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Nonpartner Violence Perpetration Among Emerging Adults: Associations With Polysubstance Use and Trait Mindfulness

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Abstract

Objective: Violence is a leading cause of death among individuals ages 18–25, with alcohol misuse consistently linked with violence perpetration. However, the association between polysubstance use and violence perpetration is less clear, despite the frequency of use of alcohol with other drugs. Additionally, protective factors such as mindfulness that may reduce violence perpetration among emerging adults have been understudied. This cross-sectional study examined the association between substance use, trait mindfulness, and violence perpetration outside of romantic relationships, utilizing a compensatory model of resilience.

Methods: Data were drawn from a sample of 665 emerging adults ages 18–25, recruited from an urban Emergency Department (68% men). Participants self-administered a computer survey that assessed non-partner violence perpetration (NPV), alcohol use, marijuana use, prescription drug misuse, and trait mindfulness. Fifteen percent reported non-partner violence perpetration over the past six months.

Results: Multivariate logistic regression tested associations between violence perpetration, substance use, trait mindfulness, and demographic characteristics. Results showed that alcohol use alone (OR= 3.04), prescription opioid use alone (OR = 3.58), alcohol and marijuana use (OR = 3.75), and use of all three substances (OR= 7.78) were positively associated with violence perpetration. Post-hoc contrasts demonstrated the polysubstance use significantly increased risk over single substance use. Trait mindfulness (OR= 0.97) was negatively associated with violence perpetration after controlling for substance use.

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Conflicts of Interest

The authors have no conflicts of interest to disclose.

Conclusions: Findings suggest that polysubstance use may increase risk for violence. Interventions that address polysubstance use, potentially including mindfulness, could reduce non-partner violence perpetration among emerging adults and requires further study.

Keywords

Violence perpetration; Polysubstance use; Emerging adults; Mindfulness

Introduction

Violence among emerging adults ages 18–25 is a persistent public health problem. Homicide is the 3rd leading cause of death during this age range in the U.S., and the leading cause of death for individuals ages 18–25 who identify as African American (Heron, 2019; National Center for Injury Prevention and Control, 2018a). In 2018 alone, hundreds of thousands of those ages 18–25 were fatally or non-fatally injured as a result of violence (National Center for Injury Prevention and Control, 2018b). The economic cost of both fatal and non-fatal violence in this age range is staggering, with an estimated $21 billion annually going toward medical costs and lost productivity. Although violence risk is elevated for youth (i.e., mid-teens to mid-twenties) overall, the specific developmental period of 18–25, often referred to as emerging adulthood (Arnett, 2007), carries with it especially high risk for violence. Alcohol and other substance use are consistently linked with violence perpetration, and emerging adults use substances at high rates (Alexandercikova et al., 2013; Singh et al., 2015). However, less is known about how patterns of substance use, including single versus polysubstance use (not necessarily co-use), are associated with violence during this period. Better understanding factors related to violence is critical to reducing death and injury among emerging adults in the U.S.

Although a substantial body of evidence links substance use with increased risk for violence perpetration, substance use alone does not necessarily result in violent behavior (Abbey, 2011; Choenni et al., 2017). Developmental psychopathology, which focuses on pathways to adaptive and maladaptive outcomes across development periods (Cicchetti & Toth, 2009), is a useful framework to understand links between substance use and violence perpetration, especially among emerging adults. Principles of equifinality (i.e., multiple pathways to a single outcome) and multifinality (i.e., a single risk factor can be linked to multiple outcomes) in developmental psychopathology emphasize the need to identify both risk and protective factors when understanding pathways to adaptation versus maladaptation (Cicchetti & Toth, 2009). This approach also calls for the contextualization of risk factors to better understand pathways to maladaptive versus adaptive outcomes. Importantly, much of the research on polysubstance use and violence perpetration has examined only intimate partner violence (IPV), demonstrating that using multiple substances (Low et al., 2016) or meeting criteria for multiple substance use disorders (Crane et al., 2014) is associated with greater likelihood of IPV use. Notably, intimate relationships are a specific context in which relationship factors have a significant influence on IPV perpetration (Capaldi et al., 2012). Given limited research on how substance use affects use of violence in non-romantic relationships (e.g., friends, strangers) in emerging adults, this study focuses on links between polysubstance use and non-partner violence (NPV) perpetration.

Polysubstance Use and Violence Perpetration

Much of the research on connections between substance use and violence perpetration has focused specifically on use of a single substance in relation to violent behavior. Yet, polysubstance use, or the use of more than one substance over a given period of time (although not necessarily co-ingestion) is common (Timko et al., 2017). For example, one recent study examining patterns of substance use in approximately 2,000 emerging adults found that more than half reported use of multiple substances, including alcohol, marijuana, and illicit drugs in varying combinations (Bailey et al., 2019). They also found that antisocial personality traits and impulsivity predicted polysubstance use beyond alcohol and marijuana use. Notably, these same factors also predict use of violence (Alexandercikova et al., 2013; Leone et al., 2016), demonstrating how polysubstance use might increase risk for violence.

