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A Longitudinal Analysis of the Overlap between Violence and Victimization among Adults with Mental Illnesses

Kiersten L. Johnson[1,*], **Sarah L. Desmarais**[2], **Stephen J. Tueller**[3], **Kevin J. Grimm**[4], **Marvin S. Swartz**[5], and **Richard A. Van Dorn**[6]

[1]Behavioral and Urban Health Program, RTI International

[2]Department of Psychology, North Carolina State University

[3]Risk Behavior and Family Research, RTI International

[4]Department of Psychology, Arizona State University

[5]Department of Psychiatry & Behavioral Sciences, Duke University Medical Center

[6]Behavioral Health Epidemiology Program, RTI International

Abstract

Prior research suggests considerable overlap of violence perpetration and victimization among adults with mental illnesses. However, there has been no examination of how the likelihood of being a victim and/or perpetrator of violence may change over time, nor consideration of clinically-relevant factors affecting these transitions. In a pooled sample of adults with mental illnesses (N=3,473) we employed latent transition analysis to: (a) determine prevalence of four violence and victimization classifications (i.e., non-victim/non-perpetrator, victim only, perpetrator only, and victim-perpetrator) over a 6-month period; (b) calculate the likelihood that adults with mental illnesses will remain in or transition between these classifications over time; and (c) assess the effects of recent substance use, psychiatric symptoms, and suicidal behaviors on transitions over time. At each time point, the majority of participants identified as non-victim/non-perpetrators, followed by victim-perpetrators, victims only, and perpetrators only. Analyses also revealed many individuals transitioned between classifications over time. These distinct pathways towards, and away from, violent outcomes were, in part, a function of recent violence and/or victimization, as well as substance use, psychiatric symptoms, and suicidal behaviors. Findings inform the identification of adults with mental illnesses at risk of violence and victimization and highlight points of intervention.

[*]*Author Contact Information:* Kiersten L. Johnson, PhD, Behavioral and Urban Health Program, RTI International, 3040 E. Cornwallis Road, Research Triangle Park, NC 27709, Phone: 919-485-2639, kijohnson@rti.org.

Conflict of interest

None

1. Introduction

Compared to the general population, adults with mental illnesses are at heightened risk of violent outcomes, including violence perpetration (Corrigan & Watson, 2005; Swanson et al., 1990; Van Dorn et al., 2012) and violent victimization (Goodman et al., 1999; Khalifeh et al., 2015; Teplin et al., 2005). Review of the empirical literature in this population shows that there are many common risk factors for violence and victimization, such as substance use and psychiatric symptoms (e.g., Goodman et al., 2001; Silver et al., 2011; Van Dorn et al., 2012), and evidence points towards the co-occurrence of violent outcomes (e.g., Johnson et al., 2016; Swanson et al., 2002). Theoretical perspectives, such as the general theory of crime (Gottfredson & Hirschi, 1990), I^3 theory (Finkel, 2014), and the general aggression model (DeWall, Anderson, & Bushman, 2011) suggest that individual characteristics, including alcohol and drug use and exacerbated symptom profiles, may work to inhibit self-control, thus increasing the risk of both perpetration and victimization (Piquero, MacDonald, Dobrin, Daigle, & Cullen, 2005; Pratt, Turanovic, Fox, & Wright, 2013). However, there have been only a handful of investigations of the overlap between violence and victimization in adults with mental illnesses (Jennings et al., 2012; Johnson et al., 2015). Consequently, whether some individuals are at greater risk of both violence and victimization compared to only one outcome – or neither – at any given time is unknown. Moreover, no research has assessed if the likelihood of being a perpetrator and/or victim of violence changes over time, and in response to dynamic, clinically-relevant characteristics.

The few studies investigating violence and victimization in the same timeframe among adults with mental illnesses have consistently observed an overlap of violent outcomes (cf., Havassy & Mericle, 2013; Hiday et al., 2001; Silver et al., 2011). For example, secondary data on 4,474 adults with mental illnesses were examined to identify the baseline prevalence and characteristics of a typology of violence and victimization defined by four groups: non-victim/non-perpetrator, victim only, perpetrator only, and victim-perpetrator (Johnson et al., 2015). Results showed that the majority of the sample reported neither violence nor victimization in a 6-month time period. The remaining participants were more likely to report both perpetration and victimization than either outcome alone. Similar analyses conducted on a sample of 345 discharged psychiatric patients over 12 months also identified a robust overlap between outcomes: of those reporting any violence, over one-third reported both perpetration and victimization (Roaldset & Bjørkly, 2015).

Taken together, findings of extant research support an association between violence and victimization in adults with mental illnesses. However, these studies typically have been cross-sectional in nature, thus defining their intersection as static; participants are classified as victim and/or perpetrator at only one point in time. Other studies only examine the predictive impact of one violent event on a subsequent event, rather than transitions in violence classifications over time. In fact, these roles likely are dynamic in nature and may change in response to variations in clinically-relevant factors that can be targeted via risk management efforts.

