ALCOHOL AND SUBSTANCE USE OUTCOMES AMONG EMERGING ADULTS LIVING IN MARGINALIZED COMMUNITIES: A SECONDARY DATA ANALYSIS

BY

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DISSERTATION

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ABSTRACT

Background: The transition period between adolescence and adulthood is associated with higher propensity for risk-taking behaviors than the periods of childhood and established adulthood. In particular, prevalence rates of alcohol and substance misuse (ASM) are highest among emerging adults (EA, ages 18-29). Emerging adult men living in marginalized communities (EAMMC) are rarely studied, despite having higher ASM rates than EA women. EAMMC face more serious consequences for their ASM than EA men living in privileged communities. These worse consequences are largely due to social determinants of health (SDH) including longstanding discrimination in housing, education, health care, criminal justice system and employment. Thus, it is critical for research to develop and test ASM interventions that are effective in reducing ASM among EAMMC to achieve health equity in United States. The core values of social work profession set forth by the National Association of Social Workers (NASW) are the foundation of this dissertation's unique purpose and perspective to promote social justice.

Aim: The intent of this doctoral dissertation was to conduct secondary data analyses using data from a large randomized controlled trial (RCT) that optimized a behavioral intervention to reduce ASM among formerly incarcerated men with a history of substance use disorder (SUD) living in a marginalized community. The dissertation examined if and how age impacts ASM over time among men from marginalized communities. This aim was accomplished by answering two research questions: a. Does age moderate the relationship between the ASM treatment intervention (i.e., Community Wise) and ASM over time among men from marginalized communities?; b. Are there distinctive ASM trajectories among EAMMC who were randomized to receive the intervention over time?

Methods: Moderation effect of age on the relationship between Community Wise and ASM among men from marginalized communities was examined using Growth Mixture Model (GMM) analysis with known class (i.e. age groups, EA vs. MA). Group-based trajectory modeling approach was also conducted to explore distinctive outcome trajectory groups and confirm the best number of groups that fit the data over six-data points for EAs within the sample.

Results: It was hypothesized that age-group (i.e., EA, 18-29 and MA, 30+) will moderate the relationship between the intervention and treatment outcomes over time, with EAMMC having worse outcomes consistent with current literature. However, no statistical difference in intervention effect was detected during GMM analysis. Further examination of ASM trajectories among EAMMC revealed multiple group trajectories as hypothesized. Five distinctive ASM trajectories among EAMMC who were assigned to the treatment group were confirmed.

Conclusion: With some limitations, this dissertation had several implications for ASM treatment intervention research and social work practice in achieving health equity including: a. confirmation of marginal support for applying Emerging Adulthood Theory to EAMMC population, b. demonstration of how individual-level interventions are less effective for EAMMC due to the socio-environmental factors that strongly dictate their ASM treatment outcomes, c. recommendation not to assume individual-level ASM treatments will work the same way it works for the general emerging adults from non-marginalized communities, and d. follow up intervention strategy specific to *Community Wise*. Policy recommendations in supporting these efforts were also offered. Importance of differentiating EAs from adolescents and MAs whenever permitted by law and programmatically appropriate was emphasized. Recommendation for the laws and regulations to create accountability for achieving

improvement on a limited set of key outcomes be reconsidered for marginalized EAs. Outcomes to consider for EAs from marginalized communities included employment, education, housing stability, safety, health, connections to responsible adults, and effective parenting. Findings will inform the development of an ASM intervention that explicitly addresses concepts informed by SDH on EAMMC. Second, post-intervention trajectory modeling and analyses will inform appropriate follow up treatment.

Keywords: Substance Use Disorder, Substance Use Intervention, Alcohol Misuse, Substance Misuse, Social Determinants of Health, and Emerging Adults.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

This dissertation project consists of secondary data analyses using data from a large randomized controlled trial (RCT) to determine if and how age impacts intervention effects on alcohol and substance misuse (ASM) over time. The study specifically examined adult men from marginalized communities, comparing emerging adults (EA, ages 18-29) and mature adults (MA, ages 30+).

The transition period between adolescence and adulthood is associated with a higher propensity for risk-taking behaviors than the periods of childhood and old-adulthood (Institute of Medicine and National Research Council, 2011; World Health Organization, 2018). Statistics on ASM behaviors support this claim indicating higher prevalence for males compared to their female counterparts (Kann et al., 2018; Loeber, Farrington, & Petechuk, 2019). Scholars in the field of criminal justice referred to this phenomenon as the "age effect" and suggest that people generally "age out" of risk-taking behaviors like ASM behaviors as they shift into established mature adulthood (Hirschi & Gottfredson, 1983; Sweeten, Piquero, & Steinberg, 2013). This prominent criminological perception delineated by Gottfredson and Hirschi (1983) claims that age has a direct effect on risky behaviors inexplicable from sociological and psychological effects. Similarly, Arnett (2000) proposed the theory of emerging adulthood as a way of conceptualizing the developmental characteristics of young people between the ages of 18 and 29 and applied his theory (i.e., Emerging Adulthood Theory) to explain the high rates of ASM in this age group (Arnett, 2005).

Nevertheless, aside from the reasons why this age group, men in particular, might have the highest rate of ASM, this phenomenon poses a threat to the well-being and general health of emerging adult men (EAM). The most prominent risk-taking behaviors among EAM aged

between 18-29 in general is ASM (Bradford, Payne, 2012; Casey, 2015; Glaze, Kaeble, & Statisticians, 2014). EAM with a history of engagement in crime report higher rates of ASM, and those who misuse alcohol and substances reported higher rates of engagement in crime compared with nonusers (Rosenfeld, White, & Esbensen, 2012). It is well documented that crimes have been linked to higher levels of injury and mortality (Turner, Mcclure, & Pirozzo, 2004). Other examples of well-known negative health consequences that are especially affecting EAM include driving under influence (DUI) related injuries and deaths (Wu, Zhu, Mannelli, & Swartz, 2017), unwanted/unprotected sexual activities and related problems (i.e., sexually transmitted diseases, SAMHSA, 2015), and alcohol and substance use disorders (SUD) later in life (Anthony & Petronis, 1995; Grant & Dawson, 1998; Grant, Stinson, & Harford, 2001; Perkonigg et al., 2006). In general, ASM among EAM not only has direct negative health consequences but also entails indirect negative health consequences ranging from mental health issues, health complications, injuries and mortalities.

While ASM is a threat to the general EAM population, research shows that EAM from marginalized communities (EAMMC) face significantly harsher consequences of ASM when compared to EAM from privileged communities. Yet, ASM treatment research that address the specific needs of this particular population is lacking. For the purpose of this dissertation, *marginalized communities* are defined as distressed communities with higher concentrations of historically marginalized racial/ethnic groups (i.e., African American and Hispanic American) with high rates of poverty and crime. These are the people who experience extreme marginalization. According to the public data available, there are over seven million persons in the United States under arraignment in federal or state jurisdictions, and over two million are in jail or prisons (Abt Associates & America, 2011). Over 60% of the people involved with the

criminal justice system are African American or Hispanic American and a very high proportion of those in jail or prisons have ASM problems. However, ASM treatment engagement and outcomes are poor, and treatment interventions do not address the social determinants of health (SDH) that make the consequences harsher for this particular population. For example, of these EAMMC, it is clearly evident that those with ASM problems are stigmatized at the intersection of class, race, and gender. They remain stigmatized even after entering into and remaining in effective treatment or undergoing rehabilitation (Kreek, 2011). Intersectional stigma further interacts with the normal stresses of life to increase atypical responsivity to traditional treatment (Lee & Waithaka, 2017). There are key reasons why EAMMC are more vulnerable with more severe consequences from ASM warranting prioritization in tailored ASM treatment intervention development.

First, EAMMC suffer higher incarceration rates. Inequities in drug-related incarceration rates have devastated marginalized communities and impacted EAMMC more than any other marginalized group (Alexander, 2010; Millett, Flores, Peterson, & Bakeman, 2007; J Schnittker, Massoglia, & Uggen, 2011; Jason Schnittker & John, 2007; Wakefield & Uggen, 2010). Second, EAMMC endure existing health inequities. For example, African American men have disproportionately higher HIV/hepatitis C virus (HCV) infection rates (Centers for Disease Control and Prevention, n.d., 2016). Hispanic American men and African American men reported fewer helpful encounters with their health providers (i.e., discriminatory experiences, reporting fewer chronic conditions, and a lack of insurance coverage, Mitchell & Perry, 2020).

These disproportionately negative consequences of ASM endured by EAM living in marginalized communities can largely be explained by SDH including longstanding discrimination in housing, education, health care, criminal justice system and employment. In

addition, research examining emerging adulthood developmental and social factors in relation to ASM treatment outcome may also contribute useful information in developing appropriate treatments for this extremely marginalized population. Current literature around ASM treatment does not address the intersection between age and socio-economic marginalization. There are a limited number of effective ASM treatment interventions that address individual, community, and societal level changes (i.e., multi-level intervention) simultaneously as well. ASM treatment research for EAs have focused primarily on undergraduate college populations (Boyle et al., 2016, 2017; Fournieret al., 2013; Moreno et al., 2012, 2016; Moreno, Cox, Young, & Haaland, 2015) where the study sample have been predominately White, non-Hispanic individuals from privileged communities. More studies need to be conducted among population and communities marginalized through intersecting characteristics, especially EAM.

In response to these gaps in the literature and the field of substance use treatment, this dissertation examined the fit and promise of an innovative intervention, *Community Wise* (CW), a culturally grounded, evidence-based, and multi-level intervention, in reducing ASM among EAMMC. Specifically, secondary data analyses were used to determine if and how age impacts intervention effects on ASM over time among adult men from marginalized communities, comparing EA men (ages 18-29) and MA men (ages 30+). The two main research questions that were answered by this project are:

Research Question 1 (**Q1**): Does age moderate the relationship between a culturally grounded, evidence-based, and multi-level intervention, *Community Wise*, in reducing ASM among males living in marginalized communities over time?

Research Question 2 (**Q2**): Are there distinctive ASM treatment outcome trajectories among EAMMC who were randomized to receive the intervention over time?

CHAPTER 2: LITERATURE REVIEW

This chapter presents the theoretical frameworks that were used to guide this study as well as the information on the prevalence of alcohol and substance misuse (ASM). Moreover, this chapter offers a review of the current literature available on emerging adult men (EAM) ASM prevalence and consequences of ASM for this particular population. Then, a literature review on currently available ASM treatment for EAMMC follows. Subsequently, discussion around how these theories and literature presented in preceding sections apply in conceptualizing and operationalizing the hypotheses for this study is offered. This chapter concludes with the research questions and the hypotheses that were evaluated in the study.

Theories

Emerging Adulthood Theory

There has been about two decades of work around conceptualizing emerging adulthood as a unique life stage by a number of researchers, most notably by Jeffrey Arnett (Arnett, 2000, 2005). Considering the peak prevalence of ASM by age, the period of life after adolescence from ages 18 to the mid- to late 20s is crucial. Closely related to this age range, emerging adulthood is proposed as a new conception of development by Arnett (2000) and conceptualized the developmental characteristics of young people between the ages of 18 and 25. Over the past two decades, the operationalized age for emerging adulthood has stretched to 29 in some studies and the theory is still undergoing scientific debates for validation and merits interpretation and application with caution. According to this theory (Arnett, 2005), emerging adulthood has five features that make it distinctive: “it is the age of identity explorations, especially in love and work; it is the age of instability; it is the most self-focused age of life; it is the age of feeling in-between, in transition, neither adolescent nor adult; and it is the age of possibilities, when hopes flourish, when people have an unparalleled opportunity to transform their lives (p.239)”. For

each of the five characteristics of emerging adulthood, hypotheses were offered by Arnett (2005) on why EAs might have such high substance use/misuse rates. The hypotheses are summarized by the Emerging Adulthood Theory characteristics below.

Table 1 Emerging Adulthood Theory and Hypotheses for ASM

The Age of Identity Explorations	**Hypothesis 1** Identity explorations in emerging adulthood will predict substance use, especially in the absence of **commitment**. Specifically, emerging adults in the moratorium status will have higher rates of substance use than those who are in the foreclosure or achievement statuses.
	Hypothesis 2 Identity confusion in emerging adulthood leads to substance use. Specifically, emerging adults who are classified as being in the **diffusion status** in the identity status model will have higher rates of substance use than those who are in the foreclosure or achievement categories, and in the identity styles model, a diffuse/avoidant style will be related to higher substance use.
	Hypothesis 3 Sensation seeking will be found to be higher in emerging adulthood than in either adolescence or young adulthood, and this will help explain why substance use is also highest in emerging adulthood.
The Age of Instability	**Hypothesis 4** Instability will increase substance use in emerging adulthood, i.e., emerging adults who experience a relatively high number of **instability events in residence, love relationships, school, and work** will have higher rates of substance use. Furthermore, the relation between instability and substance use will be mediated by mood disruptions, i.e., a high number of instability events will lead to anxiety and sadness, which in turn will motivate substance use.
	Hypothesis 5 Substance use in emerging adulthood will rise after specific instability events, i.e., in the weeks following a transition in residence, love, school, or work. This rise will be mediated by mood disruptions, i.e., negative moods will rise following a transition, which will lead to a rise in substance use.
The Self-Focused Age	**Hypothesis 6** Emerging adults will be more likely to describe themselves as **self-focused** in various respects than persons in other age periods, and this will partly explain the higher rates of substance use in emerging adulthood.
	Hypothesis 7 Social control will decline from adolescence to emerging adulthood, then rise from emerging adulthood to young adulthood. Substance use over this period will be inversely related to social control.
	Hypothesis 8 Within groups of emerging adults, those who report higher self-focus and lower social control will have the highest rates of substance use.
	Hypothesis 9 Emerging adults who use substances and/or who are similar in other characteristics that place them at risk for substance use will tend to select each other as friends, and after such a friendship is formed their substance use will increase as they each provide the other with a **social context for substance use**.

Table 1 Emerging Adulthood Theory and Hypotheses for ASM (cont.)

The Age of Feeling In-Between	**Hypothesis 10** Emerging adults who **feel they have not yet reached adulthood** will be more likely to use substances than emerging adults who feel they have reached adulthood.
	Hypothesis 11 Emerging adults who use substances will **view substance use as a behavior that is acceptable** at their current age but one that they will give up in the course of growing into adulthood.
The Age of Possibilities	**Hypothesis 12** Emerging adults with a **stronger optimistic bias with respect to substance use** will be more likely to engage in substance use, relative to other emerging adults. Hypothesis
	Hypothesis 13 Optimistic bias with respect to substance use will be higher in emerging adulthood than in later adult age periods, which will partly explain why substance use is highest in emerging adulthood.
	Hypothesis 14 Two distinct types of emerging adults will be found to use substances, those who have **especially high well-being** and use substances out of exuberance, and those who have **especially low well-being** and use substances for the purpose of self-medication. Both types will use substances more than emerging adults in the middle range.

Note: concepts that may informing covariates for this dissertation bolded and underlined.

Although, it is welcoming that a scholar started to conceptualize and operationalize this age group by proposing a theory, the inference Arnett attempts to make between emerging adulthood characteristics and increase of ASM faced some criticisms. While Arnett hypothesized the association between the number of work, residential, and romantic transition characterized as instability and increased ASM, others have argued it is unclear if developmentally induced instability as conceptualized by Arnett has an effect on emerging adults' coping responses and results in increased substance use (J. Schulenberg, O'Malley, Bachman, & Johnston, 2005). Another major critique of the theory is the generalizability. Arnett implied that the theory applies mainly to emerging adults in industrialized countries and is not generalizable across different classes or emerging adults who are not college students (Arnett, 2000). However, emerging adulthood theory is the most prominent theory of development for individuals ages 18-29. The theory provides foundational elements to consider for this age group. More importantly, these

hypotheses also inform the questions and hypotheses of this dissertation. The major critiques of this theory were acknowledged and prudently considered when applied. For example, there is a lack of data testing with marginalized EAs on how contemporary society influences human development during this age. While it was believed that this theory in relation to ASM is appropriate, the theory was used with caution in recognition of their limitations.

There are known positive characteristics of emerging adulthood such as enhanced life satisfaction and mental health (Arnett & Tanner, 2006). However, accumulating evidence suggests that emerging adulthood is also a developmental inflection point when vulnerabilities emerge, and unfavorable life paths are solidified (Zapolski, Pedersen, McCarthy, & Smith, 2014). Unfortunately, studies suggested that the benefits of emerging adulthood are less likely to accrue for those from marginalized communities that are disadvantaged with low-resources (Brody, Chen, & Kogan, 2010; Estrada-Martínez, Caldwell, Bauermeister, & Zimmerman, 2012). It is believed that this vulnerability for EAMMC is evident in patterns of harsher ASM consequences that manifest during this transitional period compared to the EAM from privileged communities. Likewise, provided these evidence that attributes of emerging adulthood may influence EAs inversely depending on the marginalization of the community they come from, it is imperative to explore ways this theory applies to the EAMMC. And, more importantly, the utility of this theory in hypothesizing the two main questions of this dissertation (i.e., *treatment outcome* for EAMMC).

There were five domains to describe emerging adulthood according to the Emerging Adulthood Theory. First, EAs were characterized as the age of identity exploration (i.e., love and work). According to the description of the characteristics in Emerging Adulthood Theory, it was appropriate to assume that identity explorations in emerging adulthood will be associated with

the EAs being *less committed* to change their ASM behaviors. Also, EAs who are classified as being in the diffusion status in the identity status model were hypothesized that they will have *less motivation* than those who are in the foreclosure or achievement categories where a diffuse/avoidant style will be related to weak commitment and motivation to change ASM behaviors. Some of the overlapping key characteristics over-represented among EAMMC include: being a single parent, being in foster care, and joining the workforce at young age to attain financial self-sufficiency (Bonnie, Stroud, & Breiner, 2015) would be relevant in evaluating how the identity exploration domain of Emerging Adulthood Theory applies. These particular characteristics often observed among EAMMC suggest EAMMC are more likely to be committed and motivated to change ASM behaviors as they are more towards the foreclosure or achievement statuses in terms of their identity exploration. It is reported that higher rates of EAMMC bear the responsibility of being a parent, often times by themselves as a single parent. Huge commitment is needed along with strong motivation to stay competent (e.g. sobered) to take care of a child. There are higher rates of EAMMC who transitioned out of foster care which requires them to be independent and take custody of their lives regardless of their readiness to do so. EAM from privileged and affluent communities often have the option to depend on their parents longer without set timeframe to transition out of their family guardianship. In addition, often times, EAMMC need to dedicate themselves in financially supporting role for the family instead of having the privilege to exploring and trying out different options for their career. For these reasons, it is hypothesized that the EAMMC are more likely to be committed and motivated to change their ASM behaviors compared to the EAM from privileged communities.