One recent study explored associations between mental health, polysubstance use (defined as use of two or more substances on the same day) and NPV perpetration in an adolescent and emerging adult sample (Stoddard et al., 2020). They found that individuals reporting high rates of NPV perpetration were more likely to report polysubstance use than individuals who reported no NPV perpetration. While an important step in understanding the relationship between polysubstance and violence, this study did not differentiate between different combinations of polysubstance (e.g., alcohol and marijuana versus alcohol and prescription opioid misuse (POM)). Given evidence suggesting links between specific substances and violence (Morley et al., 2015; Palamar et al., 2018), examining discrete patterns of polysubstance use can help identify those most at risk and may provide insight into which substances and combinations of substances are most influential in predicting violence perpetration during emerging adulthood. Another study of approximately 1,200 adults recruited from an urban emergency department (Alexandercikova et al., 2013) found that alcohol intoxication increased risk for NPV perpetration, but other drug use reduced risk for NPV perpetration. This is consistent with findings demonstrating that alcohol use, but not marijuana use, was associated with greater likelihood of violence perpetration (Lipperman-Kreda et al., 2017). These studies highlight unique effects of type of substance on violence perpetration risk.

Few studies involving emerging adults have examined polysubstance use involving prescription drugs, despite high rates of prescription drug misuse and overdose during this developmental period (Schepis et al., 2020). Recent studies have demonstrated that POM specifically is associated with IPV perpetration (Seabrook et al., 2020) and increased likelihood of gun and weapon carrying (Pontes et al., 2021). Other work found that prescription stimulant misuse was associated with higher levels of violence over time (Stoddard et al., 2020). A key limitation to this research, however, is not examining prescription drug misuse in conjunction with other substance use. Evidence in adolescents suggests that polysubstance use involving prescription drugs is associated with increased risk for violence over alcohol use alone (Espelage et al., 2018). While single substance use studies are useful in identifying which substances are risk factors for violence, previous research indicates that, when used in combination with other substances (i.e., polysubstance use) the subjective effects, patterns of use, and neurobiological outcomes change (Liu et al.,

2018). Thus, examining polysubstance use that includes prescription drug misuse has the potential to provide novel information about risk for violence.

Differences in polysubstance use and violence perpetration have been observed along the lines of age, race, and socioeconomic status (Dardis et al., 2015; Stone et al., 2012). Although the size and direction of these effects are not consistent, there is sufficient evidence indicating they have at least a small to moderate effect on the factors of interest in this study. Differences in the connections between substance use and violence along the lines of gender as well as sex assigned at birth are more consistently documented (Alexandercikova et al., 2013; Cafferky et al., 2016). Moreover, given strong links between gender, sex and health, researchers have called for more intentional analysis of gender and sex differences in research that involves or has implications for health behavior and health care (Johnson et al., 2009).

Resilience: The Potential Promotive Role of Mindfulness

Notably, much of research on the substance use – violence perpetration link has emphasized a risk (i.e., deficits-focused), rather than a resilience (i.e., strengths-focused), perspective. This has informed violence prevention strategies aimed at identifying and reducing risk factors. Yet, a resilience perspective has identified factors that lower risk for violence perpetration, including positive supports, religiosity, and individual strengths, often termed ‘promotive factors’ (Banyard et al., 2020; Stoddard et al., 2013). Resilience theorists have proposed different ways for understanding the role of promotive factors (Zimmerman, 2013). In a compensatory model of resilience, promotive factors are thought to operate through independent, direct pathways to an outcome of interest, with effects in the opposite direction of risk factors (an additive model). This can be contrasted with protective factor models, which view promotive factors as buffering against the negative effects of risk factors on outcomes of interest (a moderation model). Supplemental Figure 1 depicts these two resilience models. Ultimately, targeting both risk and promotive factors in violence prevention programming can likely enhance their overall efficacy than targeting only one risk or promotive factor.

One potentially important promotive factor is trait mindfulness. Mindfulness is conceptualized as both a state process (e.g., the act of completing a mindfulness meditation) and a trait characteristic (e.g., the extent of non-judgmental awareness of the present vs. evaluative appraisal and prediction of past, current, and future events). Higher levels of trait mindfulness are associated with lower levels of violence perpetration across many different samples, including emerging adults, although much of this research has focused on IPV (Hesse et al., 2019; Ngo et al., 2018; Shorey et al., 2015), rather than violence perpetrated against other individuals (e.g., friends, strangers). Trait mindfulness is thought to attenuate biological and affective responses to stress (Brown et al., 2012), and is responsible for the positive effects of mindfulness interventions such as Mindfulness Based Stress Reduction (Shapiro et al., 2011). Notably, mindfulness interventions are widely available and can be used in a variety of settings, including schools, hospitals, and workplaces (Creswell, 2017). Poor emotion regulation (Shorey et al., 2011), deficits in executive functioning (Ellis et al., 2009), as well as greater mental health problems (Vagi et al., 2013) have all been associated