If adults with mental illnesses do transition across classifications of victim and/or perpetrator, identifying characteristics associated with an escalation or de-escalation in

violent outcomes will be key to the development of risk management strategies and treatment plans. Proximal factors – that is, those that are currently present or occurred in the recent past – may be of particular relevance, as transitions between classifications of violence likely reflect changes in clinical functioning. Specifically, alcohol and drug use are known correlates of violence (Swanson et al., 2006; Van Dorn et al., 2012; Witt et al., 2013) and victimization (Goodman et al., 2001; Hiday et al., 1999; Teasdale, 2009) among adults with mental illnesses, and recent findings support their association with both outcomes in the same sample (Johnson et al., 2015; Roaldset & Bjørkly, 2015). Similarly, although the empirical evidence regarding strength and direction of associations is somewhat mixed, psychiatric symptoms are widely regarded as relevant to risk of violence and victimization in this population (Bjørkly, 2002; Douglas et al., 2009; Fazel et al., 2009; Roaldset & Bjørkly, 2015; Teasdale, 2009; Van Dorn et al., 2016). Finally, suicidal behaviors, including ideation and attempts, have been linked to increased risk of violence (Hillbrand, 2001; Witt et al., 2013; Witt et al., 2014) and victimization (Brown et al., 2013) in adults with mental illnesses; recent findings have also demonstrated stronger associations with violence *and* victimization than associations observed with either outcome alone (Roaldset & Bjørkly, 2015). In sum, the factors examined in this study are clinically-relevant and may be targeted in treatment to minimize high or maintain low violence risk.

1.1 The present study

The goals of the present study were threefold. First, we sought to examine the overlap between violence and victimization over time in a large, heterogeneous sample of adults with mental illnesses (N=3,473). Second, we sought to determine whether adults with mental illnesses transition between classifications of victim and/or perpetrator of violence over time. Third, we sought to identify whether proximal, clinically-relevant indicators are associated with transitions between or persistence in these classifications over time. To that end, we employed latent transition analysis (LTA) to: (1) determine the prevalence of violence and victimization as defined by four classifications – non-victim/non-perpetrator, victim only, perpetrator only, and victim-perpetrator – over the 6-month study period; (b) calculate the likelihood that adults with mental illnesses will remain in or transition between these classifications over 3-month and 6-month periods; and (c) assess the effects of recent substance use, psychiatric symptoms, and suicidal behaviors on transitions from non-victim/non-perpetrator and victim-perpetrator classifications over 3-month and 6-month periods.

2. Methods

2.1 Data

Data were pooled from four studies of adults with mental illnesses: (1) Facilitated Psychiatric Advance Directive Study (n=473; Swanson et al., 2006); (2) MacArthur Mental Disorder and Violence Risk Study (n=1,136; Steadman et al., 1998); (3) Schizophrenia Care and Assessment Program (n=404; Swanson et al., 2004); and (4) Clinical Antipsychotic Trials of Intervention Effectiveness Study (n=1,460; Lieberman et al., 2005). These studies enrolled a range of participants, from exacerbated inpatients to partially remitted outpatients. A total of 3,473 adults with mental illnesses were included at baseline. Longitudinal analyses across 3- and 6-month time frames included samples of 908 and 2,512 participants,

respectively. Sampling and inclusion criteria for each data source are described briefly below.

2.1.1 Facilitated Psychiatric Advance Directive Study (F-PAD)—A random sample of clients prescreened for eligibility was obtained from two North Carolina mental health systems. Inclusion criteria were: (a) 18–65 years of age; (b) schizophrenia-spectrum or major mood disorder; and (c) in treatment at the time of the study. Data collection began in 2003; assessments used in the present study were conducted at baseline and 6-month follow-up.

2.1.2 MacArthur Mental Disorder and Violence Risk Study (MacRisk)—Eligible participants were sampled from three acute inpatient facilities, with recruitment adjusted to maintain a consistent distribution of age, sex, and ethnicity across sites. Inclusion criteria were: (a) English-speaking White, Black, or Hispanic patients; (b) 18–40 years of age; and (c) schizophrenia-spectrum, depression, mania, brief reactive psychosis, or delusional disorder. Data were collected through participant and collateral interviews and hospital abstractions beginning in 1992; the present study used assessments conducted at baseline, 3-month, and 6-month follow-ups.

2.1.3 Schizophrenia Care and Assessment Program (SCAP)—Participants were recruited from treatment facilities across North Carolina using both sequential inpatient admissions and a random selection of outpatients, with eligibility limited to: (a) 18 years of age or older; (b) schizophrenia; and (c) current service use. Data collection began in 1997; we include assessments from baseline and 6-month follow-up in the present analyses.

2.1.4 Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE)—Participants were recruited from 57 sites across the United States. Inclusion criteria were: (a) 18–65 years of age; (b) schizophrenia; and (c) ability to take oral antipsychotics. Data collection began in 2001. The present study includes assessments from baseline and 6-month follow-up, as well as any end-of-phase assessments conducted prior to 6-month follow-up.

