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Stigma, Treatment, and Health among Stimulant Users: Life Stage as a Moderator

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Abstract

This 3-year study examined associations among drug use stigma, life stage, treatment utilization and health among 710 US adults using stimulants. Consistent with substance use developmental frameworks, life stage was represented by Emerging adulthood (18-25 years old; n=223), Early/mid adulthood (26-44 years old; n=384), and Older adulthood (45-61 years old; n=103). Emerging adults experienced less enacted stigma (i.e., experiences of discrimination) and perceived less public stigma (i.e., unjust treatment) over the course of the study than other life stage groups. More baseline enacted stigma was associated with more mental health and substance use treatment, whereas more baseline self stigma (i.e., negative thoughts about the self) was associated with less treatment utilization. Life stage moderated stigma-outcome associations such that substance use outcomes were worse for Emerging adults reporting more enacted stigma. Although emerging adults experienced less drug use stigma, stigma had a more negative impact on adults in this life stage.

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Conflict of Interest: None.

Study approval was obtained from the Institutional Review Boards at the investigators' institutions. All participants provided informed consent. A certificate of confidentiality was obtained from the National Institute on Drug Abuse.

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Keywords

stimulant use; emerging adulthood; older adulthood; health outcomes; treatment utilization

The etiology and progression of substance use may be best understood through a life course or developmental perspective (Hser, Hamilton, & Niv, 2009). The first use of illicit drugs such as stimulants (cocaine, methamphetamine) typically coincides with the developmental period of emerging adulthood (Liang, Huang, Brecht, & Hser, 2010). Research that takes a developmental approach to substance use recognizes that patterns and consequences of stimulant use may change throughout adult development (McLarnen, Barrett, Monaghan, & Stewart, 2012; Schulte & Hser, 2014). A developmental approach to understanding substance use incorporates age-related changes in physical and mental health, as well as consideration of the developmental processes associated with each life stage that may increase or decrease risk for substance use (Arnett, 2005; Schulte & Hser, 2014).

In a sample of adults using stimulants at baseline, the current 3-year study examined how stigma related to drug use may vary by life stage and be associated with less treatment utilization and poorer health outcomes. We also asked whether life stage interacts with stigma to predict treatment utilization and health outcomes.

Lifespan Approach to Substance Use

The prevalence of drug use is highest during Emerging adulthood, as drug use is potentially related to features that characterize this developmental period, such as identity exploration and instability (Arnett, 2005; Substance Abuse and Mental Health Services Administration [SAMHSA], 2014). As individuals age into Early-mid adulthood, career and family obligations tend to curtail substance use (Merline, O'Malley, Schulenberg, Bachman, & Johnston, 2004). As individuals move into Older adulthood, illicit drug use tends to decline even further, potentially due to health concerns (Mattson, Lipari, Hays, & Van Horn, 2017). However, substance use problems among older adults are increasing due to aging of the baby boom generation, who may have more liberal attitudes toward substance use (Mattson et al., 2017).

In light of the changing patterns of drug use across the lifespan, the current study takes a developmental approach by examining the role of drug use stigma on health and treatment utilization outcomes across three life stages. We focused on stimulant use due to developmental substance use research suggesting that stimulant users demonstrate more erratic patterns of drug use across a 20-year follow-up, with frequent shifts between abstinence, treatment, and regular use (Nosyk et al., 2014). This suggests that stimulant users may continue to experience drug use stigma and subsequent health problems across the adult lifespan due to frequently changing use patterns.

Drug Use Stigma

Broadly, stigma refers to a process of dehumanizing individuals who belong to specific social categories (Goffman, 1963). Four types of stigma identified (Kulesza, Larimer, &

Rao, 2013; Luoma et al., 2007) include *enacted stigma*, which is the direct experience of discrimination; *self stigma*, defined as negative thoughts about the self, based on membership in a specific group; *perceived stigma*, which refers to an individual reporting that most of the public believes the negative stereotypes about their specific group; and *public stigma*, which is negative views held by the public toward a specific group, often leading to discrimination against individuals belonging to that group. In the current study, these four types of stigma are examined within the context of drug use. Overall, drug use stigma is the devaluing and penalizing of people who use substances (Smith, Earnshaw, Copenhaver, & Cunningham, 2016).

Health care professionals tend to stigmatize individuals who use illicit drugs (van Boekel, Brouwers, van Weeghel, & Garretsen, 2013), even more so than individuals with other types of mental health diagnoses (Harnish et al., 2016; Rao et al., 2009). Providers report that caring for individuals who use substances is complex, stressful, and not particularly rewarding (Deans & Soar, 2005). Additionally, these individuals are perceived as rude, manipulative, aggressive, and poorly motivated (McGillon et al., 2000).

Stigma has been examined less frequently in relation to drug use than in relation to other mental health and medical conditions such as depression and HIV/AIDS (Livingston & Boyd, 2010; Stangl et al., 2013). Nonetheless, research on public stigma has documented the negative attitudes the public holds towards people who use drugs (Olsen & Sarfstein, 2014). In addition, individuals receiving residential and outpatient addiction treatment reported high levels of enacted stigma, self stigma, and perceived stigma (Luoma et al., 2007). Participants with more prior treatment episodes for substance use reported more stigma-related rejection than participants with fewer prior treatment episodes, and intravenous drug users reported more perceived stigma than participants who did not inject drugs (Luoma et al., 2007). A review of substance use-related stigma found that women who used drugs reported more shame related to their drug use than men did (Kulesza, Larimer, and Rao, 2013). This review also found that stigma was higher among African-American, Latino, and Asian individuals who used drugs than among Caucasian adults.