with aggressive and violent behavior. In recent years, research has also demonstrated that mindfulness interventions can improve attention and emotion regulation and reduce mental health symptoms (Goldin & Gross, 2010; Tang et al., 2016). Trait mindfulness is therefore a factor that can potentially reduce violence perpetration through its direct effects on cognition, affect, and mental health. The relationship between trait mindfulness and substance use is less clear, with some evidence suggesting the relationship between the two varies based on the function, type, or severity of substance use (Bowen & Enkema, 2014; Karyadi et al., 2014). Moreover, results from a meta-analysis indicate that the relationship between the two is relatively weak (Karyadi et al., 2014). Thus, it seems more likely that trait mindfulness acts within compensatory framework (i.e., exerts a direct effect) rather than a protective factor framework (i.e., exerts a buffering effect) in relation to the effects of polysubstance use on risk for violence perpetration.

The Current Study

This study seeks to address critical gaps in the literature on the relationships between substance use and violent behavior by examining how alcohol use, marijuana use, and POM, either alone or in some combination, relate to risk for violence perpetration during the critical developmental window of emerging adulthood (Arnett, 2007), which carries high risk for involvement in violence and is the peak period for substance use. Further, this study will test compensatory effects of trait mindfulness on risk for violence perpetration. Identifying protective factors, especially modifiable ones, for violence perpetration is vital to reducing its impact on well-being. All analyses will account for demographic factors known to be related to substance use and violence perpetration. This study also aims to produce more generalizable results by testing these relationships in a healthcare and community-based sample of underserved and under-resourced emerging adults, as research on substance use in this age group has disproportionately focused on college student samples (Stone et al., 2012). Based on our review of the literature, we propose the following hypotheses:

1. Alcohol use alone, as well as polysubstance use of any combination, will be associated with increased likelihood of perpetrating violence.

   1.2. We will also explore the specific effects of polysubstance use involving prescription drug misuse on violence perpetration risk.

2. We test a compensatory model of resilience and expect that trait mindfulness will be associated with reduced violence, even in the context of substance use.

   2.2. To further support a compensatory model of resilience, we will also test the alternative model, the protective factor model, by examining the moderating effects of trait mindfulness on the relationship between polysubstance use and violence perpetration. We predict that this interaction will not be significant.

Methods

Participants

Data for this study were gathered as part of the screening phase of an intervention development project to reduce alcohol use and physical aggression, called the Ahimsa

Project (n=1001; 23% refusal rate); however, only a subset received the mindfulness measure of interest in the current study (which was added approximately halfway through data collection), yielding a final sample size of 665 (32% women). Participants' age ranged from 18–25 (M_{age} = 21.6 years, SD = 2.3) and was racially diverse (57% Black or African American, 33% White or Caucasian, 9% other racial group). Six percent identified as Hispanic or Latino. Approximately 60% reported that they currently received public assistance, and 48.6% were currently employed. Table 1 provides demographic information for the total sample, as well as by participant gender.

Procedures

Participants were recruited from the Hurley Medical Center (HMC) between December 2013 and September 2015. The study protocols were approved by University of Michigan and HMC Institutional Review Boards (IRB), and a Certificate of Confidentiality was obtained from the National Institutes of Health (NIH) prior to the start of the study. Men were oversampled in this study given evidence that they are less likely to seek medical care and less likely to agree to participate in research studies (Mackenzie et al, 2007; Costello et al, 2014). One published manuscript has used this dataset, examining associations between mindfulness, alcohol use only, anxiety, and dating violence perpetration – assessed separately from NPV – (Ngo et al., 2018).

Research staff were present in the ED seven days a week from 6:30am – 12:00am, excluding major holidays. Any individual between the ages of 18–25 seeking treatment for any reason during these times was approached by a member of the research staff and invited to participate in a brief survey. If they agreed to join the study, participants completed a written consent form and then self-administered a screening survey on a tablet. The survey included questions about violence perpetration, substance use, and mindfulness, and took approximately 30–40 minutes to complete. Participants chose a gift valued at $1 USD (e.g., crossword puzzle, lotion) as compensation for their participation. Individuals were excluded from participating if they presented with acute suicidal ideation, aggressiveness or acute psychosis, were in police custody, were unable to unable to read and speak English, or were too sick to approach or unable to give consent (e.g., unconscious, insufficient cognitive orientation, or developmental disability). Individuals involved in another research study at the HMC at the time of recruitment or on the HMC staff were also excluded from participation in the screening survey.

Measures

Violence Perpetration.—Violence perpetration over the past six months was measured using an adapted version of the physical violence subscale of the Conflict Tactics Scales – Revised (CTS-2; Straus et al., 1996). Participants were asked two questions that assessed the frequency at which they used physical violence (e.g., punching, choking, beating someone up) against friends, neighbors, co-workers, or strangers who had never been a romantic partner. Responses ranged from "Never" to "More than 20 times". This wording differs from the wording in the original CTS-2, which specifically asks about violence toward intimate partners. Given our interest in distinguishing between those who had and had not engaged in violence, perpetration was coded as present if participants reported any use of physical

violence on either question. However, we still report frequency of violence perpetration in Table 1.