The current study protocol was approved by IRBs from North Carolina State University, RTI International, and Arizona State University. All participants in the source studies gave written informed consent.

2.2 Measures

2.2.1 Outcome variables—Prevalence and severity of community violence and victimization was assessed in all studies using the MacArthur Community Violence Screening Instrument (MCVSI; Steadman et al., 1998). The MCVSI is comprised of eight questions each for violence and victimization, derived from the Revised Conflict Tactics Scale (CTS2; Straus et al., 1996). The questions assess: (a) pushing, grabbing, or shoving; (b) kicking, biting, or choking; (c) slapping; (d) throwing an object; (e) hitting with a fist or object; (f) sexual assault; (g) threatening with a weapon in hand; and (h) using a weapon. For each item, participants are first asked if someone did this to them, then if they did this to someone else. In addition to its inclusion in the parent studies, the MCVSI has been used in other studies assessing community violence (e.g., Davidson et al., 2009; Michie & Cooke,

2006). For the present analyses, we dichotomized responses of "violence" (e.g., choking) and "other aggressive acts" (e.g., throwing an object) to obtain prevalence of violent outcomes by 3- and 6-month follow-ups.[1]

2.2.2 Covariates—*Alcohol* and *drug use* were assessed at baseline with multiple measures across studies, including the CAGE questionnaire (Mayfield et al., 1974), urine drug screens, self-report, the Alcohol and Drug Use Scales (Drake et al., 1990), and the Structured Clinical Interview for DSM-IV (SCID; First et al., 1996). We harmonized data across studies with 3-level summary variables (0=abstinence, 1=non-problematic use, 2=problematic use).

Psychiatric symptoms were assessed at baseline with the Positive and Negative Syndrome Scale (Kay et al., 1987) in the CATIE and SCAP, and the BPRS in the F-PAD and MacRisk. The MacRisk additionally used the MacArthur-Maudsley Delusions Assessment Schedule (Appelbaum et al., 1999). Briefly, a factor analytic cross-validation approach was employed with exploratory factor analyses conducted on a 50% random sample of data where four factors were identified.[2] These factors retained all items, and included *affective* (e.g., anxiety, depression, hostility), *positive* (e.g., delusions, suspiciousness, grandiosity), *negative* (e.g., social withdrawal, blunted affect, emotional withdrawal), and *disorganized cognitive processing (DCP)* (e.g., poor impulse control, excitement, mannerisms & posturing) symptoms. This model was then evaluated and supported using a confirmatory factor model with the remainder of the data, with good model fit (CFI = 0.915, RMSEA = 0.078, TLI = 0.906) (Van Dorn et al., 2016). Factor scores for each latent variable were then created from unidimensional factor models using expected a posteriori (EAP) estimates. EAP estimates are calculated as the mean of the posterior predicted distribution of scores for an individual based on his/her response pattern and the estimated model parameters. The factor scores account for incomplete data and are based on the items to which the individual responded.

Indicators of *suicidal ideation* and *suicide attempt* were harmonized across studies. For each outcome, we created a dichotomous variable (yes/no) of any ideation or attempt in the six months prior to baseline.

2.3 Data analysis

Descriptive statistics were calculated for all covariates at baseline using SPSS v.22. Subsequent analyses were conducted with Mplus 7.31 (Muthén & Muthén, 1998–2014). Model specification for the LTA was informed by prior work identifying a typology of violence and victimization among adults with mental illnesses (Johnson et al., 2015); accordingly, two parameter restrictions were imposed. First, groups were specified using fixed thresholds, such that group membership was directly derived from reported violence and victimization (e.g., an individual reporting victimization, but not violence, was identified

[1]Due to varied assessment schedules across parent studies, only CATIE and MacRisk participant data were available for inclusion in 3-month analyses.

[2]The MacArthur Mandated Community Treatment Study (Monahan et al., 2005), in addition to the four longitudinal studies, was used in the calculation of factor scores for psychiatric symptoms.

as a victim only at the corresponding time point). Second, these thresholds were held to be equal over time, signifying measurement invariance.

We conducted an initial model in LTA to obtain prevalence of the four groups at baseline, 3-month follow-up, and 6-month follow-up and calculate probabilities of transitioning between these groups from baseline to 3-month follow-up and from baseline to 6-month follow-up. We then ran a series of LTA models to calculate multinomial logistic regression coefficients linking baseline covariates to transitions between groups over the 3-month and 6-month periods. Specifically, we assessed the bivariate, predictive effects of baseline measures of recent substance use, psychiatric symptoms, and suicidal behaviors on transition probabilities. Separate models were conducted with non-victim/non-perpetrator and victim-perpetrator classifications used as reference classes. Mplus uses full information maximum likelihood to estimate transition probabilities. Listwise deletion was used in cases of missing data for regression analyses. Given the number of effects, we implemented a Benjamini and Hochberg adjustment, which is a false discovery rate adjustment for p-values and is more appropriate than family-wise error rate adjustments (Glickman, Rao, & Schultz, 2014).