Second, EAs were characterized as the age of instability. It was argued that the EAs are likely to be unstable because of their residence, love relationships, schools, or work situation

considering their socioeconomic status as young adults in the society. Disruptions in these major young adult life situations in and of itself could lead to challenges in obtaining ASM treatment but also the rise of disruptions in these areas will be mediated by mood disruptions as well. Negative moods will likely rise following a transition, which will become barriers in obtaining ASM treatment. This characteristic of emerging adulthood seems to resonate with what a lot of EAMMC would go through. Again, many of the EAMMC transition out of foster care which can escalate anxiety and stress. Many of the EAMMC live in unstable housing arrangements (e.g. temporary housing, short lease terms) and work temporary, seasonal or part-time jobs that may contribute to barriers in obtaining ASM treatment (Bonnie, Stroud, & Breiner, 2015).

Third, EAs are characterized by the self-focused age. When a person is self-focused, it would be hard to motivate them for change unless that motivation is coming from themselves. EAs with high self-focus and lower social control with them being legally adult now may lead to low rates of ASM treatment initiation and engagement. However, for EAMMC, they tend to bare and experience much of what we normally see as adult life or responsibilities. When you are a young or first time parent or, worse, single parent, you would be less self-focused and be more focused on your child. Parenthood by age 20 was strongly associated with lower childhood SES. Education also differentiated age at parenthood, with those with higher education more likely to defer fatherhood past age 31(Van Roode, Sharples, Dickson, & Paul, 2017). Many of the EAMMC grow up in female headed households or they themselves become head of the household at younger age due to absence of father figure (e.g., incarceration, violence related mortality, poor health care related early mortality, or disability) (Bonnie, Stroud, & Breiner, 2015). If you are the head of the household or the only male to physically and financially be responsible for the family's well-being, you become less self-focused. Typically residing in areas

of marginalization, too many EAMMC are trapped in a horrific cycle that includes violence, crime, prison, and early death. For example, the book titled, Against the Wall, edited by sociologist Elijah Anderson describe how the young black man has come to be identified publicly with crime and violence. The book describes how the presence of EAMMC in public gathering places becomes disturbing to others, and the stereotype of the dangerous young black male is perpetuated and strengthened for many of the black EAMMC. In addition, EAMMC experience extremely unjust informal social control through marginalization, discrimination, and oppression. Social control can be defined broadly as an organized action intended to change people's behavior (Innes, 2003). This population does not experience lower social control with them being legally adult. In fact, it is the opposite. They experience greater social control through heightened surveillance in the neighborhood, racial profiling, and different types of indirect social control. EAMMC are low self-focused and experience greater social control with them being legally adult which may lead to higher rates of ASM treatment initiation and engagement.

Fourth, EAs were characterized as the age of feeling in-between. According to the description of this characteristic emerging adulthood is the age of feeling in-between, neither adolescent nor fully adult, on the way to adulthood but not there yet. It was explained that the subjective status of EAs could mean that they feel in-between, because they are no longer adolescents and are capable of deciding for themselves whether or not to use substances. On the other hand, they also feel that they are not yet adults and do not need to feel committed to adult standards of behavior or adult level of responsibilities. For these reasons, the theory hypothesizes that EAs may think that they have a certain freedom to do things (i.e., alcohol and substance use) during this age period that will not be acceptable once they reach adulthood. Admittedly, ASM

during emerging adulthood is somewhat normalized and seen as part of the daring, enthusiasm, and license of youth in our society. In contrast, a 40 or 50 year old who is engaged in the same type of behavior would be viewed very differently, much more negatively (Schulenberg & Zarrett, in press). In fact, a study showed that EA who gets drunk several times a week and occasionally uses marijuana, ecstasy, or other drugs is not unusual (Schulenberg & Maggs, 2002). It is certainly harder for EAs with high ASM to truly seek treatment when ASM is not viewed as an issue that needs to be addressed. Described as the "age of feeling in-between," emerging adulthood is associated with a biopsychosocial profile distinct from both adolescence and older adulthood, making members of this age group unique and challenging clinical cases. Data suggest that although emerging adults can benefit from ASM treatments, they are likely to have poorer treatment response than their younger and older counterparts (Bergman, Kelly, & Nargiso, 2016). However, for EAMMC, the extent of feeling in-between is questionable. In addition to the overlapping key characteristics of EAMMC (i.e., being a (single) parent, transitioning out of foster care, and joining the workforce at young age to financially be self-sufficient) that were already mentioned, there are other common aspects EAMMC share. EAMMC often experience discrimination, become a victim of physical and/or sexual violence, and have trauma histories (Bonnie, Stroud, & Breiner, 2015). While EAM from affluent communities have greater chance of acquiring privileges associated with becoming an adult (i.e., freedom to use alcohol and substances), EAMMC acquire more responsibilities and harsher consequences associated with becoming an adult (i.e., forced to transition out of foster care, less legal protection for not being a minor anymore). EAMMC would not have much opportunity to “feel they are not yet adults and do not need to feel committed to adult standards of behavior or adult level of responsibilities” as offered by the theory.

Lastly, EAs were characterized as the age of possibilities. It was theorized that two distinct types of emerging adults will be found to use alcohol and substances. Those who have especially high well-being and use alcohol and substances out of exuberance, and those who have especially low well-being and use substances for the purpose of self-medication. In any rate, both types would have worse treatment initiation and engagement rate because of the lack of motivation to stop using. EAMMC would fit the latter case where ASM is for the purpose of self-medication. This population experiences disproportionate stress and less social and family support when compared to EAM from privileged communities. EAMMC who are much more likely to be - children of low-income families, those aging out of foster care, those with history of incarceration, those who dropped out of school, and those who bear responsibility for raising young children, those who are victims of physical and/or sexual violence, and those with trauma history – are much less likely than other EAs to experience a successful transition to adulthood. This may lead to ASM as a mean to escape from their exhausting reality and/or self-meditate.

In reviewing five domains of Emerging Adulthood Theory with an intent of evaluating the utility and applicability for studying EAMMC treatment outcomes, there were few points hypothesized: a. EAMMC are more likely to be committed and motivated as they are less likely to be in a diffused/avoidant style of identity exploration stage suggesting the possibility of better ASM treatment outcomes compared to EAMs from non-marginalized communities; b. EAMMC are more likely to be living in unstable life-style that may contribute to barriers in obtaining ASM treatment and good outcomes; c. EAMMC are less likely to be self-focused and experience greater social control leading to higher rates of ASM treatment initiation and engagement but worse treatment outcomes as they are less self-focused and may be less concerned about treating their ASM problem; d. EAMMC would not have much opportunity to feel in-between indicating

the possibility of this population having better ASM treatment outcomes; e. EAMMC are more likely to be involved in ASM for self-meditation leading to worse ASM treatment outcomes.

Social Determinants of Health (SDH) Theory

The second predominant theoretical paradigm that guided this dissertation was the SDH framework. Advances in health care have been disproportionately distributed across social strata (Barr et al., 2015). Disease burden is also disproportionately distributed, with marginalized groups having the highest risk of poor health outcomes (Barr et al., 2015). It is now well documented that the outcomes of health are not only a function of health care received, but societal factors such as social services, employment, education and ability to meet basic needs also affect health in important ways (Donohue, Plant, Barchard, & Gillis, 2017; Hasenfub & Westphal, 2009; Singh et al., 2017; Tofani, Lamarca, Sheiham, & Vettore, 2015; U.S. Department of Health and Human Services, n.d.; World Health Organization, 2010). SDH are thought to influence health care delivery and management of chronic diseases among marginalized groups (Bamberg, Chiswell, & Toumbourou, 2011). To achieve a significant improvement in overall health, we need to understand how these social factors affect health, specifically disparities in chronic disease such as ASM (Bamberg et al., 2011).

The World Health Organization (WHO) defines SDH as 'the circumstances in which people are born, live, work and age, and the systems put in place to deal with illness' (World Health Organization, 2010). Under this definition, WHO recommended three areas of action in addressing SDH: a. Improving the circumstances that determine people's daily lives, b. identifying and addressing the structural drives (the social and economic forces such as the inequitable distribution of power, money, and resources surrounding vulnerability of those conditions), and c. identifying measures and frameworks to develop and expand scholarship

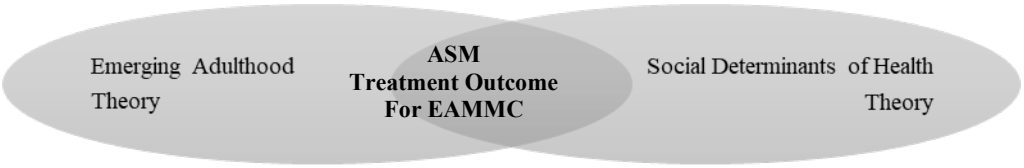
around the SDH while raising awareness of the inequitable distribution of social and health care services. This list of recommendations presents an urgent need to understand the health of high-risk marginalized populations in the context of their situation and daily lives. SDH are macro-level variables that help explain health inequities between privileged and marginalized individuals (Islam, Nadkarni, Park, Trinh-Shevrin, & Kwon, 2015).

Furthermore, the *Healthy People* initiative was created to improve health outcomes by addressing health care issues that result from social and physical environment (World Health Organization, 2010). The key domains of SDH identified by the CDC in *Healthy People 2020* are economics, education, social and community context of living, neighborhoods, and the built environment and their relationship to health (CDC, 2019). These domains reflect the fact that health outcomes such as ASM treatment outcomes are impacted by both the experience of individuals in their environment and the environment's effects on the individuals (Singh et al., 2017). Hence, integrating marginalization and SDH, two interconnected concepts, can highlight the relationship between them and aid in highlighting the need for interventions that address the effects of this reciprocal relationship.

ASM has greater consequences (i.e., higher incarceration rates, Alexander, 2010; mental health deterioration from exacerbated stressors and psychological distress, Boardman et al., 2001; and higher HIV/HCV infection rates, CDC, 2018) for EAMMC. Yet, evidence based ASM interventions have failed to explicitly address concepts informed by SDH, often overlooking community members' experiential knowledge and community input for intervention development. The current dissertation integrated the literature on EAMMC and situate the concept in the framework of SDH in evaluating ASM treatment outcomes. This perspective provides a critical lens in understanding the societal power dynamics that influences the

construction of the socio-environmental factors affecting health inequity, the ASM treatment intervention outcomes in particular for this dissertation. While the Emerging Adulthood Theory provides the ground to examine EAMMC on an individual level by attending to EAMMC during a particular biopsychosocial developmental stage, SDH perspective adds a layer of socio-ecological level aspects to study EAMMC's ASM treatment outcomes. Social Determinants of Health Theory allows us to think about how environmental and sociostructural factors affect EAMMC's ASM treatment outcome who are at a particular developmental stage. Linking Emerging Adulthood Theory with Social Determinants of Health Theory can enhance our understanding of the ASM treatment outcomes for EAMMC in a more comprehensive manner.

Figure 1 Application of theories in hypothesizing ASM treatment outcome for EAMMC



The focus of this dissertation project was on ASM treatment outcomes for EAMMC. The task of pinpointing the population of interest and aim was facilitated by considering the process of EAM's marginalization and their unique needs within the framework of SDH. It allowed this dissertation project to consider the root causes and issues that lie more upstream instead of focusing on just the individual factors associated with ASM such as motivation to change or many of the aspects that were discussed in relation to the Emerging Adulthood Theory above. The problem with downstream efforts is that privileged people will be better positioned than those who are marginalized (to obtain treatments, to obtain resources) resulting in health inequity. Provided downstream solutions, it is easy for individuals with power to adopt a "blame the victim approach". They criticize the individuals from marginalized communities for their poor health outcomes, in our case, worse ASM treatment outcome. They often claim that

individuals from marginalized communities did not utilize appropriate provisions without considering the accessibility and feasibility to adopt positive health behaviors. In return, accumulation of this attitudes will focus on individual choice and fail to address the underlying issue of why individuals from marginalized communities present seemingly unhealthy behaviors and experience worse consequences. On the other hand, upstream or distal efforts will focus on multiple sources of the problem and improve the health conditions for all people.

Below is a table summarizing literature that informs possible predictive or explanatory social factors of the ASM among U.S. adult populations. Major social factors related to ASM found within the reviewed literature included: socioeconomic status, social capital, neighborhood disadvantage (i.e., poverty level, female headed households rate, male unemployment rate, and public assistance recipient rate; Sampson et al 1997) and economic status, social stressors, and social/family problems. Racial/ethnic differences and interpersonal influence measures such as friends' use of drugs, prevalence of peer drug use, or peer approval of drug use did not predict ASM. Many of the studies were conducted long time ago and more studies assessing the relationship between variety of social factors and ASM are required.

Table 2 Key studies assessing the relation between social factors and ASM among U.S. adult populations

Study, Year	Substance	Sample	Conclusions
Jones-Webb et al., 1995	Alcohol	723 African-American men and 743 White men	Black men of lower **socioeconomic status** were more likely to report more drinking consequences and total problems than White men of lower socioeconomic status.
Kadushin et al., 1998	Multiple drugs	9,762 persons (aged 22-24) from	**Socioeconomic status** confounds the association between Black ethnicity and alcohol dependence; Blacks have a greater likelihood of dependence compared with Whites because they are relatively poorer and less likely to be in the labor force.
Weitzman and Kawachi, 2000	Alcohol	17,592 young adults enrolled in 140 colleges	Students from campuses with higher than average **social capital** had a 26% lower risk of binge drinking than their peers.
Boardman et al.,2001	Multiple drugs	1,101 Caucasian and African-American adults	A positive association was found between **neighborhood disadvantage** and **social stressors** for drug use; the net effect of neighborhood disadvantage on drug use among adults was most pronounced for persons with low incomes.
Buchanan et al., 2003	Injection drugs	164 active injection drug users from two neighborhoods	Injection drug users in more **economically advantaged neighborhoods** were more likely to share syringes from a single source and more likely to inject alone in their own residence.
Latkin et al., 1996	Injection drug use	292 Baltimore residents who had injected in the prior 6 months	**Social network** density and size were associated with injecting.
Lillie-Blanton et al., 1993	Cocaine	8,814 adults	After grouping into neighborhood clusters, no **racial/ethnic** differences were found in crack cocaine use.
Schroeder et al., 2001	Multiple drugs	702 youth	**Interpersonal influence** measures (friends' use of drugs, prevalence of peer drug use, peer approval of drug use) did not predict substance abuse or dependence in multivariate models.
Tam et al., 2000	Multiple drugs	217 adults from dependency treatment program	**Social/family problems** were associated with alcohol and drug dependence.

Note: social factors bolded and underlined.

While the etiology underpinning ASM is complex, the root cause of ASM has been traced to myriad SDH as summarized. How about the social factors that determine ASM

treatment outcomes? Table 3 summarized the literature reviewed for relationship between social factors and ASM treatment outcomes. The major social factors related to ASM treatment outcomes (bolded and underlined) informed by this literature will be operationalized and included in the data analyses to the extent dataset allows. Please refer to the methods section on how these social factors identified here were operationalized for the use in study models.

Table 3 Key studies assessing the relationship between social factors and ASM treatment outcomes.

Study, Year	Substance	Sample	Conclusions
Broome et al., 2002(90)	Multiple drugs	748 patients from 12 short-term inpatient treatment programs	Associating with **deviant peers** and **living with a drug user or alcohol drinker** was associated with relapse; abstinence **support at home** was associated with abstinence.
Kaskutas et al., 2002(89)	Alcohol	654 persons entering treatment in heterogeneous public and private programs	Having a **supportive social network** is important for abstinence; persons in Alcoholics Anonymous may offer types of social support that differ from those offered by nonmembers.
Weisner et al., 2003(93)	Alcohol	483 alcohol-dependent adults	Having more drug users and heavy drinkers in one's **social network** was inversely related to abstinence.
Chen and Kandel, 1998(94)	Marijuana	706 marijuana users followed from baseline (aged 15-16 years) to follow ups (aged 34-35 years)	More **education** was significantly associated with marijuana cessation, as was **becoming a parent** for the first time.
Havassy et al., 1995(98)	Multiple drugs	104 cocaine users followed for 6 month after completing drug treatment	Greater **social support** predicted abstinence among Whites but not among Blacks.
Kandel and Raveis, 1989(99)	Injection drug use	1,222 young adults interviewed at baseline in 1971 (aged 15-16 years) and followed up in 1980 and 1984 (aged 28-29 years)	Having fewer **friends involved in drug use** was associated with cessation of marijuana use for women and cessation of cocaine use for men and women.
Knight and Simpson 1996(97)	Injecting drug use	439 daily heroin users admitted to three methadone maintenance clinics	Participants reporting positive changes in **family conflict and peer deviance** during treatment were less likely to inject drugs than those reporting no improvement.
Latkin et al., 1999(100)	Injection drug use	335 adults (aged18 years) who reported injecting and sharing drugs	Having a smaller proportion of **drug users in one's network** was an important predictor of cessation of drug use.

Note: concepts informing covariates bolded and underlined.

Social factors identified by this body of literature in relation to ASM treatment outcomes were: deviant peers, living with individuals with ASM, social support, education, childbirth in family, and family conflict. These social factors are very relatable for EAMMC for many of the same reasons mentioned during the Emerging Adulthood Theory application discussion above. Although EAMMC are a heterogeneous group, they often share a number of characteristics and experiences (Bonnie, Stroud, & Breiner, 2015). According to the findings and recommendations from the report *Marginalized Young Adults* by the Institute of Medicine (IMO) and National Research Council (NRC), EAMMC are very likely to have low incomes and experience economic hardships, and they are disproportionately likely to be disadvantaged racial and ethnic minorities. Many of them are parents, quite often raising their children without another parent. They are likely to have disabilities, trauma histories, and mental health and ASM problems; to engage in risky behaviors; and to become victims of physical and/or sexual violence. Most EAMMC enter adulthood with limited formal education. Many are estranged from their families or have problematic family relationships and few positive adult connections on which to rely. They often face the consequences of stigma and discrimination. Those with a history of justice system involvement are ineligible to receive assistance that is routinely available to similarly situated EAMs. Another factor that is important to highlight from this report is the considerable overlap across the programs that EAMMC participated. EAMMC in the corrections system often spent time in foster care and/or frequently have mental health disorders, many former foster youth have disabilities and/or receive Supplemental Security Income, young Temporary Assistance for Needy Families (TANF) recipients often have contact with child protective services, and many homeless young adults have had experience with the child welfare and corrections systems and/or are parents.

According to the SDH Theory, EAMMC were more likely to have worse ASM treatment outcomes compared to the EAM living in non-marginalized communities. Table 4 summarized the three most recent studies presented above identifying social factors that impact ASM treatment outcomes applied to EAMMC.