Substance Use.—Participants were coded into yes/no categories for substance use using a set of three questions. Alcohol use over the previous six months was assessed using the first question from the Alcohol Use Disorders Identification Test — Consumption (AUDIT-C; Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998): "In the past 6 months, from today back to [date of 6 months ago], how often did you have a drink containing alcohol?" with responses ranging from (0) "Never" to (4) "4 or more times a week." Participants were considered to have endorsed alcohol use if they reported any frequency of alcohol consumption above "Never." Marijuana use was assessed with the following question: "During the past 6 months, from today back to [date of 6 months ago], how many days did you use marijuana (weed, pot, grass, hash)?" Responses ranged from 0 "Never" to 5 "Every day or almost every day," with any frequency beyond "Never" coded as a "yes" for marijuana use. POM was assessed with a similar question: "During the past 6 months, from today back to [date of 6 months ago], how many days did you use painkillers or opiates (such as Vicodin®, OxyContin®, Tylenol 3® with codeine, Percocet®, Norco®, Suboxone®, morphine, oxycodone, hydrocodone, or Tramadol®) on your own without a doctor telling you to take them or used more than what was recommended by your doctor?" Responses ranged from 0 "Never" to 5 "Every day or almost every day, with any frequency above "Never" being coded as a "Yes" for POM. Based on these responses, participants were grouped into the following six discrete categories: (1) alcohol use only, (2) marijuana use only, (3) marijuana and alcohol use, (4) POM only, (5) POM paired with either marijuana or alcohol use, and (6) use of all three substances. We also assessed illicit drug use, as well as prescription sedative and stimulant misuse. However, the study lacked sufficient power to include these classifications into our polysubstance use variable, given the low base rate use in the sample.

Mindfulness.—Trait mindfulness was evaluated using the 24-item Five Factor Mindfulness Questionnaire – Short Form (Baer et al., 2008; Bohlmeijer, ten Klooster, Fledderus, Veehof, & Baer, 2011). This measure gauges five theoretically informed facets of mindfulness including, 1) Observing: the extent to which one pays attention to internal and external experiences (e.g., "I pay attention to physical experiences, such as the wind in my hair or sun on my face"), 2) Describing: the ability to process internal experiences with words (e.g., "I'm good at finding words to describe my feelings"), 3) Acting with Awareness: the extent to which one is in the moment and present (e.g., "I find it difficult to stay focused on what's happening in the present moment"), 4) Nonjudging: the ability to take a stance that does not judge oneself (e.g., "I tell myself I shouldn't be feeling the way I'm feeling" [reverse]), and 5) Nonreactivity: the ability to be in the present moment without feeling overwhelmed (e.g., "I watch my feelings without getting carried away by them"). Participants were asked to evaluate the extent to which the statements were generally true for them on a scale ranging from ranging from 1 "Never or very rarely true" to 5 "Very often or almost always true." Trait mindfulness ($\alpha = 0.85$) was calculated by summing responses across the 24 items, with higher scores indicating greater mindfulness.

Demographics.—Participants completed a brief demographics questionnaire that asked about their race ("Which of the following best describes your racial background? Check all that apply," response options: Black or African American, White, Native Hawaiian/Other Pacific Islander, American Indian/Alaska Native, Asian, Don't Know, Other), age ("How old are you?"), gender ("Are you male or female?"), employment status ("Are you currently employed?"), and receipt of public assistance (e.g., welfare, Bridge Card, EBT, disability benefits, etc.).

Analytic Plan

All analyses were conducted in SAS Version 9.4. We first tested associations between substance use, trait mindfulness, and covariates and NPV perpetration in a series of bivariate analyses. Polysubstance use groups were then identified, focusing on use involving alcohol, marijuana, and POM. We were unable to look at polysubstance use involving illicit drugs or other types of prescription drug misuse given low base rates of their use (see Table 1). We also wanted to separately examine POM as opioids are among the most frequently misused prescription drugs (NIDA, 2021). We then modeled a multivariate logistic regression including all independent variables of interest and covariates simultaneously predicting violence. Independent variables of interest were substance use group and trait mindfulness. Covariates included were age, race, gender, employment status, and receipt of public assistance. This initial model only included main effects of trait mindfulness and substance use, in line with a compensatory model of resilience. However, we subsequently tested interactions between trait mindfulness and substance use groups to confirm a compensatory (direct effects) versus buffering (moderation) model as described by Zimmerman and colleagues (2013). Post-hoc analyses tested the moderating effects of gender on associations between mindfulness, substance use, and violence perpetration, given evidence of gender differences in violence perpetration.