Stigma and Life Stage

There is limited research comparing life stage-related differences in overall levels of stigma related to drug use. Adults with stigmatizing medical conditions (e.g., HIV/AIDS) may have worse health outcomes when they are older, not only because of aging per se, but also because older adults are subject to both the stigma of aging and the stigma of these health conditions, whereas younger adults do not have to also manage the stigma of aging (Emlet, 2006; Grov, Golub, Parsons, Brennan, & Karpiak, 2010). Still unclear is the extent to which drug use stigma varies by life stage and whether drug use stigma has a different impact on outcomes depending on life stage.

Two theories speak to the role of life stage as a moderator of the association between stigma and health outcomes. The double jeopardy hypothesis suggests that older adults have worse health and other outcomes in the face of high levels of stigma because multiple types of stigma related to age, sex, race, and other identities are compounded (Ferraro & Farmer,

1996a; Ferraro & Farmer, 1996b). Typically this theory has been applied to older adults who belong to a racial or ethnic minority group, though the general assumption is that being older and part of any minority group (for example, people who use substances) creates a double disadvantage for health and other outcomes (Carreon & Noymer, 2011; Goldberg et al., 2017; Song, 2017). In the context of the current study, the double jeopardy hypothesis suggests that older adults who use substances experience higher levels of stigma due to drug use than younger adults do, and worse health outcomes despite comparable treatment utilization.

The double jeopardy hypothesis stands in contrast to the “age-as-leveler” hypothesis (Dupre, 2007; Ferraro & Farmer, 1996a; Hoffman, 2011). The latter suggests that health differences due to membership in any minority group (e.g., substance use, racial/ethnic minority) become less pronounced as age increases.. This is attributed to biological processes exerting more influence than social processes on health in older age. Therefore, stigma may have more negative impact on younger than older adults and may therefore influence the health of younger adults to a greater extent (Brown, O’Rand, & Adkins, 2012; Ferraro & Farmer, 1996a; Hu, Leinonen, Myrskylä, & Martikainen, 2018). In the context of the current study, the age-as-leveler hypothesis suggests that older, substance-using adults experience less overall stigma due to drug use than younger adults, and similar health outcomes.

Stigma, Treatment Utilization, and Health Outcomes

A significant body of research suggests that stigmatizing conditions are associated with poor health (Hatzenbuehler, O’Cleirigh, Mayer, Mimiaga, & Safren, 2011; Hatzenbuehler, Phelan, & Link, 2013; Link, Phelan, & Sullivan, 2018). Stigma exerts its influence by leading to social isolation, stress, and poor mental health (Hatzenberger et al., 2013). Findings are mixed on the extent to which stigma is associated with treatment utilization and health outcomes among individuals who use illicit drugs. A review found that *enacted stigma* (i.e., perceived discrimination from healthcare professionals) was associated with lower likelihood of completing substance use treatment (van Boekel et al., 2016). In contrast, among methamphetamine users, those in drug treatment reported more experiences of rejection than those not in treatment, suggesting that the experience of enacted stigma may propel some individuals into treatment (Semple, Grant, and Patterson, 2005). Consistent with the latter findings, among participants in a residential addiction treatment, more *self stigma* was associated with a longer length of stay (Luoma et al., 2014); thus, high levels of self stigma may lead individuals to retreat into protected settings, such as residential care, to avoid interactions with family and friends in the community (Luoma et al., 2014). Taken together, these studies suggest that different types of stigma operate differently on health care utilization.

Among HIV+ individuals injecting drugs, drug use stigma (self stigma and perceived stigma) was associated with poorer health outcomes, including more depressive symptoms, poorer self-reported health, and more physical health symptoms (Burke et al., 2015). Similarly, in samples of college students and jail inmates, higher levels of *self stigma* were associated with higher levels of alcohol use severity, drug use frequency, and drug-related problems (Dearing, Stuewig, and Tangney, 2005). Among illicit drug users, *enacted stigma*

was associated with poorer physical and mental health; and *perceived stigma* was associated with poorer mental but not physical health (Ahern, Stuber, and Galea, 2007). Together, these studies suggest that physical and mental health are poorer among individuals who experience high levels of drug use stigma. This may lead to greater treatment utilization among those reporting high levels of drug use stigma.

Current Study

The current study followed stimulant-using adults over three years. It focused on adults using stimulants because patterns of use across adulthood tend to be more erratic than other types of drugs (Nosyk et al., 2014). The goals of the study were to apply a lifespan perspective to examine the extent to which (1) four types of drug use stigma, assessed at baseline, varied by life stage and over time, (2) the four types of drug use stigma, at baseline, were associated with subsequent treatment utilization and physical and mental health outcomes over the course of the study, and (3) life stage moderated associations between each type of drug use stigma and treatment utilization and health outcomes. To our knowledge, this is the first study to examine whether different types of drug use stigma (enacted, public, self, or perceived) vary by life stage, and whether life stage moderates stigma-outcome associations. The study's time frame of three years allowed for observations of changes in outcomes while also limiting attrition due to difficulty following up with this population.