Table 4 Key studies assessing the relationship between social factors and EAMMC ASM treatment outcomes.

Study, Year	Study Conclusions	EAMMC Application
Broome et al., 2002	Associating with **deviant peers** and **living with a drug user or alcohol drinker** was associated with relapse; abstinence **support at home** was associated with abstinence.	More likely to relapse and less likely to be abstinent due to widespread SUD, mental health problems, and justice involved individuals in the community.
Kaskutas et al., 2002	Having a **supportive social network** is important for abstinence; persons in Alcoholics Anonymous may offer types of social support that differ from those offered by nonmembers.	Less likely to be abstinent due to being estranged from their families or have problematic family relationships and few positive adult connections on which to rely.
Weisner et al., 2003	Having more drug users and heavy drinkers in one's **social network** was inversely related to abstinence.	Less likely to be abstinent due to more common ASM individuals in social network.

Note: concepts informing covariates bolded and underlined.

Prevalence of Alcohol and Substance Misuse

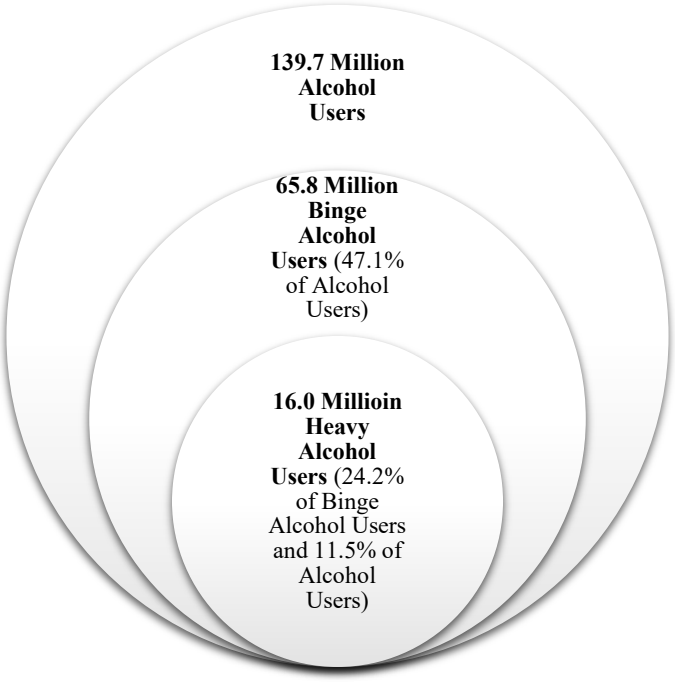
ASM affects millions of emerging adults (EAs) in the United States and contributes heavily to the burden of illness and social problems (Frieden et al., 2011; Murray & Lopez, 2013; Saxena, Funk, & Chisholm, 2014). Alcohol misuse is defined by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) as alcohol consumption that puts individuals at increased risk for adverse health and social consequences. Further, the Center for Disease Control and Prevention (CDC) defines it with slightly different wording but similar meaning: A pattern of drinking that results in harm to one's health, interpersonal relationships or ability to work. Alcohol misuse is often operationalized as either: 1) daily consumption of more than 4

drinks per day for men or more than 3 drinks per day for women, or 2) excess total consumption of more than 14 drinks per week for men or more than seven drinks per week for women. Substance misuse is used to distinguish improper or unhealthy use from use of a medication as prescribed. These include the repeated use of drugs to produce pleasure, alleviate stress, and/or alter or avoid reality. It also includes using prescription drugs in ways other than prescribed or using someone else's prescription. Many substances, both illegal and legal, have the potential for misuse. Common examples include cocaine, ecstasy, heroin, inhalants, marijuana, methamphetamine, PCP/Phencyclidine, and prescription narcotics.

General Population Alcohol Misuse Prevalence

According to the 2019 NSDUH, among the 139.7 million current alcohol users aged 12 or older, 65.8 million people (47.1 percent) were past month binge drinkers. Among past month binge drinkers, 16.0 million people (24.4 percent of current binge drinkers and 11.5 percent of current alcohol users) were past month heavy drinkers.

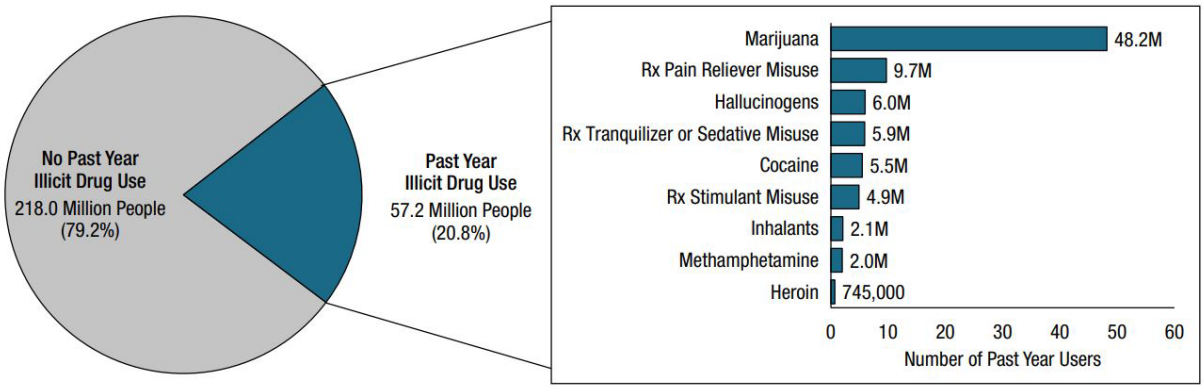
Figure 2 Current, Binge, and Heavy Alcohol Use among People Aged 12 or older: 2019 (SAMSHA, 2020)



General Population Substance Misuse Prevalence

Among people aged 12 or older in 2019, 57.2 million people used illicit drugs (i.e., use of marijuana, cocaine (including crack), heroin, hallucinogens, inhalants, and methamphetamine, as well as for the misuse of prescription stimulants, tranquilizers, sedatives, and pain relievers) in the past year. The most commonly used illicit drug in the past year was marijuana, which was used by 48.2 million people. The second most common type of illicit drug use in the past year was the misuse of prescription pain relievers, which were misused by 9.7 million people. Smaller numbers of people were past year users of other illicit drugs.

Figure 3 Past Year Illicit Drug Use Among People Aged 12 or Older: 2019 (SAMSHA, 2020)



Emerging Adult ASM Prevalence

Among EAs aged 18 to 25, the percentage who were past month binge alcohol users was 34.3 percent and 8.4 percent for heavy alcohol users in 2019. The percentage who were past year illicit drug users increased from 37.5 percent in 2015 to 39.1 percent in 2019. Past month heavy alcohol use, binge alcohol use, and illicit drug use among people aged 12 or older are summarized below in Table 5 for years 2015-2019.

Table 5 Past Month Heavy Alcohol Use, Binge Alcohol Use, and Illicit Drug Use among People Aged 12 or Older: 2015-2019

Age	Substance	2015	2016	2017	2018	2019
12 or Older	Heavy Alcohol	6.5	6.0	6.1	6.1	5.8
	Binge Alcohol	24.9	24.2	24.5	24.5	23.9
	Illicit Drug	17.8	18.0	19.0	19.4	20.8
12 to 17	Heavy Alcohol	0.9	0.8	0.7	0.5	0.8
	Binge Alcohol	5.8	4.9	5.3	4.7	4.9
	Illicit Drug	17.5	15.8	16.3	16.7	17.2
18 to 25	Heavy Alcohol	10.9	10.1	9.6	9.0	8.4
	Binge Alcohol	39.0	38.4	36.9	34.9	34.3
	Illicit Drug	37.5	37.7	39.4	38.7	39.1
26 or Older	Heavy Alcohol	6.4	6.0	6.2	6.2	6.0
	Binge Alcohol	24.8	24.2	24.7	25.1	24.5
	Illicit Drug	14.6	15.0	16.1	16.7	18.3

Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, 2015 and 2019.

Literature Review

Inequities in EAMMC ASM

ASM among EAMMC, particularly for Black and Latino men, is low in adolescence, with rapid increases in the years following high school (Johnston, O'Malley, Miech, Bachman, & Schulenberg, 2017). During emerging adulthood age between 18-29, rates of ASM become similar or exceed those of their peers from privileged communities (Substance Abuse and Mental Health Services Administration, 2014; Walsemann, Gee, & Geronimus, 2009). Regardless of the late onset of ASM, emerging adult men from marginalized communities (EAMMC) experience heightened negative consequences associated with ASM (Epidemiology, Services, Research, & Abuse, 2003; Ward & Mengesha, 2013; Zapolski et al., 2014). According to the *Drug Use*

Among Racial/Ethnic Minorities Report by US Department of Health and Human Services, National Institutes of Health (2003), adverse consequences the EAMMC experience are not necessarily due to excess in ASM in this population, but they are associated with unique conditions (i.e., delays in medical recognition, inefficiencies in the care, and management of the conditions once the conditions are detected for EAMMC). In other words, EAMMC experience harsher consequences not because of higher ASM but because of other social and environmental factors. Some other widely known inequities in ASM consequences for EAMMC included excess homicide, emergency room visits, and incarceration according to the report.

Research has not yet established risk and protective factors that explain the escalating rates of ASM during emerging adulthood, particularly for those living in marginalized communities (Kogan, Bae, Cho, Smith, & Nishitani, 2020). However, there are prevailing models that implicate majority of EAMMC's exposure to socioeconomic and race-related stressors stemming from structural oppression towards this marginalized population, both in childhood and during the emerging adulthood years (Brody et al., 2010; Gilbert et al., 2016; Ward & Mengesha, 2013; Watkins, 2012).

EAMMC have unique ASM treatment needs related to their developmental factors and the socio-environmental factors of the marginalized community they live in. Marginalized communities were defined as distressed communities with higher concentrations of historically marginalized racial/ethnic groups where there are high rates of poverty and crime. Further, there were 3 key reasons why EAMMC are more vulnerable with more severe consequences from ASM warranting prioritization in tailored treatment intervention development. To reiterate them, EAMMC suffer higher incarceration rates, EAMMC endure existing health inequities such as disproportionately higher HIV/hepatitis C virus (HCV) infection rates (Center for Disease

Control, 202; Alexander, 2010), discriminatory experiences, and a lack of insurance coverage and, yet, residents of marginalized communities, in spite of elevated needs, had considerably less access to effective ASM treatment interventions (Dunlap, Golub, & Johnson, 2006; Perron et al., 2009; Schmidt L, Greenfield T, 2011; Services, 2006). It was evident that EAMMC face more serious consequences for their ASM than emerging adult men living in privileged communities. These serious consequences are due to the SDH. However, research considering the intersection of age and marginalization with SDH framework is still needed.

Current ASM Treatments for EAMMC

Little research exists on ASM treatment focusing on EAMMC. The closest literature to ASM treatment outcome for EAMMC was a recent meta-analytic study on ASM prevention and treatment outcomes for emerging adults in non-college settings (Davis, Smith, & Briley, 2017). This study found that there were 18 ASM treatment intervention studies for emerging adults in non-college settings. Although not all emerging adults in non-college settings are from marginalized communities, when compared with college students, a higher rate of non-college emerging adults are likely to be from marginalized communities (National Center for Education Statistics (NCES), 2020).

According to the meta-analysis, motivational interviewing (MI) is one of the few treatments with extensive testing among non-collegiate EAs. About one-third of all 18 studies treating EAs for ASM in non-college settings involved MI or adaptations of MI called motivational enhancement therapy (MET). Cognitive behavioral treatment (CBT) models were also found for EAs treated in non-college settings. The most commonly used CBT models were variations of community reinforcement approach or CBT combined with MI. All of the current interventions for EAs in non-college settings aimed to change behaviors at only *individual level*.

Results of the meta-analysis showed intervention effect differences between college attending EAs and non-college attending EAs. That is, treatment studies with a higher proportion of college attending EAs had larger treatment intervention effect sizes. In terms of practical significance, a 1% increase in the proportion of college-attending participants was associated with a .01 effect size increase. For example, for a study with 0% of the participants in college, the effect size was near zero $d = .04$. This suggests that more research needs to be conducted to assess treatment effects of EAMMC and to develop interventions that address the risk and protective factors that are relevant to this population.

When reviewing the interventions for EAMMC, attention was brought to the fact that there is a very limited number of intervention models (i.e., MI and CBT) and scientific evidence for ASM treatment interventions dedicated to general emerging adult population and no study focusing on EAM nor EAMMC. The literature lagged behind that of studies exploring, developing, and assessing interventions for adolescent ASM and general adult ASM. There have been few ASM treatment outcome studies comparing emerging adults and mature adults. Satre and colleagues in 2003 reported a study examining how well older SUD patients responded to treatment relative to middle -aged and younger patients in a mixed-age private HMO outpatient program. Their results indicated that at baseline, older adults showed higher levels of alcohol dependence, lower rates of drug dependence and lower psychiatric symptoms relative to younger individuals. In terms of the posttreatment outcomes, at 6 months posttreatment, 55% of older adults reported abstinence in the preceding 30 days, versus 59% of middle-aged adults and 50% of younger adults ($p = .035$). The same group of scholars conducted another study comparing five year treatment outcomes of older adults to those of middle-aged and younger adults in a large managed care chemical dependency program (Satre, Mertens, Areán, & Weisner, 2004). In

this study, similar results were reported. Fifty two percent of older adults reported total abstinence from alcohol and drugs in the previous 30 days versus 40% of younger adults. In 2008, Mason and Luckey conducted a study with a sample of 98 young adults, ages 18-25, drawn from an alcohol treatment sample of 1022 from two large metropolitan urban settings. When young adults were compared with the remainder of the sample, authors concluded that the young adults are a unique substance abuse age group with characteristics and needs that differ from the adult treatment population. Table 6 summarized the factors identified by these studies that implies age-group will moderate the association between CW and ASM, with EAM having worse outcome.

Table 6 Risk factors unique for EAs

Study	Population	Age Groups	Results	Risk Factors Unique for EAs
Satre et al. (2003)	Private HMP outpatient program	*N* = 1204 18-39 (*n* = 736) 40-54 (*n* = 379) 55+ (*n* = 89)	Older adults have favorable treatment outcome following treatment relative to younger adults	❖ Strength of dependence ❖ Abstinence motivation ❖ Treatment retention
Satre et al. (2004)	Managed care chemical dependency program	*N* = 925 18-39 (*n* = 564) 40-54 (*n* = 296) 55-77 (*n* = 65)	Older adults have favorable long-term outcome following treatment relative to younger adults	❖ Type of substance dependence ❖ Treatment retention ❖ Social networks ❖ Gender
Mason & Luckey (2008)	two large metropolitan urban settings	*N* = 1022 18-25 (*n* = 98) 26+ (*n* = 924)	Young adult age group has unique psychosocial and behavioral needs when compared to those of an adult treatment population, and these needs may be linked to treatment retention and outcome	❖ Education ❖ Employment ❖ Mental health ❖ Alcohol and drug use ❖ Alcoholics Anonymous involvement

In addition, there is a conceptual framework delineated by Bergman (Bergman et al., 2016) that signifies factors unique to EAs. Table 7 from his work describes the clinical

differences by developmental life stage within a biopsychosocial framework that may be responsible for worse treatment outcomes for EAs.

Table 7 Clinical differences by developmental life stage

	Adolescent (12-17)	**Emerging Adult (18-25)**	**Adult (26+)**
Biological	Developed reward and limbic system, **underdeveloped** prefrontal cortex	Developed reward and limbic system, **developing** prefrontal cortex	Developed reward and limbic system, **developed** prefrontal cortex
Psychological	a) Fewer consequences of using → Low abstinence motivation b) Limited coping skills, limited stress c) Reward-driven decision making (high impulsivity) d) Co-occurring psychiatric disorders common	a) Increased consequences of using → Moderate abstinence motivation b) Developing coping skills, increased stress c) Reward-driven decision making (moderate to high impulsivity) d) Co-occurring disorders most common	a) Accumulation of consequences → High abstinence motivation b) Developed coping skills, moderate stress c) Balance between reward-driven decisions and consideration of longer-term consequences d) Co-occurring psychiatric disorders less common though psychiatric disorders and their sequelae may be chronic and debilitating
Social	a) Ongoing parental and school monitoring: High levels of social reinforcement b) Availability of non-using peers c) No ethical/legal issues with parent involvement	a) Greater freedom/independence: Reduced levels of social reinforcement b) Reduced availability of non-using peers c) Consent needed for parent involvement	a) Freedom/independence: Social reinforcement through marriage/family b) Availability of non-using peers c) Spousal involvement should be considered

Research Questions and Hypotheses

In concluding this chapter, hypotheses derived from the reviewed theories, statistics, and literature around ASM treatment outcomes are presented. EAMMC are more likely to have higher rates of ASM when compared to EAs from non-marginalized communities (Wayne Osgood, Michael Foster, & Courtney, 2010) and they experience the harshest consequences for ASM including incarceration and higher rates of co-morbidities (Bonnie et al., 2015). Emerging Adulthood Theory and Social Determinants of Health Theory help explain both, the high ASM as well as the consequences of ASM among EAMMC. It is critical to prioritize research about ASM treatment for EAMMC to address their unique needs and reduce inequities related to ASM consequences for this particular population. However, evidence for EAMMC is very limited. This dissertation responded to this gap in the field by examining the fit and promise of an

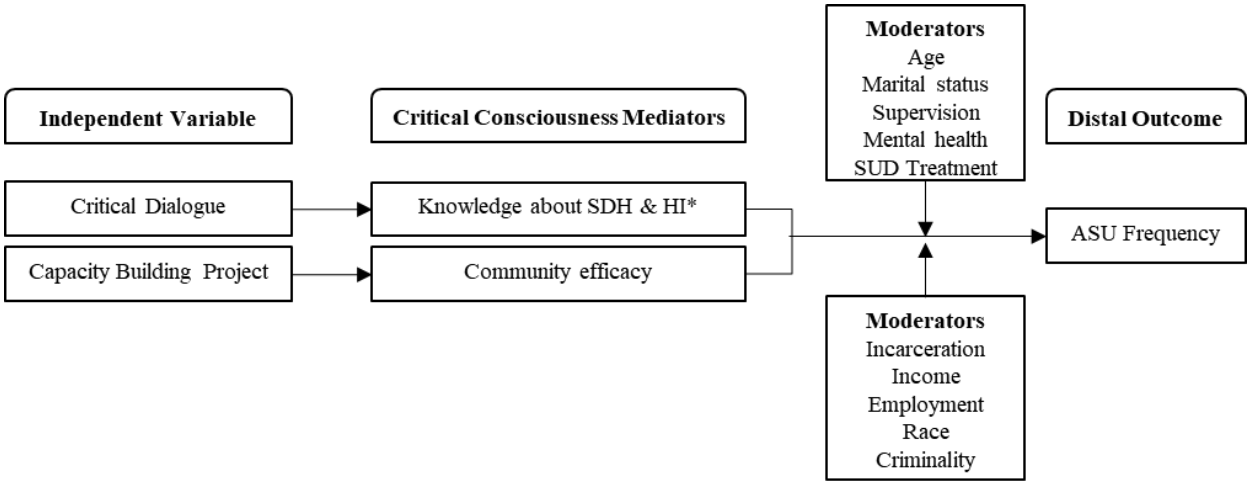
innovative intervention, *Community Wise*, a culturally grounded, evidence-based, and multi-socioecological level intervention, in reducing ASM among adults from marginalized communities. Specifically, secondary data analyses using data from a large RCT testing the optimization of *Community Wise* were conducted to determine if and how age impacts intervention effects on ASM over time among adult men from marginalized communities, comparing EAs and MAs. The specific aim of this dissertation, main research questions, and hypotheses for the research questions drawn from this literature chapter are summarized in Table 8.