Power analyses were conducted using G*Power (Faul et al., 2007) separately for mindfulness and substance use (our primary predictors), given differences in their distribution as well as the expected magnitude of their effects. Given a normally distributed predictor variable (as was the case for our mindfulness variable), results indicated a sample size of 754 would be needed to detect a 0.05 decrease in the predicted probability of violence perpetration (OR = 0.81), assuming a baseline probability of 0.4 and a power level of 0.80. For a binomial predictor variable (as was the case for each substance use category), a sample size of 153 would be needed to detect a 0.2 increase in the predicted probability of violence perpetration (OR = 2.3), assuming a baseline probability of 0.5 and a power level of 0.80. Thus, our sample of 665 is considered adequate to detect effects of interest, especially for substance use.

Results

Sample Descriptives and Bivariate Analyses

Table 1 reports sample demographics for the total sample, as well as by gender. Rates of public assistance receipt were higher among women than men [X^2 (1, N = 665) = 24.0, $p <$ .0001]. We also observed gender differences in substance use, as men reported higher rates

of marijuana use [X^2 (1, N = 665) = 33.09, $p < .0001$] as well as prescription stimulant misuse [X^2 (1, N = 665) = 4.84, $p < .05$]. Men also had lower scores on trait mindfulness than women.

Table 2 reports sample demographics based on history of violence perpetration. Of those who screened positive for violence perpetration, 73.5% reported current receipt of public assistance, compared to the 56.5% of those who did not perpetrate violence [X^2 (1, N = 665) = 10.37, $p < .01$]. Bivariate analyses also revealed differences in substance use between those who did and did not report violence perpetration, with those screening positive for violence reporting significantly higher rates of alcohol use [X^2 (1, N = 665) = 11.22, $p < .01$], marijuana use [X^2 (1, N = 665) = 14.63, $p < .01$] and POM [X^2 (1, N = 665) = 13.20, $p < .01$] than those who did not report violence perpetration. Additionally, those who reported violence perpetration had lower trait mindfulness than those who did not perpetrate violence [$t(661) = 4.25$, $p < .0001$].

Polysubstance Use

A majority of the sample reported use of at least one substance, predominately alcohol and marijuana use (see Table 1). A substantial proportion reported POM, while only a small number reported illicit drug use, sedative use, or stimulant use (see Table 1). Only three participants reported illicit drug, prescription sedative or prescription stimulant misuse that did not overlap with alcohol, marijuana, or POM. The remaining individuals who reported use of illicit drugs, stimulants, or sedatives ($n = 72$) were represented in the other five substance use categories. Therefore, we did not include an illicit drug/stimulant/sedative misuse category in the polysubstance use variable. A large proportion of the sample (42.7%) reported some form of polysubstance use, with marijuana and alcohol use as the most common (28.7%), followed by POM, marijuana, and alcohol (8.9%), then POM with either marijuana or alcohol (5.1%).

Logistic Regression

Public assistance, mindfulness, and substance use significantly predicted violence perpetration (see Table 3). Individuals who reported that they received public assistance were more likely to report violence than those without those benefits (OR = 2.04, 95% CI: 1.23 – 3.40). Individuals who scored higher on our measure of trait mindfulness were less likely to report violence perpetration (OR = 0.97, 95% CI: 0.95 – 0.98). Compared to individuals who did not report substance use, those who reported alcohol use only (OR = 3.02, 95% CI: 1.26 – 7.23) were more likely to report violence perpetration. Polysubstance use also significantly predicted odds of violence. Marijuana use alone did not significantly predict violence perpetration. Marijuana and alcohol used together (OR = 3.71, 95% CI: 1.67 – 8.21) and POM alone (OR = 3.75, 95% CI: 1.70 – 8.30) were also associated with increased odds of violence perpetration. Finally, POM combined with both alcohol and marijuana use was associated with the highest odds of violence perpetration (OR = 7.78, 95% CI: 3.20 – 18.94).

We then tested interactions between trait mindfulness and single substance as well as polysubstance use to verify the compensatory versus protective factor models. As predicted,

none of these interactions were significant and those terms were not included in the final model. We also tested the moderating role of gender on the relationships between mindfulness, polysubstance use, and violence perpetration. However, those interactions were not significant.

Post-hoc Contrasts

Since the logistic regression used no substance use as the reference group, we ran post-hoc contrasts comparing the effects of different substance use groups on violence perpetration to get a better sense of how polysubstance use related to violence perpetration in comparison to single substance use. POM + Marijuana + Alcohol Use was associated with significantly higher likelihood of violence perpetration than Marijuana Use only, Alcohol Use only, or Marijuana + Alcohol Use (see Table 3). However, risk of violence perpetration was not significantly higher for use of all three substances compared to POM only. POM in combination with Marijuana or Alcohol use was not associated with greater violence perpetration risk than use of only Marijuana or Alcohol. Additionally, use of Marijuana + Alcohol did not confer greater risk for violence perpetration than the use of either substance alone.