The conflicting literature on stigma across the lifespan precluded us from forming specific hypotheses for study goals 1 and 3. Regarding goal 2, the literature on stigma for other types of conditions suggested the hypothesis that drug use stigma would be associated with poorer physical and mental health (Ahern, Stuber, and Galea, 2007; Burke et al., 2015), and that different types of stigma would differentially impact treatment utilization (van Boekel et al., 2016; Luoma et al., 2014). Specifically, less enacted stigma, and more self stigma, may lead to more treatment utilization; however, these hypotheses were tentative because the studies on which they were based were few in number and focused on different populations from that of the present study.

Method

Participants

The current study analyzed data from a study of 710 adults using stimulants at baseline and followed for three years. The primary study was designed to examine psychosocial characteristics of users of methamphetamine and cocaine, such as determinants of types and amounts of health care utilization (Borders, Booth, & Curran, 2015). Participants' demographic characteristics at baseline are presented in Table 1, both for the full sample and by each life stage group. In order to be eligible for the study, participants had to report using stimulants (methamphetamine, crack cocaine, and/or powder cocaine) within the past 30 days, and not receiving any substance use treatment or attending any mutual-help groups in the past 30 days. Participants were also required to be 18 years of age or older, and have a verifiable address within one of the study counties.

Procedure

Study procedures were approved by the Institutional Review Boards at the investigators' universities. A Certificate of Confidentiality was obtained from the National Institute on Drug Abuse. Participants were recruited using Respondent-Driven Sampling, a type of snowball sampling (Heckathorn 1997; Wang, Carlson, Falck, Siegal, & Rahman 2005). In order to identify potential participants, study staff met with drug treatment providers in the local area, distributed research study business cards to individuals who might know drug users, and visited places such as bars frequented by drug users (Draus, Siegal, Carlson, Falck, & Wang 2005). Participants were asked to complete a baseline interview and hand out information about the study to up to three people they knew who used drugs. Each participant received \$10 for up to three referred individuals who contacted the study coordinator and were eligible for, and enrolled in, the study. Participants were paid \$50 for each completed study session.

Participants completed informed consent prior to the baseline interview. Follow-up interviews were conducted every six months for a total of 36 months. All interviews were conducted in-person or over the phone by trained study staff using computer-assisted personal interview software on a laptop computer. Table 2 indicates the retention rates for each follow-up interview; 73% of the initial sample completed all interviews. Extensive attrition analyses that compared pairs of interviews to identify potential biases in the follow-up data found that attrition at later interviews had small associations with being white, younger, and of higher income.

Measures

Demographic information.—Demographic information was collected at baseline and updated at each follow-up interview so that study staff had current information for locating the participant for the next follow-up interview.

Drug use stigma.—Each type of stigma associated with drug use was assessed at baseline and each follow-up with a modified version of Link et al.'s (1997) scale assessing stigma associated with mental illness. We used four subscales previously established by factor analysis on a subset of the sample used in the current study (Borders, Booth, & Curran, 2015): (1) Enacted stigma, i.e., experience of rejection or discrimination due to drug use; the count of five yes/no items (e.g., "Have people treated you unfairly because they knew you were a drug user?"); (2) Self stigma, i.e., secrecy and shame due to drug use; the count of four yes/no items (e.g., "Do you wait until you know a person well before you tell them about your problems with drugs?"); (3) Perceived stigma, i.e., reduction or underestimation of worth due to drug use; the mean of two items rated from 1=strongly disagree to 5=strongly agree (e.g., "Most people believe that drug users cannot be trusted."); and (4) Public stigma, i.e., perception of unjust treatment due to drug use; the mean of two items rated from 1=strongly disagree to 5=strongly agree (e.g., "Most people look down on people who have been in treatment for drug problems."). Baseline and follow-up values of the four stigma subscales are presented in Table 2.

Physical health status.—Physical and mental health status, substance use severity, and treatment utilization were assessed with the University of Arkansas for Medical Sciences-Substance Abuse Outcomes Module (UAMS-SAOM), on which indices have been shown to have diagnostic accuracy and be valid (concurrently and predictively), internally consistent, reliable, and sensitive to clinical change (Borders, Booth, Stewart, Cheney, & Curran, 2015; Borders, Booth, & Curran, 2015; Smith et al., 2006). The UAMS-SAOM contains portions of the Addiction Severity Index (ASI; McLellan, Luborsky, O'Brien, & Woody, 1980), which has also been demonstrated as valid, internally consistent, and reliable (Denis et al., 2016; Feelemyer, Des Jarlais, Arasteh, Phillips, & Hagan, 2014), and the valid and reliable Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001).

Regarding physical health, four variables, all collected at baseline and each follow-up, were combined to create an index (baseline values are presented in Table 3): (1) the total number endorsed of 29 possible medical conditions that participants reported they had been told by a doctor that they had (e.g., back problems, diabetes); (2) the mean number of self-reported diagnosed physical ailments, from 0 to 5, over the course of the past six months (open ended responses; e.g., migraine, strep throat); (3) the mean seriousness of the diagnosed physical ailments (0=not serious at all to 4=extremely serious); and (4) the medical severity composite score from the ASI, which ranged on a continuous scale from 0 to 1 with higher scores indicating greater severity.

Mental health status.—Four variables were combined to create an index of mental health status (baseline values are presented in Table 3): (1) the mean number (0-5) of self-reported emotional problems experienced in the past six months (e.g., anger, depression); (2) the mean seriousness of the reported emotional problems (0=not serious at all to 4=extremely serious); (3) the psychiatric composite score of the ASI, which ranged on a continuous scale from 0 to 1 with higher scores indicating greater severity; and (4) total score (0-27) on the nine-item PHQ-9.