Table 8 Dissertation aim, research questions, and hypotheses.

Aim of the Dissertation
To conduct a secondary data analysis using data from a large RCT to determine if and how age impacts intervention effects on ASM over time among adult men from marginalized communities, comparing emerging adults (ages 18-29) and mature adults (30+).
Research Questions
• Q1: Does age moderate the relationship between CW and ASM among males living in marginalized communities? • Q2: Are there distinctive ASM trajectories among EAMMC who were randomized to receive the intervention over time?
Hypotheses
• Hypothesis 1: Age-group will moderate the association between CW and ASM, with EAs having worse outcome. • Hypothesis 2: There will be multiple group ASM trajectories among EAMMC.

Lastly, below is the figure explaining the mechanism of ASU behavior change that is hypothesized for participants who receive *Community Wise* intervention.

Figure 4 Mechanism of ASU behavior change.



* SDH & HI : Social Determinants of Health and Health Incormation

CHAPTER 3: METHODS

This dissertation project aimed to explore if and how age impacts ASM over time among adult men from marginalized communities, comparing emerging adults (EAs, ages 18-29) and mature adults (Mas, Ages 30+). This aim was achieved by statistically answering two main research questions. Q1: Does age moderate the relationship between Community Wise and ASM among men living in marginalized communities? Q2: Are there distinctive ASM trajectories among EAMMC who were randomized to receive the intervention over time? The Moderation effect of age on the relationship between *Community Wise* and ASM among men from marginalized communities was examined using a Growth Mixture Model (GMM) with known class (i.e., age group). In addition, group-based trajectory modeling was conducted using the EA sample. This chapter describes the conceptual model, the treatment intervention, data source, sample characteristics, measures, and statistical analysis that was used to conduct this study.

Intervention

Community Wise is a manualized, multi-level group behavioral intervention that was developed using Community Based Participatory Research (CBPR) principles. The intervention aims to reduce ASM frequency among formerly incarcerated men from marginalized communities. The intervention's pilot study analysis showed significantly lower post-intervention number of days using an illicit drug, money spent on illegal drugs, and rearrests (Windsor, Jessell, Lassiter, & Benoit, 2015). *Community Wise* is grounded in critical consciousness theory that addresses individual, social, and community-level factors simultaneously (Freire, P., 1976, 1978, 2000a, 2006). Critical consciousness is operationalized as having a deep understanding of how SDH impact substance use related health inequalities and using that knowledge to inform critical action that combats health, social, and economic

inequalities. In *Community Wise*, critical consciousness is developed through four main intervention components: (1) core sessions, which all participants received. The core component includes one introduction section, one critical thinking session, and one termination session plus a graduation ceremony; (2) critical dialogue (CD), where participants attend group meetings and apply critical thinking skills to examine how social determinants of health have impacted their own lives and the health of their communities; (3) development of individual goals through a quality-of-life-wheel (QLW) exercise; and (4) engagement in capacity-building projects (CBP) that seek to address community health problems identified by participants. These components of *Community Wise* were developed to increase knowledge about how SDH impact individual behaviors; self-efficacy to engage in change; and actual individual behavior change at the micro level. Moreover, they were designed to strengthen the quality and quantity of positive social relationships at the meso-level and to change community norms and structural barriers as communities join together to combat inequalities.

Data Source

The current dissertation used individual-level longitudinal data (i.e., baseline (T0) and five follow ups (T1-T5)) from the *Community Wise Optimization* Study (CWO) (Liliane Cambraia Windsor, Benoit, Smith, Pinto, & Kugler, 2018). The objective of this parent study was to identify the most effective, efficient, and scalable combination of intervention components that can be delivered under $250 per person or less. Inclusion criteria and exclusion criteria used for the parent study are summarized in Table 9.

Table 9 Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Age ≥18 years	Gross cognitive impairment
Self-identified as male	
Agreed to being recording during CW group sessions	Severe unstable mental illness (e.g. untreated psychotic disorder, suicidality)
Living in Newark, NJ	
Released from incarceration ≤4 years	
Ability to read, write, and speak English	
Willing to provide informed consent	

Community Wise group meetings and research activities took place at a community-based agency partner who provide substance use and health services to individuals with SUDs. Newark was selected because its residents consistently show poorer health and socio-economic outcomes compared to neighboring areas. The project staff posted fliers at reentry, SUD, and HIV/HCV service agencies throughout the community and asked individual service providers to disseminate information about the study. In addition, research staff encouraged potential participants to help distribute the study fliers in their neighborhoods, churches, and other meeting places. Outreach workers approached individuals in key locales in Newark, NJ to spread the word about the study and bring individuals eligible to participate into the agency to complete the clinical screen. Men interested in participating could call the study cell phone number or attend the agency drop-in center. Outreach workers conducted a brief phone screening to obtain self-reported eligibility information including ASM, date of last prison release, age, and contact information (Liliane Cambraia Windsor et al., 2018).

There were a total of 42 *treatment groups* of up to 13 participants assigned per group and six *control groups* also up to 13 participants assigned per group. Baseline (T0) and follow ups (T1-T5) instruments were provided to participants directly via a tablet. Study data were collected and managed using REDCap electronic data capture tools hosted at University of Michigan (Harris et al., 2019, 2009). REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources. Participants received cash incentives to complete data collection. Follow-ups started one month after the first *Community Wise* session and continued for a total of five months. A total of 927 participants were recruited. 323 of these 927 participants were ineligible after the screening, two dropped out. A total of 602 participants were consented into the study.

According to the main outcome paper manuscript of this parent study, which is currently being considered for publication, CD + CBP components produced statistically, and clinically significant main effects and their interaction showed synergistic effects with a 74% reduction in marginal mean ASM over five months. The parent study research team concluded that the CD and CBP should be retained as the only effective intervention ingredients.

In accordance with this parent study result, any group including CD or CBP intervention component served as “treatment group” and all other groups served as “control group” for the purpose of this dissertation.

Table 10 Intervention groups stratified by current study treatment- and control- group assignment status

Treatment Group	Control Group
CD	Core
CBP	QLW
CD+CBP	
CD+QLW	
CBP+QLW	
CD+CBP+QLW	

Analytic Sample

For the purpose of this dissertation, frequencies of EAs in all conditions (N = 602) were examined to determine the eligibility criteria for the analytic sample. Among the total analytical sample, there were 79 EAs ages between 18 and 29 and 523 MAs ages 30 and above. Mean age for the total analytic sample was 45.11 (SD = 11.30), 24.72 (SD = 3.21) for the EAs, and 47.44 (SD = 8.99) for the MAs. While all participants had a history of ASM, alcohol (66.8%) was the most prevalent substance being used at the time of baseline followed by heroin (42.5%), recreational cannabis (35.0%), cocaine (33.6%), and opiate (8.1%).

Table 11 Analytical sample participants' characteristics at baseline (N=602)

Characteristic	**N (%) / Mean(±SD)**
Heterosexual	542 (90.0%)
Race	
Black/African American	485 (80.5%)
White	34 (5.6%)
Ethnicity	
Hispanic	46 (7.6%)
Not Hispanic	556 (92.4%)
Household yearly income	5,865.02 (1,8273.90)

Table 11 Analytical sample participants' characteristics at baseline (N=602) (cont.)

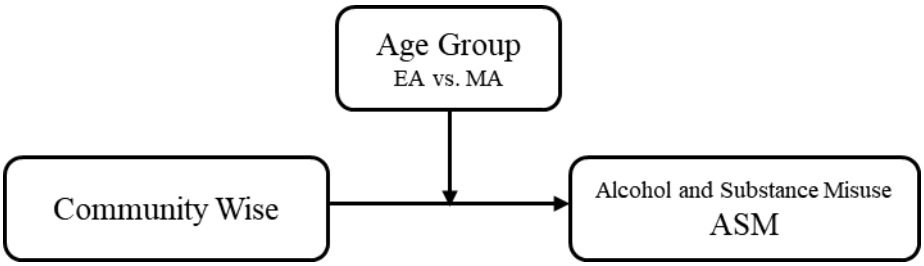
Religion	
Christian	**319 (53.0%)**
Muslim/Islam	**152 (25.4%)**
None	**104 (17.3%)**
Never married	402 (66.8%)
Unemployed	468 (78.9%)
Under supervision (Parole, Halfway House)	498 (82.7%)
Months since release from last incarceration	14.34 (15.3)
Substance Use	
(Mean # of days in past 30 days)	
Alcohol use	9.98 (11.6)
Cannabis use	5.63 (10.6)
Cocaine use	4.45 (9.0)
Heroin use	9.39 (12.8)
Opiate use	1.13 (5.0)
Readiness for abstinence (out of 100)	
Lifestyle characteristics	
Received other SUD treatment	263 (43.7%)
Received welfare support	189 (31.4%)
Homeless living in the street	81 (13.5%)
Lived in structured living situation	8 (1.3%)
Lived in homeless shelter	224 (37.2%)
Mental health	
Traumatic Stress Scale (TSS)	4.93 (3.99)
Somatic Symptom Index (SSI)	1.51 (1.5)
Depressive Symptom Index (DSS)	3.27 (3.18)
	9.6 (24.5)
Criminality	
Length of incarceration (in month)	7.08 (17.15)
Criminal Justice System Index (CJSI)	71.44 (30.84)

Statistical Analyses Conceptual Frameworks

Relations between variables are often more complex than simple bivariate relations between a predictor and a criterion. Rather these relations may be modified by, or informed by, the addition of a third variable in the research design (Fairchild & MacKinnon, 2009). Previous

research has described the moderation analysis and has provided methods to analyze them (e.g., Dearing and Hamilton 2006; Frazier et al. 2004; Gogineni et al. 1995; Rose et al. 2004). The moderation model tests whether the prediction of a dependent variable, ASM in this dissertation, from an independent variable, intervention in this dissertation, differs across levels of a third variable, Age group in this dissertation (See Fig. 3.1). This dissertation tested whether age group affect the strength and/or direction of the relation between a intervention and ASM: enhancing, reducing, or changing the influence of the predictor. Moderation effects are typically discussed as an interaction between factors or variables, where the effects of one variable depend on levels of the other variable in analysis. However, Growth Mixture Modeling (GMM), a method for identifying differences in longitudinal change with known class was used for this dissertation to maximize the use of longitudinal data.

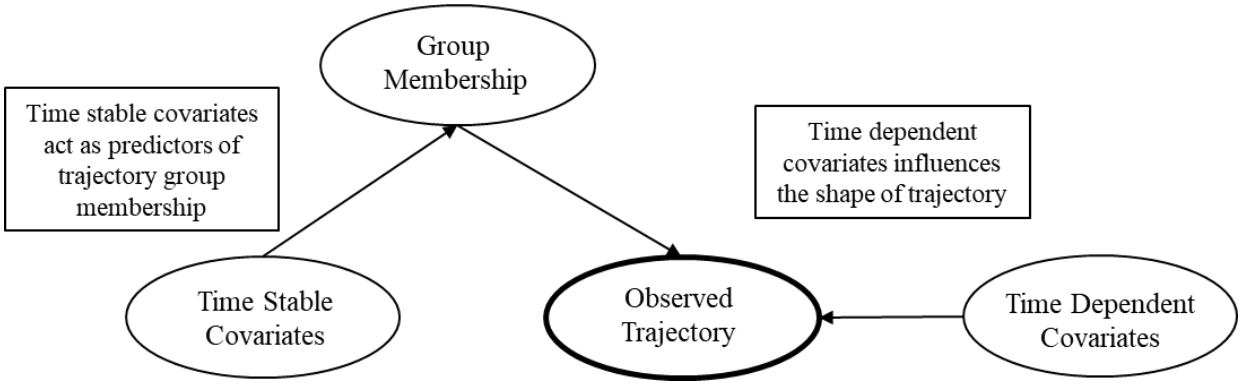
Figure 5 Conceptual model for research question #1



Group-based trajectory modeling approach applied to Latent Growth Model (LGM) was used to answer Research Question 2. This is a group-based statistical methodology for analyzing developmental trajectories - the evolution of an outcome over time. Group-based statistical method lends itself to the presentation of findings in the form of easily understood graphical and tabular data summaries. In so doing, the method provides investigators with a tool for figuratively painting a statistical portrait of the predictors and consequences of distinct trajectories of development. Data summary of this form has the advantage of being accessible to

nontechnical audiences and quickly comprehensible to audiences that are technically sophisticated. Detailed methodological reasons for selecting group-based trajectory modeling is further delineated in the proceeding sections. Figure 6 is the conceptual model for research question 2 of this dissertation.

Figure 6 Conceptual model for research question #2, a group-based modeling of development



Measures

The main outcome variable (DV) was alcohol and substance misuse (ASM), and the independent variable (IV) was *Community Wise* treatment intervention assignment (CW). ASM was selected as opposed to considering individual substances separately because most people use multiple substances simultaneously. The frequency, or severity of use is associated with negative consequences of ASM. Moreover ASM allows for inclusion of a larger number of participants, increasing our power to detect statistically significant associations. The operationalization of these variables is explained below.

Dependent Variable (DV) Alcohol and Substance Misuse (ASM)

The primary outcome was ASM severity as operationalized by an adapted version of the substance frequency scale in the Global Appraisal of Individual Needs (GAIN) (Dennis, Titus, White, Unsicker, & Hodgkins, 2008). GAIN is an assessment of substance use, mental illness,

criminal and violent behavior widely used by the clinical and research community (Conrad et al., 2012). GAIN items serve as a map to diagnostic criteria and symptoms in the DSM-V (Association of American Psychiatric (APA), 2013) intended for clinical and research use and the subscales of the GAIN may be used to produce dimensional counts or profiles of diagnostic disorders (Conrad et al., 2012). The GAIN scales have demonstrated good internal consistency and test-retest reliability. They are highly correlated with other measures of use, including timeline follow-back methods, urine tests, collateral reports, treatment records, and blind psychiatric diagnosis (Dennis, Chan, & Funk, 2006; Lennox, Dennis, Ives, & White, 2006). During all five monthly follow-ups with research assistants, participants self-reported their alcohol consumption and completed a urine toxicology screen that detected opioids, heroin, cocaine, and cannabis (including synthetic).

At each time point (baseline and 5 post-intervention time points) the severity of ASM was calculated by dividing the reported number of days in the past month that the participant used cannabis (non-medical), heroin, alcohol, opioids, or cocaine, by the number of days in the month (these data were collected with the timeline follow back measure). The reason for using overall substance use frequency as an outcome was based on the literature indicating polysubstance use is common, particularly among young adults and marginalized populations. There are many reasons people choose to use multiple rather than single substances. However, for the emerging adults, it is likely to enhance effects, by combining drugs with similar central nervous system (CNS) mechanisms such as alcohol and benzodiazepines (Darke, Duflou, Torok, & Prolov, 2013) or two or more anxiolytic-hypnotics (Darke et al., 2013). Drugs with different CNS actions may also be combined to accentuate the perceived benefits of each substance (i.e., opioids and benzodiazepines (Calcaterra, Glanz, & Binswanger, 2013; Højsted, Ekholm, Kurita,

Juel, & Sjøgren, 2013; Jones, Mogali, & Comer, 2012), stimulants and opioids (Licht et al., 2012; Trujillo, Smith, & Guaderrama, 2011), and stimulants and hallucinogens (Licht et al., 2012)). In addition, it is know that opportunistic access, experimentation, and conformity to subculture substance use norms are also motivators for common multiple substance use (Licht et al., 2012).

The primary outcome was the average proportion of overall alcohol and substance use days out of past 30 days. This provided the percentage of days each substance was used in the past month. Next, the mean of these proportions was calculated by adding the percentages for each substance and dividing by five as a measure of the severity of ASM during the 5 months of follow up (GAIN). This provided a measure of mean ASM frequency/month during the 5 months of follow up (Ives, Funk, Ihnes, Feeney, & Dennis, 2012).

Independent Variables (IVs)

There were two IVs used in this project. The main IV was the *Community Wise* intervention assignment. The analyses used intent-to-treat analysis approach and anybody who were assigned to one of the components that were selected for the optimized intervention (CD and CBP) of *Community Wise* was respected as "Intervention Received" (i.e. treatment group). On the other hand, those who were assigned to Core or QLW group operated as the "Intervention Not Received" (i.e. control group). More details about the optimization of *Community Wise* manual (L.C. Windsor, Benoit, Smith, Pinto, & Kugler, 2018) can be learned from the parent study outcome paper that is in press.

The second IV or referred to as "known-class" for the research question #2 analysis, was the age group variable. Age group variable was a dichotomous variable where participants ages between 18 and 29 are defined as "Emerging Adult (EA)" and ages 30 and older are defined as

"Mature Adult (MA)". Different studies have used variety of age range in defining EAs in the past and this dissertation used the widest range to define EAs in the past literature has been used to be inclusive.

Covariates

Covariates (i.e., social support items) were included in the model based on supporting theories and availability of those covariates within the dataset. Major social factors related to ASM treatment outcome found within the reviewed literature included: deviant peers, living with drug user or drinker, support at home, social support, education, becoming a parent for the first time, and family conflict. However, variables related to social support were the only available variables in the dataset to be added. Table 12 summarizes the social factors that theoretically impact ASM treatment outcomes and analogous variables in the analytic dataset that could be added.

Table 12 Social factors identified by key studies related to ASM treatment outcomes and variables in dataset

Study, Year	Social Factors Identified	Variable in Data
Broome et al., 2002	deviant peers	None
	living with drug user or drinker	None
	support at home	None
Kaskutas et al., 2002 Havassy et al., 1995	**social support**	**CCS6 In my community, I can find resources (e.g. knowledge, support, partners) to help me work against the biases and "isms" that try to hold us back.** **CCS8 I feel disconnected from others**
Weisner et al., 2003 Kandel and Raveis, 1989 Latkin et al., 1999	drug users in one's network	None
Chen and Kandel, 1998	education	None
	parent for the first time	None
Knight and Simpson, 1996	family conflict	None
	peer deviance	None

In addition to these social support covariates informed by the literature, variables that had statistically significant confounding effects on ASM (i.e., incarceration duration, income, employment, race, criminality, marital status, supervision, mental health, and SUD treatment history) were included in the model as covariates (p<0.05).