Discussion

This study presents novel data on the associations between patterns of polysubstance use, trait mindfulness, and NPV perpetration in emerging adults. As in samples of adolescents and adults, polysubstance was common in this emerging adult sample. Alcohol use alone, alcohol and marijuana use, POM alone, as well as the use of all three substances was associated with increased risk for violence perpetration. The odds of violence perpetration were much higher for individuals who reported use of all three substances compared to individuals who reported use of only 1–2 substances over a six-month period. Moreover, given this was a sample of emerging adults seeking treatment at an ED for a range of issues, these findings underscore the need to assess POM even in settings where individuals are not seeking substance use treatment.

Our first hypothesis, that alcohol use alone and polysubstance use of any combination would lead to increased risk of violence, was mostly supported. As in other studies, alcohol use alone as well as alcohol and marijuana use were associated with increased odds of engaging in recent violence (Alexandercikova et al., 2013; Lipperman-Kreda et al., 2017). Marijuana use alone was not associated with increased risk of violence, which has been found in prior work. These findings suggest that alcohol may be the central contributor in the relationship between combined alcohol and marijuana use and violent behavior. While we cannot infer the effects of co-use from these results, these differences are consistent with emergent evidence suggesting that combined alcohol and marijuana use is associated with greater feelings of intoxication than alcohol use alone (Lee et al., 2017). Even so, continued research using ecological momentary data is needed to delineate the acute intoxication effects of these substances on violence risk.

Our results suggest POM is associated with increased risk of violence perpetration. This may be because POM often clusters with other substance use. Future research with larger

samples is needed to evaluate the overlap between multiple substances in this way. These results also suggest that POM influences violent behavior above alcohol use, given that post-hoc contrasts found POM combined with alcohol and marijuana use was associated with greater risk of NPV perpetration than alcohol and marijuana use, alone or combined. Notably, impulsivity is associated with increased risk of prescription drug misuse, as well as co-use of prescription drugs and alcohol (Messina et al., 2014). Given that impulsivity is also associated with increased risk of aggression (Bresin, 2019), interrelationships among impulsivity, substance use – including poly-use and co-use – and aggression may in part explain our findings. Finally, we may have found this association because polysubstance use is an outcome of violence perpetration. Longitudinal and mixed-methods research incorporating qualitative inquiry might give insight into reasons why polysubstance use involving POM is associated with higher violence risk.

Trait mindfulness was associated with lower risk for violence perpetration, opposite and independent of the effect of polysubstance use. This finding is consistent with our second hypothesis, which was that trait mindfulness operates within a compensatory model of resilience. Although the mechanism for this is unclear, recent work has uniformly shown that higher levels of trait mindfulness are associated lower levels of IPV perpetration (Hesse et al., 2019; Ngo et al., 2018). Trait mindfulness may reduce violence perpetration through its relationships with emotion and cognition. Mindfulness is associated with decreased emotional reactivity and increased executive functioning, thus improving self-regulation and increasing inhibitory control over behaviors, both of which are related to lower risk of violence (Hölzel et al., 2011; Tang et al., 2015). Shared factors that influence both mindfulness and violence perpetration may also account for the significant relationship between the two. For example, attachment and self-control are associated with both mindfulness and violence perpetration (Bowlin & Baer, 2012; Spencer et al., 2021). There may also be a transactional relationship between mindfulness and violence perpetration – as in, perpetrating violence inhibits mindfulness, which then leads to greater violence perpetration over time. Moreover, although our results suggest mindfulness does not buffer against the negative effects of substance use on risk of violence, mindfulness may lead to less overall substance use over time, which is another pathway by which mindfulness could reduce violence risk and requires further study. Importantly, these findings highlight trait mindfulness as a potentially modifiable factor that is related to less violent behavior.

There were no gender differences in rates of NPV perpetration or in associations between polysubstance use and NPV perpetration. Some work suggests that violence perpetration is increased among both men and women when alcohol use is a factor (Epstein-Ngo et al., 2013; Epstein-Ngo et al., 2014). We found that men reported higher rates of alcohol consumption, marijuana use, and overall substance use in comparison to women. Thus, the fact that we saw no gender differences in violence perpetration may be because we accounted for these differences within the substance use variables. It may also be that gender differences emerge when examining frequency or type violence perpetration; this should be examined in future research.

Receipt of public assistance was associated with violence perpetration. To qualify for many types of these programs, individuals must meet criteria for low-income status. Given

longitudinal associations between poverty in childhood and adulthood (Harper et al., 2003), our result may be an index of lifetime and overall effects of poverty on violence risk, rather than indicative of a causal relationship between public assistance and violence perpetration. Further, researchers have documented the many stressors associated with navigating social insurance programs like disability (Olney & Lyle, 2011). Thus, receipt of public assistance might be serving as a proxy variable for other stressors that might increase risk for violence.

Importantly, we evaluated the associations between trait mindfulness, polysubstance use, and violence perpetration in a diverse, community sample of emerging adults. While this has provided useful insights into the effects of substance use on violence perpetration it is not clear how well this knowledge generalizes to non-student samples, which represent more than half of the emerging adult population (Hussar et al., 2020). Thus, this research is an important step toward generating knowledge about substance use and violence that is more representative of diverse emerging adults in the US who are not typically the target of research inquiry.