Substance use severity.—Four variables were combined to create an index of substance use severity (baseline values are presented in Table 3): how many days in the past 30 days the participant had (1) used alcohol (from the ASI alcohol subscale) and (2) each of 17 drugs (e.g., crack cocaine, heroin; from the ASI drug subscale); (3) met criteria for an alcohol use disorder in the past 12 months (at the baseline interview) or six months (at the follow-up interviews), scored as yes/no and based on UAMS-SAOM items mapped to DSM criteria; (4) a count (0-4) of how many other drugs for which the participant met criteria for disorders in the past 12 months (at the baseline interview) or six months (at the follow-up interviews; scored yes/no), based on UAMS-SAOM questions mapped to DSM criteria (Smith et al., 2006).

Treatment utilization.—Three types of treatment utilization were examined with the UAMS-SAOM measure (Smith et al., 2006). Medical treatment utilization included three variables: (1) number of hospitalizations (0-5) in the past three years (at baseline) or six months (at follow-ups); (2) number of days for each hospitalization; and (3) number of outpatient visits (0-6) in the past year (baseline) or six months (follow-ups) (baseline values are presented in Table 3). Treatment utilization for substance use disorders was assessed

with one question on the number of weeks spent in a substance use treatment program in the past three years (baseline) or six months (follow-ups) for each of up to five treatment episodes (the mean was taken for number of weeks across the treatment episodes; Moos, 2003). Treatment utilization for mental health problems was assessed with one question on number of treatment episodes (up to 5) for emotional problems in the last three years (baseline interview) or six months (follow-ups).

Analysis Plan

The primary independent variables were life stage at baseline and the four subscales of the drug use stigma scale (enacted stigma, self stigma, perceived stigma, and public stigma). Life stages were Emerging adulthood (18-25 years old, $n=223$; Arnett, 2000), Early-mid adulthood (26 to 44 years old; $n=384$), and Older adulthood (45-61 years old; $n=103$). Although the emerging adult group was in the traditional age range of 18 to 25 (Arnett, 2000), we used non-traditional age groups for early-mid adults (26-44) and older adults (45+). These age ranges were used due to the higher mortality rates of drug users such that many do not live into “true” older adulthood as a function of the negative effects of substance use and the lifestyle associated with illicit drug use (Hser, Hoffinan, Grella, & Anglin, 2001). Additionally, prior research has defined older drug users as over age 45 (e.g., Boeri & Tyndall, 2012).

The dependent variables were health care utilization (hospital, substance use, mental health), and health outcomes (physical, mental, substance use). Each dependent variable was computed by converting the variables it included to z-scores and then taking the mean of the z-scores (Table 2). This approach to creating composites has been used in other studies with the current cohort (Woodhead et al., in press).

To examine whether drug use stigma varied by life stage, we conducted two types of analyses. First, one-way analysis of variance was used to examine differences among the life stage groups on the four stigma subscales at baseline. Planned contrasts with a Bonferroni correction were used to examine differences between life stage groups. Second, generalizing estimating equations (GEEs) were used to examine associations between life stage group at baseline and the four stigma subscales, statistically adjusting for race and sex. Next we examined whether drug use stigma was associated with treatment utilization and health outcomes, and whether life stage moderated stigma-utilization and stigma-health associations. To address this question, GEEs were conducted with the independent variables of life stage, stigma subscales, and time. Dependent variables were treatment utilization and health outcomes. Interactions of life stage group with the stigma subscales were included if they were statistically significant.

GEE was used because it provides population-averaged effects, rather than participant-specific effects in random-effects models. GEEs are based on generalized linear models and account for the non-independent nature of repeated observations in longitudinal studies by specifying a correlation structure. For the current study, an autoregressive correlation structure was specified, which assumes that measurements are less correlated the farther apart they are in time. The models included a continuous time variable that specified when each data point was collected; specifically, time was operationalized as 1 to 7, corresponding

to the baseline interview and each of the 6 follow-ups, respectively. When time was a significant predictor in the GEE model, this indicated that the dependent variable (outcome) changed significantly during the course of the study from baseline to the 3-year follow-up. SPSS was used for all analyses.

Results

Life Stage Differences in Stigma at Baseline

At baseline, there were significant differences among the three age groups on the four subscales of the stigma scale (Table 4). Early-mid adults experienced significantly more enacted stigma due to drug use than Emerging adults. Emerging adults reported significantly more self stigma around drug use than Early-mid and Older adults. Early-mid adults reported significantly higher levels of public stigma due to drug use than Emerging adults. There were no differences among the life stage groups on the baseline report of perceived stigma due to drug use.

Life Stage and Stigma over Time

Table 5 shows results for GEEs conducted for the four stigma subscales. Enacted stigma due to drug use decreased over the course of the study. Emerging adults reported less enacted stigma than Older adults. In addition, white participants reported fewer experiences of enacted stigma due to drug use than nonwhite participants.

Self stigma related to drug use also decreased over the course of the study. However, life stage was not significantly associated with self stigma related to drug use. White participants and men reported more self stigma related to drug use than nonwhite participants and women.

Perceived stigma due to drug use decreased over the course of the study; life stage, sex, and race were not significantly associated with this type of drug use related stigma. Levels of public stigma due to drug use also did not change during the course of the study. Emerging adults reported lower levels of public stigma due to drug use than Older adults. White participants reported lower levels of public stigma due to drug use than nonwhite participants.