Table 13 Summary of covariates included in the analysis model

Covariates List	Rational
Critical Consciousness Scale Item 6 (CCS6) Critical Consciousness Scale Item 8 (CCS8)	Supported by literature on the effect of social support on ASM treatment
Last incarceration duration in month Income Employment Race Criminality Marital status Supervision (i.e., parole) Mental health Substance Use Disorders treatment history	Statistically significant (p<0.05)confounding effects on ASM

Data Analysis

The first step before conducting data analysis was to conduct data exploration. Data exploration provides insight into the data that are critical for data analysis including limitations (Quinn & Keough 2002; Zuur, Ieno & Elphick 2010; Ieno & Zuur 2015). Zuur, Ieno & Elphick (2010) described a 10-step protocol for data exploration consisting of investigation of outliers, homogeneity, normality, zero trouble, collinearity, relationships, interactions and independence (Zuur, Ieno, & Elphick, 2010). The data exploration will be carried out following the protocol described in Zuur, Ieno & Elphick (2010). Next, dependency structure in the data will be identified. Pseudo replication in regression models results in biased parameter estimates and increased type 1 errors (Hurlbert, 1984).

Data screening and data cleaning procedures were conducted prior to data analysis. First, univariate descriptive statistics on each variable were obtained (i.e. means, standard deviation,

range, kurtosis, skewness, and missing values) using SPSS27 and observed. Some variables were recoded as necessary. Missing data were inspected for each variable and confirmed all missing data was missing completely at random. For, GMM analysis, missing data was addressed using full information maximum likelihood estimation (FIML, Newman, 2014).

Group-based trajectory modeling approach accommodates missing data to some extent, thus it was expected individuals with missing observations needing to be dropped is very much avoidable (Nagin, 1999). However, if there is only one data point available among all five follow ups, the participant was dropped from the analysis.

Distribution of all variables were examined to determine whether they are normally distributed. In order to assess normality, skewness kurtosis, as well as histograms and scatterplots were used. Much has been said about centering a continuous independent variable when performing moderator analysis for interpretation and multicollinearity reasons (e.g., Cohen et al., 2003; West et al., 1991). However, the issue of centering due to concern over multicollinearity has been called into question and it is recommended to only center data when interpretation is at stake (Hayes, 2013). When considering centering, it is specifically speaking about mean centering of the continuous independent variable. This is the process of creating "deviation scores" such that the mean of each independent variable is zero. This is achieved by calculating the mean of the independent variable and then subtracting the mean from each value of the variable (e.g., if mean age is 33 years, a 47 year old would have a mean centered age of 14 years, i.e., 47 – 33 = 14 years). Essentially, each new score of a mean centered variable represents the distance from the mean of that variable. Mean centering can be helpful because it can make interpretation easier when we need to consider when the continuous independent variable is zero (which can occur in moderator analysis). As such, it is ideal for a value of zero to be a meaningful value. For example, an age of

zero (for humans) is not a meaningful age. However, in this study, number of sessions attended by participant is used for independent variable. In this case, a value of zero is meaningful because it is perfectly possible, and actually quite common, for people to not attend any intervention session. As such, there was no need to center the continuous independent variable.

Bivariate analysis was carried out using different correlation types. In order to be true to the nature of the data, correlations will be examined based on the type of variables. When both variables are continuous and normally distributed, Pearson correlations was used. When both variables are continuous but at least one of them is not normally distributed, Spearman correlations was used. In case one variable is continuous and the other is categorical, point biserial correlations was used. When there are two categorical variables, tetrachoric correlations and when the two variables are ordinal, polychromic correlations was used. Point biserial, rank biserial, tetrachoric, and polychromic correlations don't provide *p*-value and one strategy to deal with this issue was to run all correlations using Spearman and use the *p*-value from it to indicate significant correlations. For the main outcome variable, ASM, correlations analysis was conducted for self-reported ASM in the past 30 days and the toxicology urine screens to confirm the validity of the self-reported data.

Table 14 Summary of research questions and analytic strategy

Research Questions	Analytic Strategy	Statistical Software
Q1 Does age moderate the relationship between a culturally grounded, evidence-based, and multi-level intervention, in reducing ASM among males living in marginalized communities?	Growth Mixture Model (GMM)	Mplus MPLUS (Version 8.8). [Computer Software]. Los Angeles, CA: Muthén & Muthén.
Q2 Are there distinctive ASM trajectories among EAMMC who were randomized to receive the intervention over time?	Latent Growth Model (LGM) with Group-Based Modeling approach	STATA StataCorp. 2021. *Stata Statistical Software: Release 17*. College Station, TX: StataCorp LLC.

Growth Mixture Modeling (GMM) with non-normal random effects

The objective of growth curve modeling is to describe and test hypotheses about interindividual (between-person) differences in intraindividual (within-person) change. With an interest in modeling non-linear change, the analysis used a latent basis growth model to model nonlinear patterns and shapes of change over time with great flexibility (McArdle & Epstein, 1987; Meredith & Tisak, 1990). This chosen analytical method provided an alternative representation of the change trajectories often modeled via polynomial models (e.g., quadratic, cubic, etc.) and was particularly useful in the study as it represented complex shaped trajectories in a parsimonious manner.

The specific growth curve model used in answering the research question #1 was Growth Mixture Model (GMM) which is an extension of the multiple-group growth model in which the grouping variable, *c*, is latent or unobserved. In this study, the grouping variable was known (i.e. age group). Using GMM, in a post-hoc manner, group differences in longitudinal change

between and within those known groups were described. Extending on multiple-group growth model equation

$$Y[t]n = (g_{0nc} \cdot A_{0c}[t] + g_{1nc} \cdot A_{1c}[t] + e[t]_{nc})$$

where the observed longitudinal data (i.e. the left side of equation, individuals' scores on variable Y repeatedly measured at times t = 0 to T) are represented using two latent variables, g_{0n} and g_{1n}, two corresponding basis vectors (i.e. sets of factor loadings), A_0 and A_1, and a time-specific residual (i.e., error), $e[t]_n$. *c* subscripts indicate the group to which individual *n* belongs (i.e., for EAs *c* = 1 and for MAs *c* = 0).

GMM can be written as

$$Y[t]n = \sum_{c=1}^{C} \left(\pi_{nc}(g_{0nc} \cdot A_{0c}[t] + g_{1nc} \cdot A_{1c}[t] + e[t]_{nc})\right)$$

$$\text{Given } 0 \leq \pi_{nc} \leq 1 \; and \; \sum_{c=1}^{C} \pi_{nc} = 1.$$

Within the new part of the GMM model above, π_{nc} is the probability that individual *n* belongs to class *c*. As the extra conditions on the model indicate, these probabilities may range between 0 and 1 and must sum to 1. In this study, with two classes, if an individual is likely to be in class 1, $\pi_{nc=1}$ = .80, this individual *n*, by definition is not so likely to be in class 2, $\pi_{nc=2}$ = .20. In total, the observed data are represented as a function of the probability of class membership and the multiple-group growth model. With this model, three primary aspects were observed the pattern or shape of change (*Pattern*), mean change (*Means*), and the extent of interindividual differences in change (*Covs*) for two different age groups by intervention assignments (i.e., treatment group vs. control group).

Latent Growth Modeling (LGM) with group-based modeling approach

The group based modeling strategy (i.e., a specific type of LGM method) will be used to answer research question 2. Group based approach frames questions of statistical inferences in

terms of the trajectory group. It is useful in answering the question of what factors distinguish group membership and how do groups differ, if at all, in their response to events that might alter a trajectory. The group-based approach is ideally suitable for testing whether such distinctive patters are present in the data (Nagin, 2005). Standard growth curve methods will not be used in answering this research question because it is not reasonable to assume that most individuals will experience a common process of growth or decline at different rates for their ASM. The group-based approach lends itself to analyzing questions that are framed in terms of the shape of the developmental course of the outcome of interest (i.e., ASM), whereas standard growth curve modeling lends itself to analyzing questions framed in terms of predictors of the outcome's developmental course. Technically, the group-based trajectory model is an application of a statistical method called "finite mixture modeling." Finite mixture models are an elaboration of the conventional maximum likelihood model. The data analysis for this hypothesis testing will be conducted using SAS software, Version 17.0 of the STATA System for Window. Copyright 2021.

The specific form of the likelihood function will be maximized depending on the dataset, but the underlying likelihood function is "let $Y_i = \{y_{i1}, y_{i2}, y_{i3}, y_{i4}, y_{i5}\}$ denoting a longitudinal sequence of measurements on individual *i* over 5 time points. $P(Y_i)$ will denote the probability of Y_i. For count data $P(Y_i)$ is specified as the Poisson distribution. The group-based method assumes that individual differences in trajectories can be summarized by a finite set of different polynomial functions of time. Each such set corresponds to a trajectory group which is indexed by *j*. Let $P^j(Y_i)$ denote the probability of Y_i given membership in group *j*, and π_j denote the probability of a randomly chosen population member belonging to group *j*. Construction of the likelihood function requires the aggregation of the *j* conditional likelihood functions $P^j(Y_i)$, to

form the unconditional probability of the data, Y_i as below equation where $P(Y_i)$ is the unconditional probability of observing individual i's longitudinal sequence of behavioral measurements, Y_i. It equals the sum across the J groups of the probability of Y_i given i's membership in group j weighted by the probability of membership in group j.

$$P(Y_i) = \sum_j^J \pi_j P^j(Y_i)$$

And the likelihood for the entire sample of N individuals is simply the product of the individual likelihood functions of the N individuals who make up the sample, equation above.

$$L = \prod^N P(Y_i)$$

When using this equation to model a group trajectory, missing data handling is important for the longitudinal data. The simplest form of missing data would be missing completely at random. The base model specified above is easily adapted to accommodate such data. Mechanically, this is accomplished by setting $p^j(y_{it})$ equal to 1 if y_{it} is missing and also adjusting the sample count so as not to include this missing observation in the sample size, N.

The models will be estimated with a SAS-based procedure called Proc Traj. The Proc Traj estimation software uses a general quasi-Newton procedure to perform this search. The variance-covariance matrix for the parameter estimates is obtained from the inverse observed information matrix evaluated at the maximum likelihood parameter estimates. Specific form of the link function for Poisson logit formulations is defined by the parameters β_0^j, β_1^j, and β_3^j. These parameters determine the shape of the trajectory for each trajectory group j. Separate set of parameters is estimated for each group j which allows the shapes of trajectories to vary across groups. This flexibility is a key feature of the model. This provides the capacity for identification

of distinctly different developmental trajectories across groups, not only in the level of ASM at a given follow up timepoint but also in the ASM's developmental course over time. (Nagin, 2005)

Once the trajectory shapes are estimated, the shapes will be visually compared. For a two-group model, the binary logit function is a natural candidate for modeling group membership probability as a function of x_i. Specifically, the binary logit function relates the probability of membership in one of the two groups say, 1, to x_i by:

$$\pi_1(x_i) = \frac{e^{xi\theta}}{1 + e^{xi\theta}}$$

(Nagin, 2005)

CHAPTER 4: RESULTS

Results of the statistical analysis outlined in chapter three are described in this chapter. Each hypothesis was addressed separately. Descriptive statistics for the variables used in this study are presented first including bivariate analysis. Then, results of Growth Mixture Modeling (GMM) for Q1 exploring the interaction effects of age on the relationship between CW and ASM over time are presented. Finally, the results of Latent Growth Analysis (LGA) for Q2 using group-based modeling of development approach for emerging adults are presented.

Characteristics of the study sample

Table 15 and Table 16 show descriptive statistics stratified by age groups (EA vs. MA).

Table 15 Study assignment, age, follow up, and attendance statistics stratified by age groups

	Total	Emerging Adults 18-29	Mature Adults 30+
Randomized into study	*N* = 602 (100.0%)	*n* =79 (13.12%)	*n* = 523 (86.88%)
Age	*M* = 45.11 (*SD* = 11.30)	*m* = 24.72 (*sd* = 3.21)	*m* = 47.44 (*sd* = 8.99)
Assigned to Control	73	4	69
Follow Up Rates			
At least 1 follow-up (n)%	523 (86.9)	74 (93.7)	449 (86.0)
Completed follow-up 1 (n)%	418 (69.4)	60 (75.9)	358 (68.5)
Completed follow-up 2 (n)%	429 (71.3)	63 (79.7)	366 (70.1)
Completed follow-up 3 (n)%	403 (66.9)	55 (69.6)	348 (66.7)
Completed follow-up 4 (n)%	426 (70.8)	64 (81.0)	362 (69.3)
Completed follow-up 5 (n)%	399 (66.3)	54 (68.4)	345 (66.1)
Attendance Rates			
Portion of attended session	16.64%	16.03%	16.73%
Attended at least 1 session	254 (42.2%)	35 (44.3%)	219 (41.9%)
Never attended any session	348 (57.8%)	44 (55.7%)	304 (58.1%)
Attended all first 3 sessions	68 (11.3%)	9 (11.4%)	59 (11.3%)

Only 13.12% (*n* = 79) were emerging adults ages between 18 and 29 and 86.88% (*n* = 523) were mature adults who were 30 years old and older within the sample. Mean age for the total sample

was 45.11 (*SD* = 11.30) while mean age for EA and MA were 24.72 (*sd* = 3.21) and 47.44 (*sd* = 8.99) respectively. A total of 73 participants were assigned to the control group. From these, four EAs and 69 MAs were assigned to control group. EAs had higher follow up survey completion rates for all five follow up surveys compared to the MAs. EAs had higher follow up survey completion rates for all five follow ups compared to the MAs. 93.7% of the EAs completed at least one follow-up compared to 86% of the MAs completing at least one follow-up. Attendance rates for the two age groups were similarly low. The proportions of attended sessions out of the number of sessions assigned were 16.03% for EAs and 16.73% for MAs.

Table 16 Demographic characteristics of the data stratified by age groups

Characteristic	N (%) / Mean(±SD)	EA	MA
Heterosexual	542 (90.0%)	72 (91.1%)	470 (89.9%)
Race			
Black/African American	485 (80.5%)	63 (79.7%)	422 (80.6%)
White	34 (5.6%)	6 (7.6%)	28 (5.4%)
Ethnicity			
Hispanic	46 (7.6%)	8 (10.1%)	38 (7.3%)
Not Hispanic	556 (92.4%)	71 (89.9%)	564 (93.7%)
Household yearly income	5,865.02 (1,8273.90)	4512.04 (14943.33)	6084.74 (18763.65)
Religion			
Christian	319 (53.0%)	40 (50.6%)	279 (53.3%)
Muslim/Islam	152 (25.4%)	21 (26.6)	132 (25.2%)
None	104 (17.3%)	16 (20.3%)	88 (79.4%)
Never married	402 (66.8%)	70 (88.6%)	332 (63.5%)
Unemployed	468 (78.9%)	63 (79.8%)	430 (82.2%)
Under supervision (Parole, Halfway House)	498 (82.7%)		
Months since release from last incarceration	14.34 (15.3)		
Substance Use			
(Mean # of days in past 30 days)			
Alcohol use	9.98 (11.6)	7.71 (10.24)	10.33 (11.75)
Cannabis use	5.63 (10.6)	13.05 (12.90)	4.18 (9.14)
Cocaine use	4.45 (9.0)	1.47 (5.13)	5.01 (9.37)
Heroin use	9.39 (12.8)	2.77 (8.00)	10.32 (13.11)
Opiate use	1.13 (5.0)	2.91 (7.90)	.85 (4.38)
Readiness for abstinence (out of 100)	71.44 (30.84)	64.67 (31.60)	72.42 (30.64)
Lifestyle characteristics			
Received other SUD treatment	263 (43.7%)	30 (38.0%)	222 (42.4)
Received welfare support	189 (31.4%)		
Homeless living in the street	81 (13.5%)	12 (15.2%)	69 (13.2%)
Lived in structured living situation	8 (1.3%)	1 (1.3%)	7 (1.3%)
Lived in homeless shelter	224 (37.2%)	28 (35.4%)	196 (37.5%)
Mental health			
Traumatic Stress Scale (TSS)	4.93 (3.99)	4.86 (4.26)	4.94 (3.95)
Somatic Symptom Index (SSI)	1.51 (1.5)	1.04 (1.31)	1.58 (1.51)
Depressive Symptom Index (DSS)	3.27 (3.18)	2.68 (2.93)	3.36 (3.21)
	9.6 (24.5)	3.95 (7.32)	10.47 (26.05)
Criminality			
Length of incarceration (in month)	7.08 (17.15)	9.41 (23.26)	6.72 (16.00)
Criminal Justice System Index (CJSI)	71.44 (30.84)	64.67 (31.60)	72.42 (30.64)

Bivariate analysis

Table 17 shows bivariate correlations between all study variables. Two asterisks indicate correlation was significant at the 0.01 level (2-tailed) and one asterisk indicate correlation was significant at the 0.05 level (2-tailed). All correlations used pairwise deletion. Thus, sample size varies for each correlation.