3. Results

Frequencies and means for covariates across non-missing and missing cases are reported in Table 1. At baseline, the majority of the sample indicated abstinence from alcohol and drugs. Problematic use of alcohol was reported by approximately one-fourth of participants; problematic use of drugs, by about one-fifth. Roughly one-third of the sample reported suicidal ideation, and over one-tenth reported an actual attempt. Baseline characteristics of the participants who were present at follow-up interviews differed from those who were not present in several ways (see Table 1); in general, those present at 3- and 6-month follow-up exhibited poorer psychosocial functioning at baseline. These factors were included as predictors in subsequent analyses. All parent studies reported significant levels of violence and victimization at all three time points.

Results of the first LTA model (without covariates) are presented in Table 2. Specifically, the top section shows the prevalence of classifications at baseline, 3-month follow-up, and 6-month follow-up observed in participants at each time point. The majority of participants identified as non-victim/non-perpetrator at all three time points, followed by victim-perpetrator, victim only, and perpetrator only.

The bottom section of Table 2 shows transition probabilities between baseline and 3-month follow-up and baseline and 6-month follow-up. The bolded, diagonal values represent stability in a group from one time point to the next. For example, 89.9% (n = 1,953) of those who were classified as non-victim/non-perpetrator at baseline maintained that classification through three months. Off-diagonal values indicate movement across groups. For example, 4.5% (n = 98) of those classified as non-victim/non-perpetrator at baseline were re-classified as victim only by three months. Estimates for both transition periods (i.e., from baseline to 3-month follow-up and from baseline to 6-month follow-up) indicated that non-victim/non-perpetrators at baseline were likely to persist in that role over time. In contrast, victims and/or perpetrators were more likely to move across groups than to remain stable; these

participants were most likely to report no violent outcome at follow-up assessments or, less frequently, both violence and victimization.

Table 3 presents odds ratios for the effects of covariates on transitions away from non-victim/non-perpetrator and victim-perpetrator classifications between baseline and 3-month follow-up. In comparison to the LTA without covariates, all covariate models reported lower AIC and BIC values and significant changes in −2 log likelihood values ($ps < .001$), indicating improved model fit. When non-victim/non-perpetrator at baseline served as reference in regression analyses, all covariates (with the exception of affective and positive symptoms) demonstrated significant predictive effects over time. As shown in the leftmost columns, alcohol use increased the risk of victimization or violence *and* victimization by 3-month follow-up; drug use increased the risk of victimization only. Increased negative symptoms were associated with a decreased likelihood of experiencing both violence and victimization, whereas increased DCP symptoms were associated with a decreased likelihood of perpetration only. Reports of suicidal behaviors at baseline were associated with increased risk of victimization only, as well as violence and victimization, by 3-month follow-up.

When the baseline reference group consisted of victim-perpetrators, alcohol use, affective, positive, and DCP symptoms were associated with transitions from baseline to 3-month follow-up. Alcohol use significantly decreased the likelihood of violence in the absence of victimization. Decreased affective symptoms were associated with a transition to no violent outcomes by 3-month follow-up. Increased positive symptoms were associated with reports of only victimization by 3-month follow-up, and increased DCP symptoms were associated with reporting no perpetration nor victimization.

Table 4 presents odds ratios for the effects of covariates on transitions away from non-victim/non-perpetrator and victim-perpetrator classifications between baseline and 6-month follow-up. When participants identified as non-victim/non-perpetrator at baseline, increased negative and DCP symptoms lessened the odds of reporting both violence and victimization at 6-month follow-up. As was the case with 3-month analyses, suicidal ideation and suicide attempt increased the risk of victimization as well as violence and victimization from baseline to 6-month follow-up. Notably, baseline alcohol and drug use did not demonstrate significant predictive effects in increasing the risk of someone moving from the non-violent/non-perpetrator classification to one of the violence classifications by 6-month follow-up.

When victim-perpetrators at baseline served as reference group, all covariates demonstrated varying degrees of significant predictive effects. Specifically, both alcohol and drug use decreased the likelihood that participants would transition to another classification over the 6-month period. There was an inverse relationship between affective symptoms and transitioning to non-victim/non-perpetrator or victim only by 6-month follow-up when someone started as a victim-perpetrator; conversely, increased negative symptoms were associated with transitioning from victim-perpetrator at baseline to another classification by six months. Heightened positive and DCP symptoms both increased the likelihood of moving from the victim-perpetrator classification at baseline to the non-victim/non-

perpetrator classification by six months. Suicidal behaviors significantly decreased the likelihood that participants would move to any other classification by 6-month follow-up.

4. Discussion

4.1 Summary of findings

At baseline, the majority of participants identified as non-victim/non-perpetrators (62.5%), followed by victim-perpetrators (18.7%), victims only (13.2%), and perpetrators only (5.3%). Though this ordering remained unchanged at 3- and 6-month follow-up, transition probabilities yielded by LTA demonstrated that many individuals did transition between classifications of victim and/or perpetrator. Prior research has demonstrated heterogeneity in violent events for this population, and with similar rates across violence classifications (Silver et al., 2011; Roaldset & Bjørkly, 2015). We additionally find that involvement in violent events changes over time, and in estimable ways that are associated with clinically-relevant factors. Specifically, observed escalations and de-escalations in violent outcomes over different time periods – and the role of substance use, psychiatric symptoms, and suicidal behaviors in those transitions – highlight potential intervention points for this population.