Life Stage as a Moderator of the Association Between Stigma and Outcomes

Table 6 shows results for the GEE analyses conducted for the outcomes of treatment utilization and health. For the outcome of *physical health*, time was a significant predictor, indicating that participants' physical health improved over the course of the study. Older adults reported poorer health than Emerging and Early-mid adults. Participants who reported more enacted stigma due to drug use and more self stigma around drug use reported poorer health over the course of the study. There were no significant interactions with life stage.

For *mental health* time was a significant predictor, indicating that participants improved in mental health over the course of the study. Participants who reported more enacted stigma due to drug use, more self stigma around drug use, and higher levels of perceived stigma

around drug use reported poorer mental health over the course of the study. There was no main effect of life stage on mental health or significant interactions with life stage.

We did not observe a statistically significant change in the outcome of *substance use severity* over the course of the study. Participants who reported more enacted stigma due to drug use and more self stigma around drug use at baseline reported more severe substance use problems over the course of the study. Significant interactions between life stage and enacted stigma, and between life stage and perceived stigma, revealed that substance use outcomes were worse for Emerging adults who reported more enacted stigma due to drug use ($p < .001$) and more perceived stigma due to drug use ($p < .02$). These interactions were not significant for Early-mid or Older adults.

There were no statistically significant changes in the outcomes of *medical, mental health, and substance use treatment utilization* over the course of the study. For the outcome of *medical treatment utilization*, a main effect of life stage indicated that Older adults used more hospital services than Emerging adults. There were no significant main effects for the stigma variables, or significant interactions with life stage. For the outcomes of *mental health* and *substance use treatment utilization*, participants who reported more enacted stigma due to drug use at baseline also used more mental health and substance use services over the course of the study.

Participants who reported more self stigma about drug use at baseline used fewer substance use treatment services over the course of the study. There were no significant main effects of life stage on mental health or substance use treatment, or significant interactions of stigma by life stage on these outcomes.

Discussion

- In this 3-year longitudinal study, we found support for life stage differences in stigma related to drug use in a sample of adults using stimulants at baseline. We first provide a brief summary of the findings using bullet points, and then provide further explanation of each point.
- Emerging adults experienced less enacted stigma (discrimination) and lower levels of public stigma (negative views) related to drug use than the Early-mid and Older adult groups.
- White participants reported fewer experiences of enacted stigma, more self-stigma related to drug use, and lower levels of public stigma than nonwhite participants.
- More enacted stigma and self stigma (negative self thoughts, such as shame and secrecy) among stimulant users at baseline were associated with poorer physical health, mental health, and substance use outcomes over the course of the study.
- More enacted stigma at baseline was associated with more subsequent use of mental health and substance use treatment, whereas more self stigma at baseline was associated with less subsequent use of substance use treatment. This

suggests that different types of stigma have different associations with treatment utilization in this population.

- Life Stage moderated the stigma-health association. Emerging adults who reported more enacted stigma and perceived stigma (agreement with negative stereotyping) at baseline had poorer substance use outcomes over the course of the study. This association did not hold for Early-mid or Older adults.

Stigma, Life Stage, and Race

The current study is one of the first to compare levels of drug use stigma across life stage groups. Results suggest that Emerging adults may experience less stigma related to drug use than other life stage groups. Because there is limited literature on life stage-related differences in drug use stigma, research on other types of stigmatizing conditions inform this finding. Among older adults with HIV/AIDS, stigma was higher among those who had poor health and maladaptive coping skills (Emlet et al., 2013). Among younger and older adults living with HIV, overall levels of stigma increased until age 50 and then began to decline (Emlet et al., 2015). Similarly, in a study of drug and alcohol screening, older adults were less likely to perceive their drug use as problematic compared to younger adults (Nemes et al., 2004).

Taken together, these results suggest a possible lifespan developmental process for drug use stigma. Younger adults may experience less stigma related to drug use because drug use is perceived as normative, socially acceptable, and less risky for their age group compared to other life stage groups (Berg et al., 2015; Lord, Brevard, & Budman, 2011; Zander et al., 2007). Stigma may begin to increase with age as drug use starts to interfere with career and family development in middle adulthood and is seen as inappropriate and/or immature. It is also possible that the results on drug use stigma reflect a cohort effect rather than an age effect. Specifically, emerging adults may experience less drug use stigma because of generational changes that involve a more liberal attitude towards drugs and drug use (Nielsen, 2010).

Low levels of stigma about drug use among younger adults may lead to a perception that treatment is unnecessary or that levels of drug use are not severe enough to seek treatment. Ideally, younger adults who use stimulants would seek treatment before use becomes a lifelong problem, although treatment response tends to be poorer for substance use disorders among emerging adults than other age groups (Bergman, Kelly, Nargiso, & McKowen, 2016). Modifications to traditional treatment approaches for emerging adults may be needed, such as couching treatment within a developmental model, allowing for non-abstinence substance use goals, utilizing parents for contingency-management approaches, or supplementing treatment with text messages (Bergman et al., 2016).

Our results suggest that race impacts drug stigma, with White participants reporting fewer experiences of enacted stigma, more self-stigma related to drug use, and lower levels of public stigma than nonwhite participants. Research is mixed on the extent to which race is associated with drug use stigma. Perceived stigma was higher among nonwhite than White participants in a study of adults with an alcohol use disorder (Keyes et al., 2010). Among

minority substance users, Black participants were more likely than Latino participants to report discrimination due to drug use (Minior, Galea, Stuber, Ahern, & Ompad, 2013). In contrast, Black participants reported less perceived stigma than White participants in a study of rural at-risk drinkers (Fortney et al., 2004). The association between race and drug use stigma may depend significantly on the community context and type of drug.