Table 17 Correlation Matrix of study variables

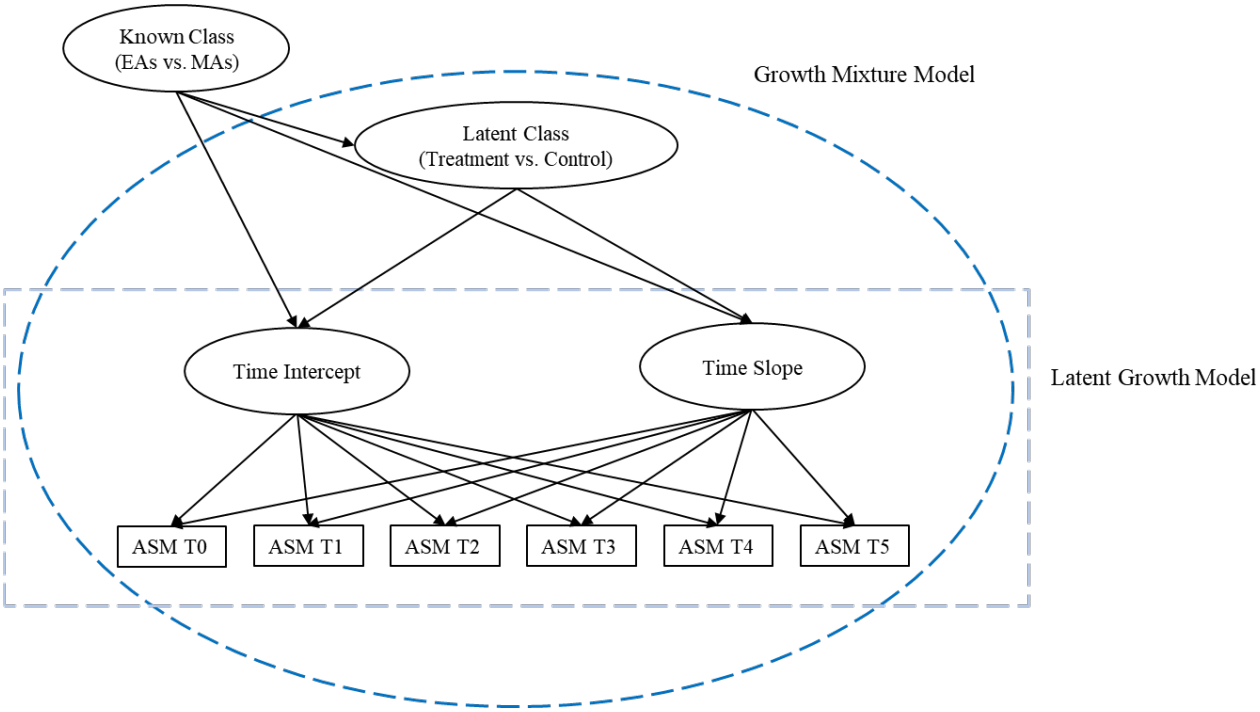
		1	2	3	4	5	6	7	8	9	10
1	Disturbed by memories	1.00	-0.07	0.06	0.04	0.07	.261**	-0.01	.342**	.381**	0.06
2	Incarceration duration	-0.07	1.00	0.00	-0.05	0.06	-0.07	0.07	-0.07	0.00	-.121**
3	Income at baseline	0.06	0.00	1.00	0.03	-0.06	-0.07	-0.03	0.08	-0.05	-0.03
4	Employment	0.04	-0.05	0.03	1.00	0.07	0.04	0.02	.116*	0.09	-.119**
5	Race	0.07	0.06	-0.06	0.07	1.00	0.09	-0.06	.103*	.200**	-0.01
6	Criminality	.261**	-0.07	-0.07	0.04	0.09	1.00	-.130**	.205**	.320**	.177**
7	Social support	-0.01	0.07	-0.03	0.02	-0.06	-.130**	1.00	0.00	0.01	-0.06
8	Mental health	.342**	-0.07	0.08	.116*	.103*	.205**	0.00	1.00	.482**	.092*
9	General Mental Health	.381**	0.00	-0.05	0.09	.200**	.320**	0.01	.482**	1.00	0.09
10	ASM	0.06	-.121**	-0.03	-.119**	-0.01	.177**	-0.06	.092*	0.09	1.00

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Research question 1 results

Figure 7 Statistical model of the growth mixture model with known class (i.e. age group)



Growth mixture modeling with known classes

Figure 7 is the conceptual diagram of the Growth Mixture Modeling (GMM) with known class (i.e. age groups) used in the current study. The Latent Growth Model (LGM) is represented in the rectangular frame. This then extends to a GMM with the introduction of an additional categorical latent class variable in the circular frame. In this analysis, LGMs were fitted to the data using Mplus version 8. Missing data varied across waves ranging from 0.1% to 2.5%. The group difference between two age groups was tested using (GMM) with known classes (classes = EA/MA), which means that growth curve models were estimated for each group. This approach is essentially the same as a multi-group LGM given that the categorical variable of group membership is observed (i.e. we already know the membership in both groups, Asparouhov and Muthén (2010)). A key advantage of the GMM with known class approach over the multi-group

LGM approach is that the GMM model provides more robust estimation when there are missing data (Kim, Mun, & Smith, 2014). This study examined whether the parameters (intercepts and slopes) that determine the within-person growth trajectory for ASM varied between the two groups and whether the between-person difference in age group has an impact on these growth model parameters. The latent intercept corresponds to the initial level of the ASM and the latent slope corresponds to the rate of change in the ASM over time.

As shown in Figure 6, GMM in which the effects of time on ASM for 6 time-points were examined across the two different age groups. Time 0 through Time 5 outcome (i.e. ASM) loaded onto the latent time intercept factor with factor loadings of 1, and also loaded onto the latent time slope factor with factor loadings of [0, 1, 2, 3, 4, 5]. Such factor loadings directly correspond to the latent growth factor effect in linear change trend of the outcome after 1 month (4 sessions) of treatment (Time 1), 2 months of treatment (Time 2), 3 months of treatment (Time 3), 4 months of treatment (Time 4), and 5 months of treatment (Time 5). The known class (i.e. two age groups) was modeled as a latent categorical variable that corresponds to observed group membership.

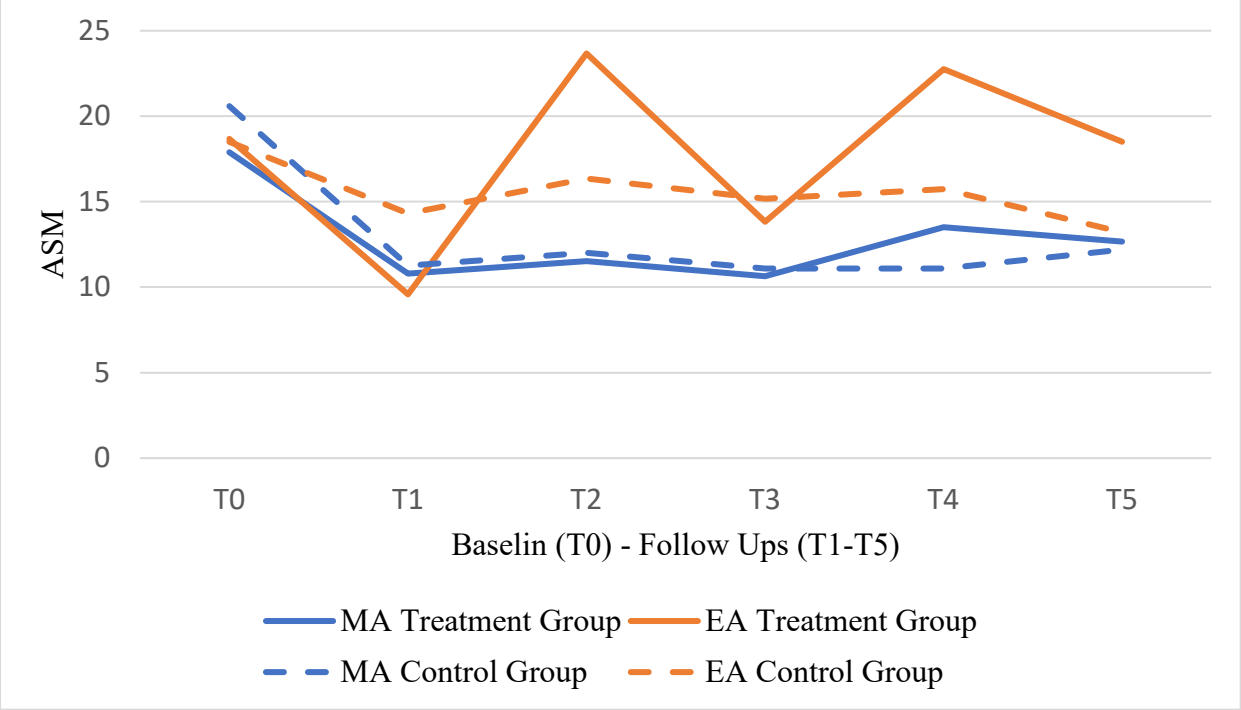
An alternative model was simultaneously tested in which the slopes and intercepts of the two groups were constrained to be equal. The first GMM with differential model parameters had a better fit than the alternative constrained model (ASM: $\Delta \chi^2$ (Δ *df* = 5) = 223.51, $p < .01$) justifying the need for modeling separate growth curves for the two age groups. Furthermore, the mean level changes of ASM was checked from the alternative Latent Growth Model (LGM). The MA group demonstrated a negative growth trend in ASM ($\beta = -0.011$, $p = 0.098$) compared to the positive growth trend ($\beta = 1.577$, $p < 0.001$) among EA group, showing prima facie evidence for group differences as well.

The results of the final GMM are summarized in Table 18. As shown in the table, intercept for MA was 13.529 (SE = 0.665) with slope of -0.482 (SE = 0.157). Intercept for EA was 16.511 (SE = 1.651) with a slope of -0.431 (SE = 0.349). Residual variance for the intercept was 88.366 (SE = 13.387) and the residual variance for the slope was 2.888 (0.806) for both of the groups. The intercept for EA was 2.982 higher with 0.051 slope difference. However, these differences in intercept and slope between the two age groups were not statistically significant.

Table 18 Effects of CW on ASM over time by age group

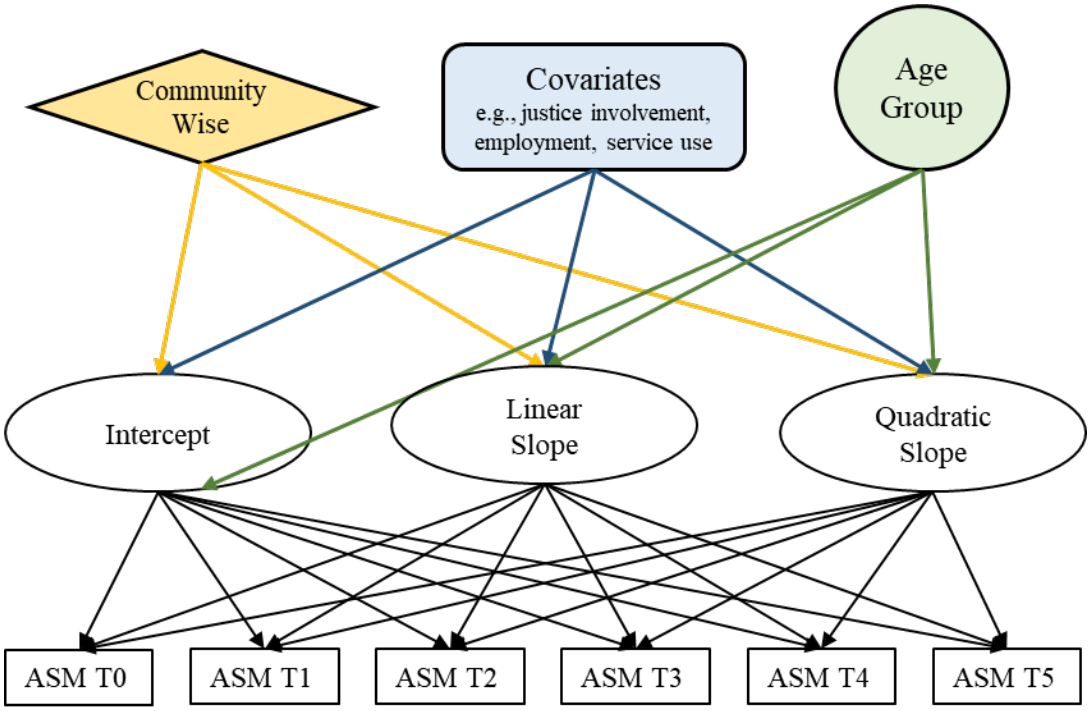
	MA (n = 454)	EA (n = 75)	Difference
Intercept	13.529 (*se* = 0.665))	16.511 (*se* = 1.651)	2.982 (*p* = 0.90)
Slope	-0.482 (*se* = 0.157)	-0.431 (*se* = 0.349)	0.051 (*p* = 0.893)
Residual variance I	88.366 (*se* = 13.387)		
Residual variance S	2.888 (*se* = 0.806)		

Figure 8 Mean level changes of ASM over time



Research question 2 results

Figure 9 Research question 2 statistical analysis conceptual model



As proposed, this study used a group-based modeling of development method described in work by Nagin and colleagues (Jones, Nagin, & Roeder, 2001; Nagin, 1999; Nagin & Land, 1993; Roeder, Lynch, & Nagin, 1999) to identify the developmental trajectories of ASM among EA who were assigned to the treatment group. By using finite mixtures of suitably defined probability distributions, the group-based approach for modeling developmental trajectories is intended to provide a flexible and easily applied method for identifying distinctive clusters of individual trajectories within the population and profiling the characteristics of individuals within these clusters. While the hierarchical and latent growth curves methodology models population variability in growth with multivariate continuous distribution functions, the group-based approach utilizes a multinomial modeling strategy. In group-based modeling analysis,

parameters are estimated by maximum likelihood technically making the analysis an example of a finite mixture model.

A key issue in the application of a group-based model is making a determination of how many groups define the best fitting model. Bayesian information criterion (BIC) score was used as a basis for selecting the optimal model. Kass and Raftery (1995) and Raftery (1995) indicated that BIC can be used for comparison of both nested and non-nested models under fairly general circumstances. Table 19 reports BIC scores for models with varying number of groups. Based on the BIC score, a five-groups trajectory model (*BIC* = -1835.12) was found to be the best fitting model.

Table 19 Using BIC to select the number of groups to include in the model

No. of groups	BIC (N = 378)	Change	BIC (N = 79)	Change	$e^{\text{BIC}i\text{-BIC}j}$	Jeffreys's scale of evidence for Bayes factors
2	-2234.56		-2229.08			
3	-2130.01	-104.55	-2121.40	-107.68	5.82	Moderate evidence for 3 groups
4	-1962.10	-167.91	-1950.36	-171.04	1.91	Weak evidence for 3 groups
5	-1849.90	-112.20	-1835.12	-115.24	1.11	**Weak evidence for 4 groups**
6	-1856.81	6.91	-1838.81	3.69	0.03	**Strong evidence for 5 groups**
7	-1830.33	-26.48	-1809.20	-29.61	7.24	Moderate evidence for 7 groups

If the best fitting model of five-group model is estimated with all trajectories quadratic, the predicted trajectories and group membership probabilities are virtually identical. Table 20 compares the (2,2,2,2,2) model (that is, five quadratic trajectories) with the (0,2,2,2,2) model (that is, one zero-order trajectory and three four quadratic trajectories) and the (0,0,1,2,1) model (that is, two zero-order trajectories, two linear trajectories and one quadratic trajectory).

Table 20 Comparing the model orders of ASM

		(22222) Model	(02222) Model	(00121) Model
BIC (N = 378)		-1849.99	-1962.51	-1898.66
BIC (N = 79)		-1835.12	-1949.21	-1888.48
Group membership %				
	1	4.87	5.06	5.06
	2	28.11	29.98	25.76
	3	20.83	28.30	10.83
	4	15.41	4.32	26.39
	5	30.79	32.34	31.96
Group membership *Sig.*				
	1	0.06	0.05	0.04
	2	0.00	0.00	0.00
	3	0.00	0.00	0.00
	4	0.00	0.10	0.00
	5	0.00	0.00	0.00
SE of Parameter				
	1	0.51 0.57 0.11	0.27	0.27
	2	0.07 0.06 0.01	0.07 0.07 0.01	0.04
	3	0.13 0.10 0.02	0.07 0.05 0.01	0.07 0.03
	4	0.07 0.10 0.02	0.12 29.65 29.64	0.07 0.05 0.00
	5	0.04 0.04 0.04	0.03 0.03 0.01	0.03 0.01
Sig. of Parameter				
	1	0.90 0.82 0.74	0.74	0.74
	2	0.00 0.00 0.00	0.00 0.27 0.13	0.00
	3	0.00 0.00 0.00	0.00 0.00 0.00	0.00 0.00
	4	0.00 0.00 0.00	0.00 0.97 0.98	0.00 0.00 0.00
	5	0.00 0.91 0.08	0.00 0.00 0.10	0.00 0.00

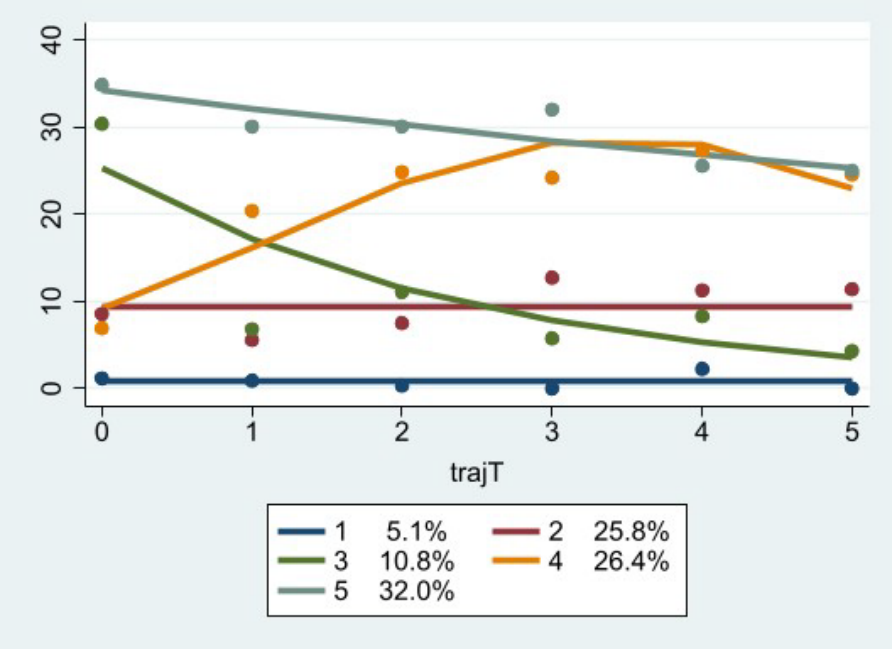
Following Jeffreys's scale of evidence, the improvement of BIC strongly favored the (0,0,1,2,1) model. Furthermore, model adequacy test results also supported the good fit for the selected model with such order. Table 21 reports the results of model adequacy test.

Table 21 Model adequacy test results

		95 %CI				
Group	$\widehat{P}_l$	lower	upper	$\hat{P}$	$Ave\ PP$	OCC
1	0.051	0.001	0.100	0.051	1.000	187609.696
2	0.266	0.165	0.366	0.266	0.963	72.298
3	0.114	0.041	0.187	0.114	0.930	103.041
4	0.253	0.151	0.355	0.253	0.999	2265.856
5	0.317	0.209	0.424	0.317	0.989	190.658

Figure 9 depicts the trajectories of the best fitting model (five-group model with 0,0,1,2,1 order). 5.1% of the EAs who were abstinent in the beginning of the treatment did not change at all over the 6 time points and stayed abstinent. 25.8% of the EAs were using at a low level and remained their quantity of usage with slight increase in their use. 10.8% of the EAs started by using a lot in the beginning and decreased their usage over time. 26.4% of the EAs started out by using low amount of alcohol and substances and gradually used more as time went by. Finally, the last group of EAs (32.0%) with the largest proportion started out using a lot and slowly and minimally decreased their amount of use over time.