Results showed that the role of clinical factors in the escalation of violent outcomes – that is, their effects in transitions away from non-victim/non-perpetrator status at baseline – demonstrated a greater number of significant effects over the 3-month, rather than 6-month period, though the direction of effects remained the same across both time frames. By 3-month follow-up, results showed that increased alcohol use, drug use, and suicidal behaviors increased the risk of reporting victimization or both violence and victimization. Decreased negative and DCP symptoms were also associated with a heightened likelihood of reporting both violent outcomes. By 6-month follow-up, increased suicidal behaviors and decreased negative and DCP symptoms remained positively associated with risk of violent outcomes. Specifically, suicidal behaviors increased the likelihood of victimization or violence and victimization, and decreased negative and DCP symptoms increased the risk of reporting both violence and victimization.

In contrast, results demonstrated that the role of clinical factors in the de-escalation of violent outcomes over time – that is, their effects in transitions away from victim-perpetrator status at baseline – was more prominent over the 6-month period, though again, the direction of effects were mirrored across both time periods. By 3-month follow-up, results showed that alcohol use decreased the likelihood of transitioning to perpetrator only status. Increased affective symptoms lessened the likelihood of transitioning to non-victim/non-perpetrator status; increased positive and DCP symptoms were associated with de-escalations to victimization and no violent outcomes, respectively. Over the 6-month follow-up period, increased alcohol and drug use, affective symptoms, and suicidal behaviors lessened the likelihood of transitioning to another classification, whereas increased positive, negative, and DCP symptoms heightened the likelihood of de-escalation.

These findings, which offer insight into the role of clinical factors in the escalation or de-escalation of violent outcomes over time, are consistent with some prior studies examining

the correlates of violence and victimization (albeit as separate outcomes and without a specific focus on transitions between violence classifications). For example, alcohol and drug use have been identified as correlates of violence (Swanson et al., 2006; Van Dorn et al., 2012; Witt et al., 2013) and victimization (Goodman et al., 2001; Hiday et al., 1999). Additionally, recent findings showed significant effects on both outcomes in the same sample (Roaldset & Bjørkly, 2015). Our analyses demonstrate that alcohol use is involved with transitions towards violence, on the one hand, but also that decreased alcohol use is associated with transitions away from violence, on the other hand. As such, integrated interventions, such as dual diagnosis motivational interviewing, may minimize high or maintain low risk of violence and victimization associated with alcohol use (Drake, Mueser, Brunette, & McHugo, 2004; Swanson, Pantalon, & Cohen, 1999).

Prior research has also considered the role of psychiatric symptoms in predicting violence (Johnson et al., 2016), and violence and victimization (Roaldset & Bjørkly, 2015; Silver et al., 2011), though the operational definitions of violence and victimization differed in the latter studies. Our study investigated the effects of a 4-factor model of psychiatric symptoms (Van Dorn et al., 2016) on both violence and victimization. Overall, our findings show that decreased positive, negative, and DCP symptoms and increased affective symptoms were generally associated with worse outcomes and thus provide multiple targets for risk management efforts. Indeed, significant effects of psychiatric symptoms in the escalation and de-escalation of violent outcomes were more likely than that of alcohol and drug use to emerge across both 3- and 6-month time frames. Cognitive behavioral and psychopharmacological interventions to address internalizing and externalizing symptoms across all four factors may work to decrease risk of violent outcomes (Van Dorn et al., 2016). The affective factor, in particular, likely has direct and indirect effects on violence risk. For example, hostility (one of the included items) is associated with violence, medication noncompliance, impaired insight, and substance use (Bartels, Drake, Wallach, & Freeman, 1991; Czobor et al., 2015; Lindenmayer et al., 2009; Volavka, Czobor, Citrome, & Van Dorn, 2014; Volavka et al., 2016). As a result, an increase in affective symptoms should prompt further investigation of clinical functioning across other domains to inform assessment of violence risk and the subsequent treatment response.

Prior research has also observed associations of suicidal behaviors with violence (Hillbrand, 2001; Witt et al., 2013; Witt et al., 2014) and victimization (Brown et al., 2013). The present study is among the first to assess the effects of suicidal ideation and attempt on both outcomes in the same sample (see Roaldset & Bjørkly, 2015). Our findings highlight the role of suicidal behaviors in the escalation from no violent outcomes to victimization-only or both violence and victimization over both 3- and 6-month periods, as well as in the de-escalation from both violent outcomes to another violence classification over a 6-month period. This latter finding suggests that the effects of suicidal behaviors on short-term violence and victimization may be tempered by the recent occurrence of violent outcomes. Nevertheless, the relationship between suicidal behaviors and violent outcomes provides another target for clinical intervention, vis-à-vis clinical assessment and provision of tailored treatment (e.g., medication monitoring, cognitive behavioral therapy).