Limitations

There are several limitations to the current study that should be noted. Some of our single and polysubstance use groups had very small cell sizes, namely our POM only and POM + either Alcohol or Marijuana. Additionally, we were unable to examine the unique effects of illicit drug use and other forms of prescription drug misuse (e.g., stimulants) – alone or in combination with other substances – on violence perpetration. Thus, these findings should be interpreted as preliminary and in need of replication with larger samples. The use of single-item assessments of substance use is also a limitation, as we were unable to examine whether frequency and severity of substance use, or route of administration for marijuana (e.g., smoking, edibles) were related to violence perpetration. Similarly, we used a dichotomous violence perpetration outcome, which limited our ability to examine predictors of violence perpetration frequency. The use of retrospective self-report measures was also a limitation, as behaviors such as substance use and violence are often underreported using these types of measures. The cross-sectional design of the study also makes it impossible to know if trait mindfulness and substance use truly preceded violence perpetration. Finally, although our community sample is more representative than unique samples such as college student samples, all participants were recruited from one city in the Midwest. Therefore, these results may not generalize to different geographic contexts.

Future Research Directions

Future research utilizing longitudinal data is needed to disentangle temporal relationships between substance use, trait mindfulness, and violent perpetration. These studies should also examine other risk and protective factors to better characterize the effects of substance use and trait mindfulness on violence relative to other factors. Research investigating polysubstance use and co-use simultaneously would also help distinguish the effects of acute intoxication and general substance use on violence perpetration risk. Use of ecological momentary assessment or similar methods would help further elucidate the effects of co-use and intoxication on risk for violence perpetration. Examining how polysubstance use relates to the frequency or severity of violence perpetration would provide further insight

into how substance use affects risk for violence. Additionally, future studies investigating violence across different relationships (e.g., friend, stranger) would give insight into how relationship context affects associations between substance use, trait mindfulness, and violence perpetration. Future research may also benefit from examining latent classes to answer complementary research questions to the current study. Given we looked at these associations in anyone presenting to an ED, future work could parse whether the relations between substance use and violence differ between individuals who present to the ED for substance use specific concerns versus other concerns. Notably, our assessment of gender was limited in that it forced a binary response option; moreover, it used terms that would be most salient for cisgender participants. Future work should use more inclusive assessments of participant gender and sex when examining links between mindfulness, substance use and violence perpetration. Finally, research with larger samples across multiple sites would provide more sufficient power to detect small effects, such as the type we found for trait mindfulness, and might also allow for the examination of the effects of substances other than alcohol, marijuana, and prescription opioids on violence risk, generating more generalizable knowledge.

Clinical and Policy Implications

These findings demonstrate that various patterns of polysubstance use, including polysubstance use including prescription opioids, are associated with increased risk of violence in emerging adults. Trait mindfulness may be a critical promotive factor that can reduce the risk of violence, even in the context of polysubstance use. Future interventions might consider a harm reduction strategy of focused on decreasing substance use through reducing the number of different substances used as one potential pathway to violence perpetration reduction. Interventions would benefit from including an understanding of violence perpetration as strongly associated with difficulties in regulation of emotions and behaviors; increasing mindfulness might be a useful strategy to address these challenges in practices and treatments. Finally, policy makers and interventionist must address the impact of structural stressors, such as inadequate resources, as a potential pathway to change violence perpetration in emerging adults.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Sample characteristics by gender.

Variable	Women N (%)/M (SD)	Men N (%)/M (SD)	Total N (%)/M (SD)
	210 (31.6%)	455 (68.4%)	665 (100%)
Age	21.4 (2.2)	21.6 (2.3)	21.6 (2.3)
Latino/a	12 (5.7%)	30 (6.8%)	42 (6.3%)
Black or African American	133 (63.3%)	248 (54.5%)	381 (57.3%)
White or Caucasian	59 (28.1%)	163 (35.8%)	222 (33.4%)
Other Racial Group	18 (8.6%)	44 (9.7%)	62 (9.3%)
Public Assistance ***	**153 (72.9%)**	**240 (52.8%)**	**393 (59.1%)**
Employed	97 (46.2%)	225 (49.5%)	322 (48.4%)
Promotive and Risk Factors			
Trait Mindfulness **	85.0 (12.2)	81.8 (12.3)	82.8 (12.3)
AUDIT-C Total ***	**1.4 (1.9)**	**2.2 (2.8)**	**2.0 (2.6)**
Alcohol Use	114 (54.3%)	275 (60.4%)	389 (58.5%)
Marijuana Use ***	**71 (33.8%)**	**263 (57.8%)**	**334 (50.2%)**
Rx Opioid Misuse	35 (16.7%)	83 (18.5%)	118(17.7%)
Rx Simulant Misuse *	**4 (1.9%)**	**26 (5.7%)**	**30 (4.5%)**
Rx Sedative Misuse	11 (5.2%)	40 (8.8%)	51 (7.7%)
Illicit Drug Use	4 (1.9%)	20 (4.4%)	24 (3.6%)
Any Substance Use ***	**138 (65.7%)**	**361 (79.3%)**	**499 (75.0%)**
Violence Perpetration Frequency			
Never	180 (85.7%)	383 (84.2%)	563 (84.6%)
1–2 times	24 (11.4%)	62 (13.6%)	86 (12.9%)
3–5 times	2 (1.0%)	3 (0.7%)	5 (0.9%)
6–20 times	1 (0.5%)	5 (1.0%)	6 (1.0%)
More than 20 times	2 (1.0%)	3 (0.7%)	5 (0.9%)