Figure 10 ASM trajectory over 5 months for EAs



Although the results did not produce much statistically significant findings, it is worth mentioning that the group-based trajectory modeling also allows one to model the groups controlling for risk factors. Information generated from these modeling could be helpful during implementation stage of the intervention to increase effectiveness of the intervention. Thus, major confounding variables were added as risk factors into the model and included: Incarceration duration, income, criminality, marital status, supervision, mental health, and SUD treatment history. The results showed that none of these risk factors tested was statistically significant for developing the trajectories. This may be due to the small sample size of the EAs in the data to detect any statistically significant risk factors.

CHAPTER 5: DISCUSSION

This last chapter offers an interpretation of the results and integrates the study findings with current literature. This chapter will also discuss the strengths and the limitations of the study, the implications for theory, practice, and policy, and it will end with an overview of future research directions.

Effects of age groups on ASM treatment outcomes

The question of whether age group difference would impact ASM treatment outcomes over time was examined in this dissertation. The multi-group latent growth mixture model showed a good fit to the data but did not support the hypothesis that was generated using current literature. While the age group difference did not have a statistically significant influence on the ASM treatment outcome, there are some important points to highlight from this analysis. The intervention had a reduction effect on EAMMC's ASM with an intercept of 16.511 (*SE* = 1.651) and a slope of -0.431 (*SE* = 0.349) while mature adults' ASM had an intercept of 13.529 (*SE* = 0.665) and a slope of -0.482 (*SE* = 0.157). The intercept is 2.982 higher for the EAMMC compared to the EMMMC. Intercept denotes the ASM rate when the independent variable is at 0, meaning no intervention at all. This higher intercept value indicates the ASM severity was worse at the baseline for the EAs in the sample and warrants the suggestion of initiating treatment interventions for EAMMC. There was a clear age-effect of ASM in the study analytic sample where the ASM peaks at about age between 18-25 and starts to slowly decline after 30s mirroring the ASM prevalence literature presented in Chapter 2. This lower intercept of ASM in GMM model suggests that this sample echoed the general population trend of ASM where EAs have higher ASM rate.

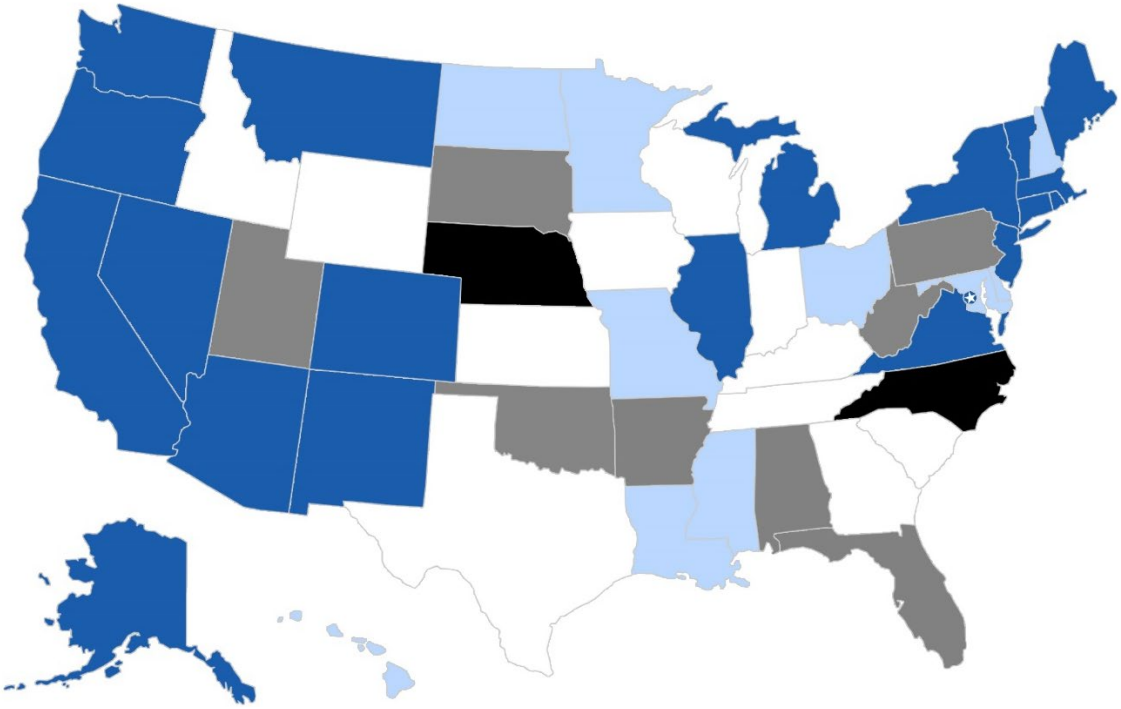
In terms of individual substances, at the baseline, MAs had higher rates for Alcohol, Cocaine, and Heroin use which were not statistically significant. On the other hand, the EA sample had much higher rates for Cannabis use with statistical significance and Opiate without statistical significance. These statistics are summarized in Table 22.

Table 22 Mean number of days substance used in the past 30 days stratified by age groups

Substance Used	Mean / ±SD	EA	MA	*p*
Alcohol use	9.98 (11.6)	7.71 (10.24)	10.33 (11.75)	.673
Cannabis use	5.63 (10.6)	**13.05 (12.90)**	**4.18 (9.14)**	**.001**
Cocaine use	4.45 (9.0)	1.47 (5.13)	5.01 (9.37)	.507
Heroin use	9.39 (12.8)	2.77 (8.00)	10.32 (13.11)	.093
Opiate use	1.13 (5.0)	2.91 (7.90)	.85 (4.38)	.010

Although the primary outcome used in this dissertation was ASM severity, these statistics for individual substances warrant our attention. The five substances included in the data source are very distinct in terms of their physical, psychological, and social consequences (NIDA, 2004). For example, alcohol is legal and has physical and psychological effects including distorted vision, hearing, and coordination, impaired judgment, altered perceptions and emotions, and liver damage. On the other hand, cocaine is illegal and associated risks include increases in blood pressure, heart rate, breathing rate, and body temperature, heart attacks, strokes, hepatitis or AIDS through shared needles, and violent, erratic, or paranoid behavior. Cannabis is now legal in some states and illegal in other states (See Figure 11).

Figure 11 Cannabis policy in the United States in 2022 (Source: Marijuana Policy Project)



Note: Dark blue – Legalized and regulated marijuana for adults 21+, Light blue – Medical cannabis law and have removed jail time for possessing small amount of cannabis, Black – Removed jail time for possessing small amount of cannabis, Gray – Medical cannabis laws

Cannabis use continued to rise among EAs in general over the past five years and remained at historically high levels in 2020, according to survey results from the 2020 Monitoring the Future (MTF) panel study (J. E. Schulenberg et al., 2021). This represents the highest levels of marijuana use recorded since the 1980s. Considering these statistics and evidence, future replicated studies are essential for examining separate substances as outcome to get more accurate and practical knowledge around ASU and treatment outcome for EAMMC.

Chapter 2 discussed literature showing that EAMMC are more likely to relapse and less likely to be abstinent due to several reasons. The literature identifies several possible factors explaining poorer treatment outcomes for EAMMC. Broome, Simpson, & Joe (2002) identified widespread SUD, mental health problems; involvement with the criminal legal system as

contributing factors to EAMMC poor treatment outcomes. EAMMC are more likely to be estranged from their families or have problematic family relationships and few positive adult connections on which to rely. These challenges were found to contribute to higher relapse rates (Kaskutas, Bond, & Humphreys, 2002). The literature on social network suggested that EAMMC social networks include higher numbers of individuals using ASM, which in turn increases the negative treatment outcome rates (Weisner, Matzger, & Kaskutas, 2003).

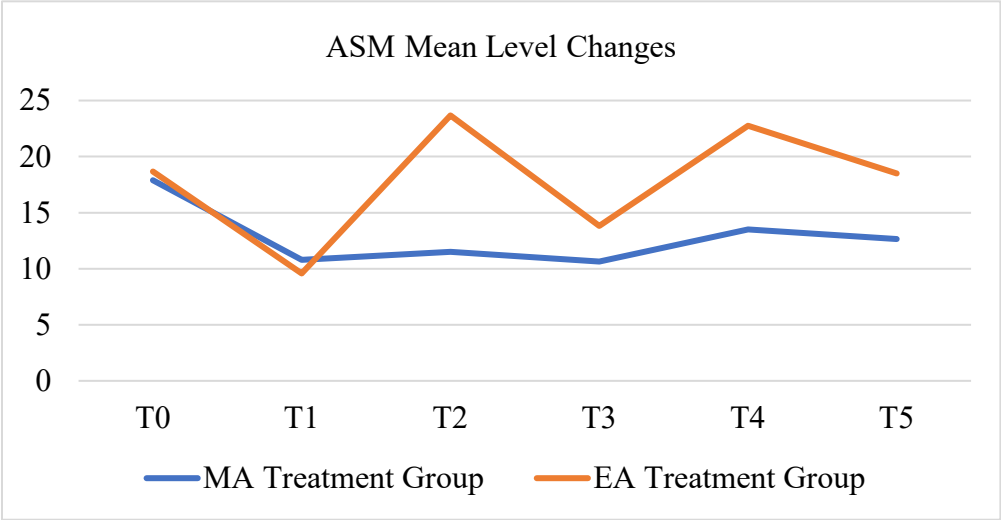
The results of this study differed from the current literature and found no statistical differences between EAMMC and MA in the longitudinal ASM treatment outcome. The difference for the model intercept was 2.982 (p = 0.90) with slope difference of 0.051 (p = 0.893). One possible explanation for this finding is the small EAMMC sample size. There were only 79 EAs in the sample and 75 EAs included in the GMM analysis as this model only used the participants who went through the intervention. There is not enough power to detect the group differences using GMM with this small sample size for the EAs. The participants were recruited for the purpose of answering the parent study and the power calculation for effect size was conducted for answering the optimization study research questions. We can only assume that this GMM result applies to this particular sample of EAs. Second, the analyzed sample had very low rates of intervention attendance that is discussed in detail in the limitation section. This population is a very hard population to reach and engage due to unstable housing, active substance misuse, transportation, unstable employment, reincarceration, and frequently changing phone numbers. While intent to treat is the mainstream analysis approach in intervention science, given the poor intervention engagement rates, this approach may be too conservative to detect intervention effects that end up being diluted by the participants who never attended the

intervention in the first place. Hence, future research must replicate this analysis with a larger sample.

Another possible explanation for this result is the unique mechanism of change *Community Wise* used to promote reduction in participants' ASM. *Community Wise* is an intervention that is grounded in critical consciousness theory and was developed to create change at the individual (thoughts and behaviors), meso (relationships and networks), and macro levels (community, policy, culture). From the SDH framework perspective, this type of treatment intervention targeting socio-structural factors at the macro level in addition to individual level factors would be effective for EAMMC in principle. In addition, this intervention used community-based participatory research (CBPR) principles in developing the research to maximize the effectiveness when applied to the particular community. While this argument should be considered with caution given the small sample size and low intervention engagement, this may be an indication that this type of multi-level intervention is a viable intervention framework for individuals living in marginalized communities. Future research seeking to enhance treatment engagement and testing the effectiveness of *Community Wise* in reducing ASM among EAMMC is warranted.

Analysis of change trajectories yielded results that can further elucidate the question about the moderation of age on *Community Wise*'s effect on ASM among EAMMC. A major difference between the two groups is the drastic fluctuations one sees in the EA line. You also see a bit of fluctuations in MA trajectory line as well after T1 indicating the greatest reduction in ASM for the MAs was during the 1 month right after starting the intervention. However, the slope is very gentle and shows very gradual slight increases and decreases throughout T2-T5.

Figure 12 ASM mean level changes for treatment group by age group



EAs' ASM mean level changes over time displays fluctuation in ASM with instability in the direction of the change. The instability in direction in particular differentiates the EA's trajectory from the MA's. This may be an indication of persistent barriers EAMMC face in trying to reduce their ASM. In particular, this dynamic ASM mean level changes among EAs throughout the five months follow up period implies two significant behavioral change process. First, *Community Wise* may not be enough to reduce the EAs' ASM uninterruptedly for a long periods of time. It is recommended that more analysis be done with the EAs within the sample to figure out the factors preventing them to keep their reduced ASM after their 1st month of starting the intervention. It may be the case that a booster session is necessary or assistance with a certain situation that prevent them from maintaining the reduced ASM such as stress management. Second, it is recommended that more follow ups that extends for a longer period of time be collected to examine the extended ASM level change for the EAs. ASM is a chronic disease and behavior change, especially persistent change, does not come easily. In addition, in considering the concept of critical consciousness that is being used as a mechanism of change in *Community*

Wise, it is not confirmed how long it takes for the learned critical consciousness to start to affect ASM. Critical consciousness theory not only explains how stigmatization and discrimination impact individual thinking and behavior in general, but also provides a tested strategy to combat the roots of social inequities (Pinto, Lee, Arthur, & Windsor, Under Review). However, there are no previous rigorously tested manuals based on critical consciousness theory to reduce ASM available to inform the process in which behavioral change related to ASM unfolds. For this reason, longer longitudinal data collection is suggested for future consideration.

Trajectories of CW effects on EAs

The group-based trajectory modeling analysis revealed five distinctive trajectories within EAs. The Group 1 and Group 2 may be the groups of individuals who are considered more stable with control of their ASM. They are the individuals who were abstinent in the beginning or use very little alcohol and substance and continued to stay steady with their abstinence or low usage over time. Group 3 is the group of individuals who started with using quite a bit and steadily decreased their usage over time. This is the most ideal group of intervention participants. Group 4 trajectory is both a bit concerning and represents the necessity for longer longitudinal data. It is concerning to see the trajectory for this group indicating consistent increase in their usage over the four months after intervention with a slight decrease from T4 to T5. Due to this change in direction of their outcomes over time, from increasing right after the intervention to decreasing later, Group 4 stands out from all other trajectory groups in terms of paucity. Over 26% of EAs followed this trajectory and is cautiously hypothesized that this may be due to the warming up period for the participants to get used to the intervention content. *Community Wise* is a group intervention that heavily relies on participation and their critical thinking process around the oppressive society and the SDH that contributes to their ASM. The contents discussed during the

intervention may trigger negative feelings such as anger, resentment, and bitterness as this population has high rates of trauma history, discrimination, and social stressors. And, as individuals with a history of SUD, they are inclined to use ASM as coping mechanism to process their negative feelings during the course of development of critical consciousness skills. However, additional follow up data and possibly data informing the reasons for their use could test this theory. Most EAs (32%) followed the Group 5 trajectory which shows steady and slight decrease in ASM over time. Similar to what was discussed for Group 4, longer follow up data may reveal vital information as to if this group of people would continue to decrease over long periods of time.

Study Strengths

This dissertation study had certain strengths that should be emphasized. First, the appropriateness of the data. The data used in this study was from a very recently completed community-based participatory research (CBPR) study applying multiphase optimization strategy (MOST) funded by the United States National Institutes on Minority Health and Health Disparities (NIMHD, R01MD010629). As asserted in the literature review chapter, there are very limited ASM treatment interventions tailored for EAs from marginalized communities and none specifically for EAMMC according to the literature search conducted for the purpose of this dissertation. *Community Wise*, an innovative multi-level, behavioral group intervention, addresses individual, social and community-level factors simultaneously from a foundation in critical consciousness theory, a well-established framework for mobilizing resistance to social inequalities. It is an appropriate type of ASM treatment intervention that is needed for EAMMC considering their determinants of ASM. ASM treatment interventions that take a comprehensive approach, emphasizing SDH specific to the population living in marginalized communities, can

challenge prejudices and strengthen social networks, which in turn can lead to higher levels of employment, housing and financial security, thus benefiting the community as a whole while reducing ASM (Andrews et al., 2012; Cashman et al., 2008; Parker et al., 2003; Wilson, Minkler, Dasho, Wallerstein, & Martin, 2008). Yet interventions often ignore or minimize environmental factors (Cashman et al., 2008; NIDA, 2018) such as racism, classism, and sexism that have been shown to impact ASM treatment outcomes and related health inequities (Dunlap & Johnson, 1992; Stuber, Galea, Ahern, Blaney, & Fuller, 2003; Wilson et al., 2008). The *Community Wise* Optimization clinical trial (ClinicalTrials.gov, NCT02951455) data used in this dissertation was the only rigorously tested, longitudinal intervention outcome data based on critical consciousness theory available to reduce ASM among adult men from marginalized community.

In addition to the uniqueness of this data source's fit with the dissertation research questions, novelty of the intervention tested, ethical and appropriate CBPR approach used, and cutting-edge MOST study design, I was privileged to personally be involved in the data collection and management process of the optimization parent study. I joined the *Community Wise* Optimization Study team (ClinicalTrials.gov, NCT02951455. Registered on 1 November 2016) in August 2016 as a graduate research assistant to lead the data collection instrument development in REDCap, data quality control, and data management until 2021, when the data collection completed. While the data analysis conducted for this dissertation was classified as secondary data analysis, in many ways, I had the understanding and knowledge about the data as if I was the primary data collector. Inherent to the nature of the secondary data analysis of existing data is that the researchers who are analyzing the data are not usually the same individuals as those involved in the data collection process. Therefore, they are probably unaware of study-specific nuances or glitches in the data collection process that may be

important to the interpretation of specific variables in the dataset. Likewise, the amount of documentation is daunting (particularly for complex, large-scale surveys like the parent study with over 2000 variables), so users may miss important details unless they are prominently presented in the documents (Cheng & Phillips, 2014). However, these prominent disadvantages of secondary data analysis were mitigated as the person who developed the online data collection instruments, conducted data quality control assessments, and managed the collected data was the same person as the person doing the data analysis for this dissertation. Variables were often times validated by triangulation with administrative data or parent study team field manager's assessments. Variables with more accurate and appropriate data were chosen to be used in the statistical analysis whenever multiple alternatives for a construct were present in the dataset.