Finally, our tests of statistical significance were based on a Benjamini and Hochberg adjustment. This adjustment is notable as substance use, psychiatric symptoms, and suicide-related behaviors were significantly associated with additional transitions without the adjustment. For example, while affective symptoms were inversely and significantly associated with transitioning from victim-perpetrator to non-victim/non-perpetration (i.e., away from violent behaviors) at 3-month follow-up with the Benjamini and Hochberg adjustment, a similar trend was found for affective symptoms and an escalation towards violence perpetration and victimization as separate outcomes in the same follow-up period. Specifically, with odds ratios of 1.49 (NVNP to VO) and 1.94 (NVNP to PO), affective symptoms for these two outcomes had adjusted p-values of .059 and unadjusted p-values of .022 and .019, respectively. In another example, the unadjusted effect for suicide attempts in the escalation towards violence perpetration was significant (p=.021) with an odds ratio of 3.47, whereas the adjusted effect was not (p=.059). Additional trends were noted for alcohol use in the transition away from violent behaviors at 3-month follow-up; while alcohol use was inversely and significantly associated with the transition from victim-perpetrator to perpetrator only, unadjusted effects for the transitions to non-victim/non-perpetrator (OR=0.75) and victim only (OR=0.69) were also significant with p-values of .033 and .047, respectively; adjusted p-values were .083 and .107. While we maintain that our implementation of adjusted p-values was methodologically appropriate given the number of effects examined simultaneously, examination of the unadjusted effects is also worthwhile to inform future research and begin to develop a cumulative science related to clinically-relevant factors that can be addressed within effective risk management strategies.

4.2 Implications

Our findings show that adults with mental illnesses vary in their involvement in violent events. Notably, the majority of our sample did not report violence or victimization; those who did were more likely to transition from one classification to another over the 6-month study period, thus illustrating that one's classification as a victim and/or perpetrator is not fixed. This enhanced perspective on the "dangerousness" of adults with mental illnesses – or rather, the diversity of their violence or victimization – may translate to improved public perceptions and an increase in service use in this population (Corrigan, 2004). Furthermore, modifiable, clinicallyrelevant factors are associated with escalations or de-escalations in violence and victimization; clinicians can use these associations as points of leverage in treatment.

In showing that recent violence and/or victimization create distinct pathways to future violent outcomes, findings offer important insights for clinical practice. Notably, non-victim/non-perpetrators and victim-perpetrators exhibited particular susceptibility to violent outcomes as a function of clinical characteristics over 3-month and 6-month follow-ups, respectively. Consideration of these pathways, as well as the differing effects of substance use, psychiatric symptoms, and suicidal behaviors, may assist clinicians in identifying those at risk of future violence and/or victimization. Our findings support mounting evidence of the importance of proximal, clinically-relevant factors in routine and ongoing risk assessment and management approaches (Johnson et al., 2016; McNiel et al., 2003; Sadeh et al., 2014). Indeed, clinical characteristics were especially predictive of an escalation in

violent outcomes over the shorter, 3-month follow-up period. Moreover, the change in risk of violent outcomes was signified by multiple factors, suggesting that violence risk assessment is not only an iterative process, but one that requires actively attending to how a change in one domain of functioning affects or is reflected in changes in another.

Furthermore, findings from the present study can assist clinicians in the tailoring of treatment according to recent involvement in violent outcomes. For example, for a patient who has recently been involved in violent outcomes, both as perpetrator and victim, short-term violence prevention may be most effective when incorporating evidence-based practices to reduce alcohol use and manage high affective symptoms while attending to the effects of low negative and DCP symptoms. Violence prevention over a longer period of time (e.g., six months or longer) may additionally include treatment to reduce drug use and suicidal behaviors, while still attending to improvements in positive symptoms and how that affects other domains of functioning. In contrast, for someone who has not been involved in recent violence or victimization, short-term treatment to effectively maintain low violence risk may work best when implementing evidence-based practices for substance use and suicidal behaviors, with attention also being paid to negative and DCP symptomatology. Over longer periods of time, clinical focus is best directed at symptom management (particularly negative and DCP symptoms) and suicidal behaviors.