Note: tests conducted included t-tests and chi-square tests;

* $p < .05$,

** $p < .01$,

*** $p < .001$;

Rx = prescription; 'Other Racial Group' includes the following categories: Native Hawaiian/Other Pacific Islander, American Indian/Alaska Native, Asian, Middle Eastern/North African, Unknown/Other

Table 2.

Bivariate Table of Individual Associations between Risk and Promotive Factors and Violence Perpetration

Variables	Violence Perpetration n = (102, 15.3%)	No Violence Perpetration n = (563, 84.7%)
Age	21.6 (2.3)	21.5 (2.3)
Women	30 (29.4%)	180 (32.0%)
African-American	63 (61.8%)	318 (56.5%)
White and Caucasian	26 (25.5%)	196 (34.8%)
Other Race	13 (12.8%)	49 (8.7%)
Public Assistance **	**75 (73.5%)**	**318 (56.5%)**
Employed	50 (49.0%)	272 (48.3%)
Trait Mindfulness ***	**78.0 (12.7)**	**83.6 (12.1)**
AUDIT-C Total ***	**3.1 (3.2)**	**1.8 (2.4)**
Any Substance Use		
Alcohol Use ***	**75 (73.5%)**	**314 (55.8%)**
Marijuana Use ***	**69 (67.7%)**	**265 (47.1%)**
POM ***	**31 (30.4%)**	**87 (15.5%)**
Substance Use Groups		
Polysubstance Use		
POM + Marijuana + Alcohol Use ***	**21 (20.6%)**	**38 (6.8%)**
POM + Marijuana Use or POM + Alcohol Use	5 (4.9%)	29 (5.2%)
Marijuana + Alcohol Use	35 (34.3%)	156 (27.6%)
Single Substance Use		
POM only	5 (4.9%)	20 (3.6%)
Marijuana Use Only	10 (9.8%)	57 (10.1%)
Alcohol Use Only	17 (16.7%)	105 (18.7%)
No Substance Use	9 (8.8%)	157 (27.9%)

Note:

* $p < .05$,

** $p < .01$ and

*** $p < .001$,

POM = prescription opioid misuse

Table 3.

Multivariate Logistic Regression Predicting Violence Perpetration (N=665)

Predictors	AOR (95% CI)
Age	0.99 (0.89–1.09)
Women versus Men	0.99 (0.60–1.64)
White and Caucasian versus Black or African American	0.65 (0.39–1.09)
Other Racial Group versus Black or African American	1.09 (0.52–2.26)
Public Assistance **	**2.03 (1.22–3.38)**
Employment Status	1.44 (0.90–2.30)
Trait Mindfulness ***	**0.97 (0.95–0.98)**
POM + Marijuana + Alcohol Use ***	**7.87 (3.24–19.14)**
POM + Marijuana Use or POM + Alcohol Use	2.76 (0.84–9.09)
POM only *	**3.58 (1.05–12.3)**
Marijuana Use + Alcohol Use **	**3.75 (1.70–8.30)**
Marijuana Use only	2.58 (0.97–6.89)
Alcohol Use only *	**3.04 (1.27–7.29)**
Post-Hoc Contrasts	
Marijuana + Alcohol Use versus Alcohol Use only	1.23 (0.63–2.40)
Marijuana + Alcohol Use versus Marijuana Use only	1.45 (0.66–3.19)
POM + Marijuana + Alcohol Use versus Alcohol Use only *	**2.59 (1.18–5.69)**
POM + Marijuana + Alcohol Use versus Marijuana Use only *	**3.05 (1.26–7.39)**
POM + Marijuana + Alcohol Use versus POM only	2.20 (0.68–7.11)
POM + Marijuana Use or POM + Alcohol Use versus Alcohol Use only	0.91 (0.30–2.77)
POM + Marijuana Use or POM + Alcohol Use versus Marijuana Use only	0.77 (0.19–3.17)
POM + Marijuana + Alcohol Use versus Alcohol + Marijuana Use *	**2.10 (1.07–4.12)**

Note:

* $p < .05$,

** $p < .01$ and

*** $p < .001$

POM = prescription opioid misuse, AOR = adjusted odds ratio, CI = confidence interval

Goodness Fit: chi-square (df = 8) = 6.8691 and p-value = .5508 indicate data fit model well.