Stigma, Treatment Utilization, and Health

We found that not all types of stigma had the same influence on treatment utilization. Although both enacted stigma and self stigma had negative effects on physical health, mental health, and substance use severity, enacted stigma was associated with increased use of mental health and substance use services whereas self stigma was associated with decreased use of substance use services. Individuals who endorse high levels of secrecy around their drug use may be particularly reluctant to seek services and disclose their use to health care professionals. Although high levels of secrecy may protect an individual from enacted stigma, it is also associated with negative psychosocial outcomes, such as low self-esteem and alienation from peers and family (Palamar, 2011). Therefore, individuals who endorse higher levels of self stigma are particularly at risk for negative outcomes due to less use of services and poorer health.

The findings about the impact of enacted stigma on health and treatment utilization have significant clinical implications. Individuals with more health, mental health, and substance use problems may elicit more enacted stigma from other individuals due to their more obvious problems such as a poor physical appearance or homelessness. When these individuals enter treatment, they may have a higher need for treatment and also a potentially long-standing history of discrimination. These factors may increase their use of services, but also may make it more difficult to achieve meaningful change in substance use patterns, therefore leading to even more use of services. Additionally, treatment may quickly lose effectiveness if the individual re-enters an environment that is high in enacted stigma.

Moderating Effects of Life Stage

Even though Emerging adults in the current study experienced less stigma due to drug use than Early-mid and Older adults, the stigma that they did experience appeared to affect them more, specifically in terms of substance use outcomes. This supports the age-as-leveler view in that the early-mid and older adults with higher levels of stigma experienced better substance use outcomes than the younger adults. There are several possible mechanisms that may help explain this finding. With increasing age, stigma may not contribute as substantially to health outcomes. In a study of perceived need and barriers to treatment among younger and older adults seeking substance use and mental health treatment (Choi, DiNitto, & Marti, 2014), stigma was less of a concern for older than younger adults, whereas more practical barriers such as cost and insurance were more commonly cited by the older adults. This suggests that, despite potentially higher levels of stigma among older adults, stigma may not factor as largely in treatment access and health outcomes for older adults compared to younger adults.

A second possible mechanism for understanding the moderating effects of life stage is that it may reflect age-related differences in coping. In the face of enacted stigma, emerging adults may turn to avoidant coping (i.e., use more substances) whereas early-mid and older adults may employ more adaptive coping strategies that they have developed over the course of their lives (Woodhead, Cronkite, Moos, & Timko, 2014). A substantial amount of research suggests that older adults are better able to employ coping and emotion regulation strategies that help them manage negative situations more effectively than younger adults (Amirkhane & Auyeung, 2007; Brennan, Holland, Schutte, & Moos, 2012; Urry & Gross, 2010). Specific to the current study, even in the face of higher levels of stigma, older adults may employ coping strategies that avoid the negative impact of stigma, such as ignoring the situation, avoiding the individuals or situations that evoke high levels of stigma, and shifting focus away from negative situations.

Limitations

Limitations of the study may impact the generalizability of the findings. Homeless or transient individuals were not eligible to participate. Although 39% of the sample was female and over 30% were not white, the sample was still primarily white, single, and male, which may limit the degree to which findings generalize to individuals not meeting these characteristics. We characterized older adults in the sample as age 45 and older (Boeri & Tyndall, 2012). Findings may not generalize to adults over age 65, which is a common age cutoff used in research on older adults (American Psychological Association, 2014). Additionally, the sample included only people who use stimulants, which is a subset of drug users. Further, the use of respondent-driven sampling also may limit generalizability from the sample to the population of stimulant users. Finally, although we statistically adjusted for race and sex in the GEE analyses predicting drug use stigma, these characteristics were not included in the GEE analyses predicting health and treatment utilization due to the focus on life stage and the number of analyses. Related to this, the number of analyses may have increased the risk of Type I error. Future research should further examine interactions between age, race, sex, stigma, and these outcomes.

Conclusions and Future Directions

In the current study, drug use stigma was associated with poorer physical health, mental health, and substance use outcomes, despite also being associated with more use of mental health and substance use treatment. Not all types of stigma affected outcomes in the same way; for example, self stigma was associated with decreased use of substance use treatment over the course of the study whereas enacted stigma was associated with increased use of these services. Strategies for how to better meet the treatment needs of individuals with high levels of self stigma is an area for additional research (Palamar, 2011). The results of the current study suggest that individuals with higher levels of self stigma are at high risk for negative outcomes based on their relatively poorer health and low use of services.

Although emerging adults reported less drug use stigma than the other life stage groups, the stigma that they did experience was related to poorer substance use outcomes, which was not the case among the other life stage groups. During the developmental stage of emerging

adulthood, drug use may be expected, resulting in less stigma. However, emerging adults may not have the appropriate coping strategies to manage the negative impact of stigma that they do experience. Future research should examine coping skills of emerging adults who use stimulants (Miller & Kaiser, 2001) as some of these coping strategies could be modified via treatment.

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Highlights:

- Emerging adults experienced less drug use stigma than other life stage groups.
- Stigma affected emerging adults more than the other life stage groups.
- High drug use stigma had a negative effect on health.
- Not all types of stigma had the same influence on treatment utilization.