4.3 Limitations

Findings of the present study should be considered in light of its limitations. First, violence and victimization data were derived from self-report and are thus susceptible to effects of social desirability, recall bias, and other errors. Though self-report has been found to be a reliable and valid method in violence and victimization research (Huizinga & Elliott, 1986; Van Dorn et al., 2010), other sources (e.g., hospital and arrest records) may capture additional violent events. Second, attrition and variation in assessment times across studies resulted in missing outcome data at 3-month and 6-month follow-ups. Comparisons between 3- and 6-month follow-ups revealed significant differences in missing and non-missing cases, such that participants present at follow-up assessments had poorer psychosocial functioning at baseline. Results may thus not generalize to lower risk populations. Third, we assess the incidence – not the context – of violent outcomes. As a result, we are unable to determine, in the case of victim-perpetrators, if violence preceded victimization, victimization preceded violence, or violence and victimization occurred simultaneously. Across studies, however, violence in self-defense was not counted as perpetration. Fourth, the included studies all take place in the United States. Findings may not generalize to countries with differing societal contexts and mental health systems. Fifth, we focused on several proximal, clinically-relevant characteristics, but there are other factors that may provide further insight into transitions across violence classifications, such as homelessness and access to treatment. Moreover, static factors such as sex may warrant consideration in further research, though, in the present study, chi-square test results indicated that sex did not affect transitions across violence classifications; this is illustrated in the Supplemental Figure. Finally, we conducted bivariate analyses to assess the individual effects of factors at both follow-up assessments. Further research is needed to examine unique effects of or potential interactions among factors that increase or decrease risk.

4.4 Conclusions

This paper examines the classification of victims and/or perpetrators over time among adults with mental illnesses, and assesses the effects of proximal, clinically-relevant variables on transitions between classifications over 3- and 6-month periods. Findings point to heterogeneity in risk of violent outcomes. Notably, many individuals transitioned between classifications of victim and/or perpetrator during 3-month and 6-month follow-ups. Indeed, distinct pathways to future violent outcomes emerged as a function of recent violence and/or victimization, as well as modifiable clinically-relevant factors, including psychiatric symptoms, substance use, and suicidal behaviors. Consideration of these pathways and associated factors may assist in the identification of adults with mental illnesses at acute or persistent risk of violence and victimization. Furthermore, our findings on the differing effects of substance use, psychiatric symptoms, and suicidal behaviors offer insight into how interventions may be tailored to minimize high or maintain low violence risk and, ultimately, improve outcomes for adults with mental illnesses.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Experiences with violent outcomes vary widely among adults with mental illnesses.
- An individual's classification as a victim and/or perpetrator may change over time.
- Clinical characteristics are associated with changes in classification over time.
- Interventions targeting clinical characteristics may prevent violent outcomes.

Table 1

Frequencies and Means of Covariates.

	Full Sample (*N*=3,473)		3-Month Follow-Up (*N*=908)					6-Month Follow-Up (*N*=2,512)				
			Non-Missing		Missing			Non-Missing		Missing		
	n	*%*	*n*	*%*	*n*	*%*	*p*	*n*	*%*	*n*	*%*	*p*
Study							<.001					<.001
F-PAD	473	13.6	0	0.0	473	18.4		381	15.2	92	9.6	
MacRisk	1,136	32.7	845	93.1	291	11.3		855	34.0	281	29.2	
SCAP	404	11.6	0	0.0	404	15.8		339	13.5	65	6.7	
CATIE	1,460	42.0	63	6.9	1,397	54.5		936	37.3	525	54.5	
Baseline Alcohol Use							<.001					<.001
Abstinence	2,474	55.3	270	29.8	2,204	61.8		1,286	51.3	1,188	60.4	
Non-problematic use	858	19.2	254	28.0	604	16.9		534	21.3	324	16.5	
Problematic use	1,141	25.5	382	42.2	759	21.3		686	27.4	455	23.1	
Baseline Drug Use							<.001					<.001
Abstinence	3,022	67.7	470	51.9	2,552	71.7		1,629	65.1	1,393	70.9	
Non-problematic use	476	10.7	143	15.8	333	9.4		301	12.0	175	8.9	
Problematic use	969	21.7	293	32.3	676	19.0		572	22.9	397	20.2	
Baseline Suicidal Ideation							<.001					.006
No	2,913	65.2	301	33.2	2,612	73.4		1,588	63.5	1,325	67.5	
Yes	1,552	34.8	606	66.8	946	26.6		913	36.5	639	32.5	
Baseline Suicide Attempt							<.001					<.001
No	3,928	88.0	588	64.9	3,340	93.9		2,145	85.8	1,783	90.8	
Yes	536	12.0	318	35.1	218	6.1		355	14.2	181	9.2	
Baseline Symptoms (M±SD)												
Affective	.26±.89		.59±.99		.18±.84		<.001	.30±.90		.21±.88		<.001
Positive	.09±.93		−.11±1.05		.15±.89		<.001	.19±.94		−.03±.91		<.001
Negative	−.07±.92		−.32±.88		−.01±.92		<.001	.04±95		−.22±.87		<.001
DCP	−.02±.88		−.36±.77		.07±.89		<.001	.09±.91		−.15±.83		<.001

Notes. %=valid percent. Means of variables were compared across missing and non-missing participants by *t* tests, and proportions were compared by chi square tests.

Table 2

Prevalence and transition probabilities of observed class over time.