The total sample size was large (N =602) with fairly large EA sample size (n = 79) for a pilot testing analyses. The outcome measures and most of the covariate variables used standardized measures in collecting the data making them valid and reliable. The analyses were informed by sound, rigorous theory and literature. Furthermore, advanced statistical analyses were used in testing hypotheses. Growth mixture modeling (GMM) combines the conventional Laird and Ware (Laird & Ware, 1982) random effects modeling with latent trajectory classes as in finite mixture modeling (McLachlan & Peel, 2000). GMM is a method for identifying multiple unobserved sub-populations, describing longitudinal change within each unobserved sub-population, and examining differences in change among unobserved subpopulations. Stated differently, GMM methods provide a framework for post-hoc identification and description of group differences in change. The first research question was answered using GMM with known class which is a constrained exploratory technique. It allowed the analysis to tell a story for two different age groups with longitudinal data that is limited by the specific bounds imposed during

model specification. Much was learned about possible patterns of ASM change that exist within the data. The second research question was answered by using a more special case of GMM that assume no interindividual differences in change within-class, often called latent class growth analysis (LCGA; cf. Nagin, 1999, 2005) or group-based modeling. Longitudinal data provides the empirical foundation for the analysis of developmental trajectories and using this rigorous modeling method utilized the data to the fullest extent. Standard growth curve methods are well suited for analyzing data that is reasonable to assume that most individuals experience a common process of growth or decline at different rates. However, the research question in this dissertation was to explore the large classes of ASM change phenomena for which the conception of a common growth process does not naturally fit. Using this statistical technique allowed this dissertation to answer how different trajectory groups within EAs differ in their response to the intervention.

Lastly, the major strength of this study is related to the timeliness in filling the gap in the literature around EAMMC ASM treatment outcomes. The results of this study are a direct extension of the clinical trial that tested a brand new ASM treatment intervention developed for marginalized communities. It is claimed by the principal investigators of *Community Wise* that this intervention contributes to the paradigm shift in ASM treatment intervention field by applying a new theory for mechanism of change. By examining whether or not and how this innovative ASM treatment intervention applies for EAMMC, sound bases for implementation science were swiftly provided.

Study Limitations

The study also had several limitations. This dissertation stems from analyzing a dataset that has already been collected. There are two general approaches for analyzing existing data: the

'research question-driven' approach and the 'data-driven' approach. This dissertation takes the research question-driven approach where the researcher had an a priori hypothesis for a question in mind and looked for suitable variables to address the question. The *Community Wise* Optimization parent study, which is the data source, selected for this dissertation had its own limitations that this dissertation had to embrace. Despite significant reductions in ASM using an intent-to-treat sample, intervention engagement was low. As summarized in Table 23, both EAs and MAs attended a little over 16% of the intervention that they were assigned to. Less than half attended one session and more than half never attended any session. Those who attended all first three sessions were about 11% of both groups. While this dissertation used intent-to-treat model in all statistical analyses, data with improved attendance would yield more accurate results.

Table 23 Intervention attendance rate stratified by age group.

	Total	Emerging Adults 18-29	Mature Adults 30+
Randomized into study	*N* = 602 (100.0%)	*n* =79 (13.12%)	*n* = 523 (86.88%)
Attendance Rates			
Portion of attended session	16.64%	16.03%	16.73%
Attended at least 1 session	254 (42.2%)	35 (44.3%)	219 (41.9%)
Never attended any session	348 (57.8%)	44 (55.7%)	304 (58.1%)
Attended all first 3 sessions	68 (11.3%)	9 (11.4%)	59 (11.3%)

The parent study involved a marginalized population that struggled to meet basic housing, nutrition, and safety needs making the participants hard to engage. The impact of capacity to change was not considered and motivation to change was only measured during the screening process which could be an important source of information to gage whether the EA participants had increased potential to change their behavior that was masked by different barriers that marginalized population commonly face.

Inherent to the nature of the secondary analyses of existing data, the parent study data was not collected to address the research questions in this particular dissertation nor to test the specific hypothesis. The sample sizes for age subgroups (EAs, $n = 79$ and MAs, $n = 523$) may not yield the most desirable power for statistical models being developed to answer research questions. Concerns regarding power are particularly important in research exploring interventions of medium or small effect sizes, and especially important in cases when these changes constitute potentially important effects (Prentice & Miller, 1992). While some of the models may be underpowered, the discussion section focused on describing the magnitudes and precisions of the findings and also the practical, theoretical, and clinical significance. Further, strategies to maximize power such as Bayesian statistics (Kadane, 2016; Kaplan, 2014) to incorporate prior information in the analysis and imputation techniques to make the full use of the data provided by each participant when some of the data cells or time points are missing (de Jong & Spiess, 2015; van Buuren, 2011) were used in consultation with two statisticians. One other accommodating factor that may be considered in terms of the data source is the fact that the investigator for this dissertation was involved in the data collection process from the beginning. While this can be an advantage as described in the previous section, there are ways in which this could have generate bias in conducting the study.

Lastly, the study only included male residents of Essex County, NJ. Generalizability will not be permitted using this dataset and warrants future replication with females and different geographical locations to expand the generalizability to different marginalized communities. Geographically speaking, other urban marginalized communities and rural marginalized communities should be studied and compared. Marginalized communities of various States and cities are also necessary.

Despite the limitations and challenges described, the unique purpose and perspective to promote social justice by addressing the lagging research around ASM treatment outcomes for EAMMC of this dissertation is much needed. The work from this dissertation will ultimately provide help to EAMMC in need of appropriate ASM treatments with respect to their inherent dignity and worth by contributing to the evidence base of the social work profession.

Implications

Theoretical implications

There were two major theories used in hypothesizing the research questions for this dissertation. First, Emerging Adulthood Theory was used. By attempting to explore EAMMC's ASM treatment outcomes offered insights concerning the theory's applicability to EAMMC. The results of this study provided evidence around whether Emerging Adulthood Theory has utilization promise among underprivileged EAs, men in particular. In Chapter 2, five domains of Emerging Adulthood Theory were reviewed with an intent to evaluate how each domain of the theory would function and apply for studying EAMMC treatment outcomes. According to the literature, it was concluded that: a. EAMMC are more likely to be committed and motivated as they are less likely to be in a diffused/avoidant style of identity exploration stage suggesting the possibility of better ASM treatment outcomes compared to EAMs from non-marginalized communities; b. EAMMC are more likely to be living in unstable life-style that may contribute to barriers in obtaining ASM treatment and good outcomes; c. EAMMC are less likely to be self-focused and experience greater social control leading to higher rates of ASM treatment initiation and engagement but worse treatment outcomes as they are less self-focused and may be less concerned about treating their ASM problem; d. EAMMC would not have much opportunity to feel in-between indicating the possibility of this population having better ASM treatment

outcomes; and e. EAMMC are more likely to be involved in ASM for self-meditation leading to worse ASM treatment outcomes.

While there were no measurements included in the parent study that can be used to explore individual differences in self-identification with the process of emerging adulthood, such as Inventory of the Dimensions of Emerging Adulthood (IDEA), literature around commonly shared characteristics of EAMMC was strong and consistent enough to be used to hypothesize how EAMMC would react to the *Community Wise* intervention. It was hypothesized that the EAMMC would have worse treatment outcomes according to two of the Emerging Adulthood Theory domains (i.e., The Age of Instability and The Age of Possibility) and better treatment outcomes according to three of the domains (i.e., The Age of Identity Explorations, The Self-Focused Age, and The Age of Feeling In-Between). The Table 24 summarizes the EAMMC treatment outcome hypothesized for each domain.

Table 24 General treatment outcome direction hypothesized for EAMMC using Emerging Adulthood Theory domains.

5 Domains of Emerging Adulthood	Treatment Outcome
The Age of Identity Explorations	Better
The Age of Instability	Worse
The Self-Focused Age	Better
The Age of Feeling In-Between	Better
The Age of Possibilities	Worse

The findings from this particular study did not support Emerging Adulthood Theory by Arnett as age group difference did not affect the ASM outcomes overtime. Using the existing literature on commonly shared characteristics of EAMMC to test the utility of this theory was

challenging and beyond the scope of this dissertation. However, the theory provided useful information during the hypotheses development process as a guiding tool to think about how different domains of this emerging theory would affect EAMMC. General treatment outcome direction hypothesized for EAMMC using Emerging Adulthood Theory domains may be tested in the future for theory validation for this particular population. Among five domains of the theory, the domain of *The Age of Instability* may warrant a particular discussion as to how they are measured and how they should be measured in the future for EAMMC. Recent studies, during the past two decades, have used Reiffman, Arnett, and Colwell's (2007) Inventory of Dimension of Emerging Adulthood (IDEA) to predict substance use. However, the negative/instability subscale on the IDEA measures perceived instability. For example, items are phrased as "Is this time of your life a time of instability?" and "a time of high pressure." EAs from marginalized communities experience trauma and economic hardships at a young age and in some ways normalize stressor related to instability described by Arnett. Future research using IDEA to measure emerging adulthood status should take this into consideration and pay close attention to how items within the inventory are phrased. Additional questions phrased appropriate for EAs from marginalized communities to measure the target domains are necessary.

While this theory is the most appropriate theory that has been developed to explain emerging adults, to date, only one study has investigated the dimensions of emerging adulthood and its association with substance misuse in a clinical sample (Smith, Bahar, Cleeland, and Davis, 2014). According to this study, none of the dimensions of emerging adulthood were associated with ASM frequencies. However, feeling in-between was positively associated with substance-related problems. Other non-clinical setting sample studies on emerging adulthood

dimensions produced mixed findings, with feeling in-between and other-focus being the most consistent correlates of substance misuse and treatment motivation (Allem et al., 2013; Goodman et al., 2015; Smith et al., 2014). In summary, although Arnett's theory is well known and his hypotheses about how the dimensions of emerging adulthood would increase substance misuse, additional research is needed to assess the utility of this theory on EAMMC treatment outcomes or EAs from marginalized communities as a whole.

Along with the Emerging Adulthood Theory, Social Determinants of Health Theory was considered in guiding this dissertation. To consider unique factors of EAMMC, the current dissertation integrated the literature on EAMMC and situate the concepts in the framework of SDH in evaluating ASM treatment outcomes. While the Emerging Adulthood Theory provides the ground to examine EAMMC on an individual level and developmental phase perspective by attending to the fact that EAMMC are in a particular biopsychosocial developmental stage, SDH perspective added a layer of socio-ecological level aspects in studying EAMMC's ASM treatment outcomes. Social factors identified by this body of literature in relation to ASM treatment outcomes were: deviant peers, living with individuals with ASM, social support, education, childbirth in family, and family conflict. Variables representing these concepts were identified from the dataset to be included as covariates in analyses but none of them turned out to be statistically significant risk factors in predicting ASM trajectories over time among EAs. It is recommended that these risk factors be tested again with a larger sample to ensure fully powered analysis.

Practice implications

This dissertation generated knowledge that leads to informing the promise and feasibility of an ASM treatment intervention, *Community Wise* for EAMMC. *Community Wise* explicitly

addresses concepts informed by SDH. While the etiology underpinning the inequities in ASM treatment outcome and consequences discussed throughout this dissertation for EAMMC is complex, the cause rests firmly in SDH (e.g. stigma, poverty) for EAMMC (Dunlap & Johnson, 1992; Wilson et al., 2008). Unfortunately, it was learned that evidence-based treatment interventions have not paid enough attention to how SDH affect distressed communities differently and discounted marginalized communities' experiential knowledge and their potential contributions to developing and testing interventions (Feldman, Silapaswan, Schaefer, & Schermele, 2014; Nuru-Jeter & LaVeist, 2011; Shoptaw et al., 2005). This dissertation indicated that there were no age differences in treatment outcomes between the EAs and MAs within the sample. In other words, developmental factors related to EAMMC did not make a difference in treatment outcomes. By confirming that the age-group is not a strong moderating factor for the relationship between the *Community Wise* and post-intervention ASM, evidence is established to support the claim that intervention targeting SDH (more specifically social determinants of ASM for men from marginalized communities) will likely be effective despite the adult participants' developmental stage.

Conversely speaking, it is possible to suggest the ASM treatment interventions that only target individual level factors (e.g. CBT, pharmacological therapy) may need to consider developmental factors identified by Emerging Adulthood Theory in order to effectively treat EAMMC. This is related to the fact that the developmental factors affecting ASM informed by Emerging Adulthood Theory are considered individual level factors. In addition, the evidence accumulated through this dissertation support that the interventions targeting exclusively individual factors may not work as effectively for EAMMC. Socio-environmental factors that strongly dictate EAMMC's ASM treatment outcomes despite their individual willingness and/or

readiness to change their ASM behaviors are speculated as explanations. In syntheses with the reviewed literature around EAMMC's commonly shared characteristics from Chapter 2, ASM for EAMMC may be a distorted symptom of extreme marginalization that this population experience by the oppressive societal structure and environment that they live in. ASM for the EAM from non-marginalized communities, on the other hand, ASM appears to be the coping mechanism for their developmental struggle in transitioning to adulthood. Therefore, ASM treatment interventions should target the appropriate corresponding root causes of ASM. Social workers and health care workers providing ASM treatments to EAMMC should not assume individual level ASM treatment will be functioning the same way it changes EAM's ASM behaviors from non-marginalized communities. Culture of addressing SDH affecting clients' ASM simultaneously when working with EAMMC needs to be established.

Additional practical implications are informed by the group-based trajectory modeling analysis. Post-intervention trajectory modeling and analyses informed appropriate follow up treatment for this population. Using the trajectory of Group 4 in particular, it may be necessary to provide counseling sessions or booster sessions to check how EAMMC participants feel about the intervention after a moth. If it occurs the participant is using more as mechanism to cope with lingering negative feelings from the intervention or contemplations they may go through, appropriate follow up intervention should be provided.

Policy implications

This section will offer some recommendations for federal, state, and local administrations and nongovernmental organizations that fund programs serving EAMMC or research affecting the ASU treatment of this population. The most important foundation that is currently needed is to differentiate EAs from adolescents and MAs whenever permitted by law and

programmatically appropriate to continue conducting exploratory studies examining the mediators and moderators for relationship between ASU treatment interventions and EAs. Modifying the reporting of data to identify EAs (aged 18-29) as a distinct age group in all reports, evaluations, and open data systems in which they are included will allow continued studies looking for risk- protective- factors for successful treatment outcomes for EAs. Much of literature reviewed around ASM and health inequity did not distinguish the sample used by age groups. Samples were usually amalgamated and classified as adults. Modifying the reporting of data to identify EAs as a distinct age group will enhance new or existing surveys or experimental research focused on adults to advance knowledge regarding the health and wellbeing of EAs.

In addition, ASM treatment interventions and services provided to EAMMC should be ensured that they are socially and culturally appropriate. It is recognized that general adult services may sometimes be appropriate. However, modifications to existing interventions and services or entirely new approaches may be needed considering strong socioeconomic factors that influence capacity to change behaviors for individuals from marginalized communities. Engaging individuals from diverse marginalized communities in designing and implementing programs and services using community engaged approach is advised. Establishing workforce training for ASM treatment services providers to develop the skills and knowledge needed to work with EAMMC, their families, and their communities may also help.

Developing, implementing, and evaluating systematic policy and program experiments to help identify the most effective approaches to improving the prospects of EAMMC is critical to achieve equitable society. The current lack of a comprehensive view on EAMMC population limits the development of policies and programs intended to reduce their marginalization. Gaining better knowledge of how EAMMC fare is complicated by the fact that the character of

their marginalization often changes over time, and many subpopulations make up a very small portion of the overall population of EAMMC. For example, EAMMC move into and out of the foster care and corrections systems, and these systems generally collect little or no information about what happens when EAMMC are outside these systems. Integration of information across systems serving EAMMC over time can provide a more complex, longitudinal perspective on their health and well-being. It is recommended that federal and state government agencies (i.e., Departments of Health and Human Services, Labor, Justice, Housing and Urban Development, and Education) as well as corresponding state agencies incorporate a greater focus on EAMMC in ongoing and new population-based, longitudinal studies of young adults. Federal and state governments also should continue encouraging programs that serve EAMMC to make better use of administrative data for describing the overlap of populations across service systems and EAMMC's trajectories into and out of these systems, and for evaluating policies and programs affecting EAMMC's ASM.

Policies and programs aimed at treating ASM are fragmented and have narrow and idiosyncratic eligibility criteria that pose additional barriers for EAMMC getting the help they need. These obstacles frequently create lapses in the support that EAMMC need, and too often are stigmatizing. Major entitlement programs intended to help vulnerable populations provide limited support for EAMMC, and discretionary programs targeting these populations often fall far short of meeting evident basic need for this population to concentrate in treating their ASM. It is recommended that Congress and the executive branch amend federal laws and regulations to allow for more flexible and efficient eligibility determination and service provision across marginalized populations. In funding evaluations of programs for marginalized populations, the federal government and philanthropic funders should emphasize evaluation of programs aimed at

improving ASM treatment outcomes across multiple marginalized populations while remaining sensitive to differences across subpopulations.

Lastly, grounded in SDH framework, it is recommended the laws and regulations to create accountability for achieving improvement on a limited set of key outcomes be reconsidered for marginalized populations. Outcomes should broadly include employment, education, housing stability, safety, health, connections to responsible adults, and effective parenting.

Future research

There are number of different explanations for EAMMC's ASM behaviors that were not covered under the two theories used in this dissertation (i.e., religiosity, peers, parental use and parental disapproval, and many more). Within the little research done on EAMMC ASM and ASM treatment outcomes, research has produced mixed findings on Arnett's hypotheses about the developmental features of emerging adulthood that are associated with ASM. As no single theory is likely to account for all ASM within this developmental period for men living in marginalized communities, the next generation of research should continue to explore the complex interplay of processes occurring both before and during emerging adulthood for this particular population.

ASM among marginalized populations has historically been constructed as a social problem to be managed, cured, and eliminated. Much social science research concerning drug use among marginalized populations focuses on risks and harms, with little attention to positive aspects of substance use, meaning of substance misuse, purpose of substance misuse, and root causes of substance misuse. As generation shifts and society evolves, much research exploring

these significant aspects of ASM among EAMMC should be conducted in a timely manner. Otherwise, the health inequity around ASM will continue to expand.

Conclusion

The primary mission of the social work profession as set forth by the National Association of Social Workers (NASW) is to enhance human well-being and help meet the basic human needs of all people by empowering people who are vulnerable, oppressed, and living in poverty. This mission is rooted in a set of core values: *service, social justice, dignity and worth of the person, importance of human relationships, integrity, and competence*. These core values are the foundation of this dissertation's unique purpose and perspective to promote social justice. The focus of this dissertation is on individual well-being in a social context (i.e., marginalized communities). Fundamental to the work was attention to the environmental forces that create, contribute to, and address problems in ASM among EAMMC. Therefore, the work from this dissertation will ultimately provide help to EAMMC in need of appropriate ASM treatments with respect to their inherent dignity and worth by contributing to the knowledge base of the social work profession.

Despite extensive challenges, some EAMMC ultimately fare very well as adults, and their hopes and aspirations are similar to those of young people who have not been marginalized. Young adults are resilient and adaptable, and many make remarkable accomplishments, demonstrating an extraordinary capacity for creative insight and innovation. At the same time, however, too many EAMMC are struggling with their ASM bearing disproportionately harsher consequences. Healthy, productive, and skilled young adults are critical to the nation's workforce, global competitiveness, public safety, and national security. This dissertation

emphasizes the need to provide appropriate ASM treatment that will promote independence and productivity for EAMMC.

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