Table 1

Baseline Demographics for the Full Sample and by Life Stage

	Full Sample (n=710)	Emerging Adults (n=223; 31.4%)	Early-Mid Adults (n=384; 54.1%)	Older Adults (n=103; 14.5%)
Age, mean (SD)	32.56 (10.35)	21.08 (2.15)	34.76 (5.92)	49.24 (3.88)
Years of Education, mean (SD)	11.27 (1.86)	10.91 (1.58)	11.35 (1.87)	11.70 (2.21)
% Female	274 (38.6%)	74 (33.2%)	161 (41.9%)	39 (37.9%)
Race				
White	482 (67.9%)	180 (80.7%)	252 (65.5%)	50 (48.5%)
African-American	208 (29.3%)	37 (16.6%)	120 (31.3%)	51 (49.5%)
Other	20 (2.8%)	6 (2.7%)	12 (3.2%)	2 (2.0%)
Marital Status				
Married/Partnered	112 (15.8%)	28 (12.6%)	68 (17.7%)	16 (15.5%)
Separated/Divorced/Widowed	254 (35.8%)	13 (5.8%)	170 (44.3%)	71 (69.0%)
Never Married	344 (48.4%)	182 (81.6%)	146 (38.0%)	16 (15.5%)
Current Living Situation				
Own house/apartment	320 (45.0%)	80 (35.9%)	192 (50.0%)	50 (48.5%)
Someone else's house/apartment	368 (51.8%)	137 (61.4%)	180 (46.9%)	51 (49.5%)
Employment Status				
Unemployed	353 (49.7%)	132 (59.2%)	172 (44.8%)	49 (47.8%)
Employed part- or full-time	229 (32.2%)	71 (31.8%)	132 (34.4%)	26 (25.2%)
Disabled	76 (10.7%)	6 (2.7%)	47 (12.2%)	23 (22.3%)
Annual Income				
Less than \$6,999	392 (55.4%)	134 (60.6%)	197 (51.3%)	61 (59.2%)
\$7,000 to \$13,999	117 (16.5%)	35 (15.8%)	64 (16.7%)	18 (17.5%)
\$14,000 to \$21,999	105 (14.8%)	29 (13.1%)	61 (15.9%)	15 (14.6%)

Note. Presented values are means and standard deviations or number percent.

Table 2

Values of the Stigma Subscales and Composite Variables at Each Interview

	Baseline	6 months	12 months	18 months	24 Months	30 months	36 Months
Total Participants	n=710	n=603; 84.9%	n=581; 81.8%	n=575; 81.0%	n=561; 79.0%	n=563; 79.3%	n=519; 73.0%
Stigma Subscales							
Enacted Stigma	2.38 (1.63)	1.72 (1.58)	1.61 (1.62)	1.36 (1.52)	1.35 (1.56)	1.33 (1.59)	1.28 (1.51)
Self stigma	2.36 (1.15)	2.14 (1.22)	2.11 (1.24)	1.98 (1.21)	1.93 (1.26)	1.84 (1.24)	1.79 (1.29)
Perceived Stigma	3.88 (0.71)	3.83 (0.72)	3.80 (0.67)	3.79 (0.62)	3.75 (0.67)	3.76 (0.65)	3.70 (0.66)
Public Stigma	3.21 (1.01)	3.28 (0.97)	3.17 (0.97)	3.18 (0.93)	3.22 (0.93)	3.21 (0.97)	3.19 (0.92)
Dependent Variables							
Physical Health Composite	-0.06 (0.72)	-0.04 (0.67)	-0.05 (0.67)	-0.05 (0.68)	-0.05 (0.69)	-0.06 (0.68)	-0.05 (0.67)
Mental Health Composite	-0.04 (0.77)	-0.05 (0.80)	-0.07 (0.80)	-0.07 (0.77)	-0.07 (0.80)	-0.08 (0.78)	-0.07 (0.78)
Substance Use Severity Composite	0.09 (0.71)	0.01 (0.68)	0.00 (0.66)	0.01 (0.69)	0.01 (0.69)	0.01 (0.68)	0.00 (0.69)
Hospital Utilization Composite	-0.01 (0.76)	0.05 (0.77)	0.05 (0.82)	0.04 (0.76)	0.06 (0.81)	0.04 (0.77)	0.04 (0.75)

Note. Presented values are means and standard deviations

Table 3

Baseline Raw Scores for Composite Component Variables

Variables	Mean (SD) or %	Possible Range
Physical Health Composite		
Historical Health Problems	3.24 (3.05)	0-29
Health Problems in Past 6 Months	0.82 (1.14)	0-5
Seriousness of Past 6 Month Health Problems	2.47 (1.01)	0-4
ASI Medical Composite	0.31 (0.34)	0-1
Mental Health Composite		
PHQ-9 Total Score	8.88 (6.61)	0-27
Emotional Problems in Past 6 Months	1.43 (1.11)	0-5
Seriousness of Past 6 Month Emotional Problems	2.30 (0.98)	0-4
ASI Psychiatric Composite	0.20 (0.22)	0-1
Substance Use Severity		
ASI Alcohol Subscale	0.18 (0.19)	0-1
ASI Drug Subscale	0.22 (0.15)	0-1
Met Alcohol Abuse Criteria in Past 6 Months (% Yes)	402 (56.62)	n/a
# of Other Drugs Met Abuse Criteria for in Past 6 Months	1.47 (1.06)	0-4
Hospital Utilization Composite		
Hospitalizations in Past 3 Years	1.79 (1.70)	0-5
Length of Stay for Hospitalization	2.54 (5.58)	0-45
Outpatient Treatment Episodes in Past Year	1.08 (1.83)	0-6
Substance Use Disorder Treatment Utilization		
Weeks in Alcohol/Drug Treatment	2.64 (9.00)	0-88
Mental Health Treatment Utilization		
Treatment Episodes in Past 3 Years	0.23 (0.67)	0-5