Prevalence		Observed Class							
		NVNP		VO		PO		VP	
		n	%	*n*	%	*n*	%	*n*	%
Baseline		2,172	62.5	456	13.2	182	5.3	647	18.7
3-Month Follow-Up		499	55.0	130	14.3	72	7.9	207	22.8
6-Month Follow-Up		1,781	70.9	191	7.6	115	4.6	425	16.9
Transition probabilities		3-Month Follow-Up							
		NVNP		VO		PO		VP	
Baseline	NVNP	**.899**		.045		.017		.040	
	VO	.577		**.211**		.055		.156	
	PO	.591		.053		**.193**		.162	
	VP	.457		.142		.082		**.319**	
		6-Month Follow-Up							
		NVNP		VO		PO		VP	
Baseline	NVNP	**.831**		.051		.034		.083	
	VO	.533		**.170**		.053		.243	
	PO	.547		.052		**.151**		.251	
	VP	.422		.115		.069		**.393**	

Notes. %=valid percent. NVNP=non-victim/non-perpetrator; VO=victim only; PO=perpetrator only; VP=victim-perpetrator. Bolded transition values represent the probability of staying in the same class.

Table 3

Effects of covariates on class transitions between baseline and 3-month follow-up.

	NVNP at baseline						VP at baseline					
	VO		PO		VP		NVNP		VO		PO	
Substance use	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Alcohol use	1.56**	1.21–2.01	1.31	0.79–2.17	2.58***	1.91–3.48	0.75	0.58–0.98	0.69	0.48–1.00	0.54*	0.34–0.85
Drug use	1.46*	1.10–1.92	1.25	0.74–2.10	1.35	1.01–1.81	0.88	0.70–1.12	0.93	0.67–1.30	0.89	0.58–1.37
Psych. symptoms												
Affective	1.49	1.06–2.09	1.94	1.11–3.40	1.22	0.86–1.74	0.75*	0.60–0.94	1.06	0.76–1.47	0.96	0.68–1.35
Positive	0.73	0.49–1.07	0.59	0.30–1.16	0.77	0.55–1.07	1.07	0.86–1.34	1.54*	1.14–2.09	1.15	0.79–1.67
Negative	0.67	0.48–0.93	0.70	0.46–1.05	0.63*	0.47–0.84	1.15	0.90–1.46	1.18	0.83–1.68	1.34	0.89–2.02
DCP	0.68	0.47–1.00	0.28***	0.14–0.56	0.70	0.52–0.95	1.56**	1.20–2.04	1.35	0.93–1.96	1.24	0.83–1.87
Suicidal behavior												
Ideation	2.22*	1.33–3.72	2.18	0.90–5.29	2.43**	1.42–4.18	0.67	0.43–1.06	0.96	0.50–1.83	1.44	0.59–3.52
Attempt	4.43***	2.39–8.24	3.47	1.21–9.97	3.47***	1.75–6.89	0.66	0.42–1.04	0.59	0.31–1.14	0.78	0.35–1.73

Notes. n=908.

* $p < .05$

** $p < .01$

*** $p < .001$.

NVNP=non-victim/non-perpetrator; VO=victim only; PO=perpetrator only; VP=victim-perpetrator.
Top row indicates reference group in multinomial regression; the row below indicates groups at 3-month follow-up.

Table 4

Effects of covariates on class transitions between baseline and 6-month follow-up.

	NVNP at baseline						VP at baseline					
	VO		PO		VP		NVNP		VO		PO	
Substance use	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Alcohol use	1.08	0.73–1.58	0.95	0.63–1.44	1.40	0.98–2.01	0.29***	0.21–0.41	0.48**	0.32–0.74	0.55*	0.36–0.85
Drug use	0.91	0.56–1.48	1.12	0.75–1.69	1.06	0.70–1.61	0.30***	0.22–0.42	0.53**	0.36–0.79	0.61*	0.40–0.92
Psych. symptoms												
Affective	1.47	0.93–2.33	0.99	0.63–1.56	1.39	0.98–1.97	0.30***	0.20–0.45	0.57*	0.38–0.85	0.69	0.41–1.15
Positive	0.74	0.47–1.18	0.72	0.47–1.08	0.71	0.44–1.17	4.17*	1.45–12.01	1.17	0.61–2.24	1.39	0.61–3.18
Negative	0.72	0.47–1.10	0.68	0.47–0.99	0.72*	0.54–0.96	5.84***	3.05–11.16	2.84*	1.38–5.82	2.36*	1.20–4.61
DCP	0.74	0.46–1.20	0.83	0.53–1.31	0.59*	0.40–0.87	7.25***	3.69–14.24	1.61	0.79–3.28	2.11	0.91–4.89
Suicidal behavior												
Ideation	2.88*	1.38–5.99	1.49	0.66–3.36	4.85***	2.38–9.89	0.05***	0.03–0.11	0.38*	0.18–0.79	0.27*	0.11–0.68
Attempt	3.18*	1.36–7.43	1.48	0.42–5.22	10.26***	5.21–20.22	0.07***	0.04–0.14	0.30*	0.13–0.71	0.24*	0.09–0.65

Notes. n=2,512.

* $p < .05$

** $p < .01$

*** $p < .001$.

NVNP=non-victim/non-perpetrator; VO=victim only; PO=perpetrator only; VP=victim-perpetrator.
Top row indicates reference group in multinomial regression; the row below indicates groups at 6-month follow-up.