults in social networks on substance use among young men who have sex with men. *Journal of Homosexuality*, *68*(10), 1727-1744. https://doi.org/10.1080/00918369.2019.1705670

Stopponi, S., Soverchia, L., Ubaldi, M., Cippitelli, A., Serpelloni, G., & Ciccocioppo, R. (2014). Chronic THC during adolescence increases the vulnerability to stress-induced relapse to heroin seeking in adult rats. *European*

Neuropsychopharmacology, *24*(7), 1037-1045. https://doi.org/10.1016/j.euroneuro.2013.12.012

Su, J., Kuo, S. I-C., Aliev, F., Chan, G., Edenberg, H. J., Kamarajan, C., McCutcheon, V. V., Meyers, J. L., Schuckit, M., Tischfield, J., & Dick, D. M. (2021). The associations between polygenic risk, sensation seeking, social support, and alcohol use in adulthood. *Journal of Abnormal Psychology, 130*(5), 525–536. https://doi.org/10.1037/abn0000568

Su, J., Supple, A. J., Leerkes, E. M., Sally, I., & Kuo, C. (2019). Latent trajectories of alcohol use from early adolescence to young adulthood: Interaction effects between 5-HTTLPR and parenting quality and gender differences. *Development and psychopathology*, *31*(2), 457-469. http://dx.doi.org/10.1017/S095457941800024X

Substance Abuse and Mental Health Services Administration (2015). *Using Technology-Based Therapeutic Tools in Behavioral Health Services.* Treatment Improvement Protocol (TIP) Series 60. HHS Publication No. (SMA) 15-4924. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration (2023). Key substance use and mental health indicators in the United States: Results from the 2022 National Survey on Drug Use and Health (HHS Publication No. PEP23-07-01-006, NSDUH Series H-58). Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. https://www.samhsa.gov/data/report/2022-nsduh-annual-national-report

Substance Abuse and Mental Health Services Administration (September 2022). Mental Illness and Substance Use in Young Adults. Retrieved from: https://www.samhsa.gov/young-adults

Swain, N. R., Gibb, S. J., Horwood, L. J., & Fergusson, D. M. (2012). Alcohol and cannabis abuse/dependence symptoms and life satisfaction in young adulthood. *Drug and alcohol Review*, *31*(3), 327-333. https://doi.org/10.1111/j.1465-3362.2011.00339.x

Taber-Thomas, B., & Pérez-Edgar, K. (2015). Emerging adulthood brain development. *The Oxford handbook of emerging adulthood*, 126-141.

Tang, S., Ports, K. A., Zhang, K., & Lin, H. C. (2020). Adverse childhood experiences, internalizing/externalizing symptoms, and associated prescription opioid misuse: A mediation analysis. *Preventive medicine*, *134*, 106034. https://doi.org/10.1016/j.ypmed.2020.106034

Taylor, S. E. (2020). *Concurrent Polydrug Use Behaviors among Opioid Using Emerging Adults: Perceived Life Satisfaction and Influencers* (Doctoral dissertation, Indiana University).

Teicher, M. H., Samson, J. A., Polcari, A., & Andersen, S. L. (2009). Length of time between onset of childhood sexual abuse and emergence of depression in a young adult sample: a retrospective clinical report. *Journal of Clinical Psychiatry*, *70*(5), 684. https://doi.org/10.4088/jcp.08m04235

Testa, A., Jackson, D. B., Ganson, K. T., & Nagata, J. M. (2022). Adverse childhood experiences and criminal justice contact in adulthood. *Academic pediatrics*, *22*(6), 972-980. https://doi.org/10.1016/j.acap.2021.10.011

The White House (September 24, 2022). What They Are Reading in the States: Biden-Harris Administration Awards $1.5 Billion to States and Tribes to Combat Overdose Epidemic. Retrieved July 10, 2023, from https://www.whitehouse.gov/briefing-room/statements-releases/2022/09/24/what-they-are-reading-in-the-states-biden-harris-administration-awards-1-5-billion-to-states-and-tribes-to-combat-overdose-epidemic/

Thompson, B. (2004). Then commandment of structural equation modeling. In L.G Grimm, & P. R. Yarnonld (Eds.), *Reading and understanding more multivariate statistics* (4th ed., pp. 261- 285). American Psychological Association.