Table 4

Stigma by Age Group at Baseline

	Emerging Adults	Early-Mid Adults	Older Adults
Enacted Stigma	2.09 (1.52) ^a	2.53 (1.66) ^a	2.49 (1.72)
Self stigma	2.58 (1.08) ^{a, b}	2.26 (1.14) ^a	2.25 (1.26) ^b
Perceived Stigma	3.84 (0.76)	3.89 (0.71)	3.91 (0.60)
Public Stigma	3.01 (1.01) ^a	3.31 (1.01) ^a	3.28 (0.93)

Note. Presented values are means and standard deviations. Enacted Stigma: ($F(2, 707) = 5.329, p = .005$); self stigma ($F(2, 707) = 6.250, p = .002$); public stigma ($F(2, 700) = 6.505, p = .002$). Values with the same superscript indicate significant differences between those values as indicated by planned contrasts.

Table 5

Results of GEEs: Age Group and Stigma

Variables	Enacted Stigma		Self Stigma		Perceived Stigma		Public Stigma	
	b	95% CI	b	95% CI	b	95% CI	b	95% CI
Intercept	3.00	2.56, 3.45	1.51	1.18, 1.83	3.85	3.70, 3.99	3.48	3.25, 3.71
Time	-0.18 ***	-0.20, -0.16	-0.10 ***	-0.11, -0.08	-0.03 ***	-0.04, -0.02	-0.01	-0.02, 0.01
Race	-0.38 ***	-0.59, -0.17	0.47 ***	0.32, 0.62	0.02	-0.05, 0.09	-0.13 *	-0.24, -0.02
Sex	-0.03	-0.22, 0.17	0.18 **	0.04, 0.32	0.01	-0.06, 0.08	0.01	-0.10, 0.12
Age								
18 – 25 (ref. 45+)	-0.28 *	-0.57, 0.02	0.10	-0.12, 0.33	-0.02	-0.13, 0.09	-0.22 **	-0.39, -0.05
26 – 44 (ref. 45+)	0.23	-0.06, 0.52	-0.02	-0.23, 0.19	0.03	-0.07, 0.12	0.06	-0.09, 0.21

Note. For race, 1=nonwhite, 2=white. For sex, 1=male, 0=female

p < .001,

**
p < .01,

*
p < .05

Table 6

Results of GEEs: Age as Moderator Between Stigma and Health and Treatment Utilization Outcomes

Variables	Physical Health		Mental Health		SUD Severity		Hospital Utilization		SUD Treatment Utilization		Mental Health Treatment Utilization	
	b	95% CI	b	95% CI	b	95% CI	b	95% CI	b	95% CI	b	95% CI
Intercept	-0.16	-0.33, 0.01	-0.71	-0.88, -0.52	-0.41	-0.65, -0.17	-0.04	-0.22, 0.14	-0.11	-0.32, 0.10	-0.15	-0.43, 0.12
Time	0.01 *	0.00, 0.02	0.02 ***	0.01, 0.04	0.01	0.00, 0.02	0.01	-0.01, 0.02	0.01	-0.01, 0.02	0.01	-0.01, 0.03
Age												
18 – 25 (ref. 45+)	-0.33 ***	-0.44, -0.22	-0.04	-0.19, 0.10	-0.09	0.39, 0.22	0.13 *	-0.26, -0.01	0.08	-0.04, 0.20	-0.12	-0.28, 0.04
26 – 44 (ref. 45+)	-0.13 *	-0.25, -0.10	0.03	-0.11, 0.18	0.09	-0.18, 0.36	-0.03	-0.16, 0.10	0.09	0.03, 0.22	0.03	-0.14, 0.19
Enacted Stigma	0.03 ***	0.01, 0.05	0.09 ***	0.07, 0.11	0.08 ***	0.05, 0.10	0.01	-0.02, 0.03	0.04 ***	0.01, 0.06	0.04 **	0.01, 0.07
Self stigma	0.03 **	0.01, 0.04	0.05 ***	0.02, 0.05	0.05 ***	0.03, 0.07	-0.01	-0.03, 0.02	-0.03 *	-0.06, 0.00	0.01	-0.02, 0.03
Perceived Stigma	0.03	-0.01, 0.06	0.08 ***	0.05, 0.11	-0.01	-0.06, 0.05	0.01	-0.03, 0.05	0.02	-0.03, 0.07	0.01	-0.04, 0.06
Public Stigma	0.01	-0.02, 0.03	0.01	-0.01, 0.04	0.01	-0.02, 0.02	0.02	-0.01, 0.04	-0.03	-0.07, 0.01	-0.01	0.03, 0.04
Enacted Stigma * Age (18-25)					0.05 *	0.01, 0.09						
Enacted Stigma * Age (26-44)					0.01	-0.02, 0.05						
Perceived Stigma * Age (18-25)					0.08 *	0.00, 0.16						
Perceived Stigma * Age (26-44)					0.03	-0.04, 0.09						

p < .001,**
p < .01,*
p < .05