Thompson, A. E., & Voyer, D. (2014). Sex differences in the ability to recognise non-verbal displays of emotion: A meta-analysis. *Cognition and Emotion*, *28*(7), 1164-1195. https://doi.org/10.1080/02699931.2013.875889

Thornberry, T. P., Henry, K. L., Ireland, T. O., & Smith, C. A. (2010). The causal impact of childhood-limited maltreatment and adolescent maltreatment on early adult adjustment. *Journal of Adolescent Health*, *46*(4), 359-365. https://doi.org/10.1016/j.jadohealth.2009.09.011

Thrul, J., Rabinowitz, J. A., Reboussin, B. A., Maher, B. S., Anthony, J. C., & Ialongo, N. S. (2023). Longitudinal associations between age 20 problematic substance use and opioid use disorder incidence at age 30–findings from an urban cohort. *Journal of Psychiatric Research*, *160*, 1-7. https://doi.org/10.1016/j.jpsychires.2023.01.033

Tyler, K. A., & Ray, C. M. (2019). Risk and protective factors for substance use among youth experiencing homelessness. *Children and youth services review*, *107*, 104548. https://doi.org/10.1016/j.childyouth.2019.104548

Tyler, K. A., Schmitz, R. M., & Ray, C. M. (2018). Role of social environmental protective factors on anxiety and depressive symptoms among Midwestern homeless youth. *Journal of Research on Adolescence*, 28(1), 199-210. https://doi.org/10.1111/jora.12326

U.S. Department of Health & Human Services, Administration for Children and Families, Administration on Children, Youth and Families, Children's Bureau. (2023). *Child Maltreatment 2021*. Available from https://www.acf.hhs.gov/cb/data-research/child-maltreatment.

Van der Graaff, J., Branje, S., De Wied, M., Hawk, S., Van Lier, P., & Meeus, W. (2014). Perspective taking and empathic concern in adolescence: Gender differences in developmental changes. *Developmental Psychology*, *50*(3), 881–888. http://dx.doi.org/10.1037/a0034325

Van Duin, L., De Vries Robbé, M., Marhe, R., Bevaart, F., Zijlmans, J., Luijks, M. J. A., Doreleijers, T.A. H, & Popma, A. (2021). Criminal history and adverse childhood experiences in relation to recidivism and social functioning in multi-problem young adults. *Criminal justice and behavior*, *48*(5), 637-654. https://doi.org/10.1177/0093854820975455

Veenhoven, R. (1996). The study of life-satisfaction. Saris, W.E., Veenhoven, R., Scherpenzeel, A.C. & Bunting B. (eds) A comparative study of satisfaction with

life in Europe, pp. 11-48. Eötvös University Press, ISBN963 463 081 2. Retrieve from: https://personal.eur.nl/veenhoven/Pub1990s/96d-full.pdf

Walters, G. D. (2013). Delinquency, parental involvement, early adult criminality, and sex: Evidence of moderated mediation. *Journal of Adolescence*, *36*(4), 777-785. https://doi.org/10.1016/j.adolescence.2013.03.011

Williams, J. R., Cole, V., Girdler, S., & Cromeens, M. G. (2020). Exploring stress, cognitive, and affective mechanisms of the relationship between interpersonal trauma and opioid misuse. *PloS one*, *15*(5), e0233185. https://doi.org/10.1371/journal.pone.0233185

Wood, D., Crapnell, T., Lau, L., Bennett, A., Lotstein, D., Ferris, M., & Kuo, A. (2018). Emerging adulthood as a critical stage in the life course. In *Handbook of life course health development* (pp. 123-143). Springer, Cham.

World Health Organization. (1999). *Report of the consultation on child abuse prevention, 29-31 March 1999, WHO, Geneva* (No. WHO/HSC/PVI/99.1). https://apps.who.int/iris/handle/10665/65900