

Psychosis Uncommonly and Inconsistently Precedes Violence Among High-Risk Individuals

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Abstract

A small group of individuals with mental illness is repeatedly involved in violence. Little is known about how *often* and how *consistently* these high-risk individuals experience delusions or hallucinations just before a violent incident. To address these questions, data from the MacArthur Violence Risk Assessment Study were used to identify 305 violent incidents associated with 100 former inpatients with repeated violence (representing 50% of incidents and 9% of participants) and test whether psychosis-preceded incidents cluster within individuals. Results indicated that (a) psychosis immediately preceded 12% of incidents, (b) individuals were “fairly” consistent in their violence type (ICC = .42), and (c) those with exclusively “non-psychosis-preceded” violence (80%) could be distinguished from a small group who also had *some* psychosis-preceded violence (20%). These findings suggest that psychosis sometimes foreshadows violence for a fraction of high-risk individuals, but violence prevention efforts should also target factors like anger and social deviance.

Keywords

violence, psychosis, risk factors, violence prevention

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Recent mass shootings in Connecticut, Virginia, and Washington, D.C., by individuals who ostensibly have a mental illness have generated tremendous media attention and public concern. Because these shootings are rare, they are difficult to study systematically and little is known about them (Mulvey & Cauffman, 2001). In comparison, a great deal is known about violence toward others, as a general class of behavior. According to the best estimates, only 4% of violence in the United States can be attributed to people with mental illness (Swanson, 1994), and mental illness is a modest risk factor for violence (Monahan et al., 2001). Indeed, people with and without mental illness share robust risk factors for violence (e.g., past violence; Bonta, Blais, & Wilson, 2013).

Violence tends to be concentrated in a small fraction of both the general (Blumstein, Cohen, Roth, & Visser, 1986) and patient populations (Gardner, Lidz, Mulvey, & Shaw, 1996); members of these subgroups display repeated violence and account for the majority of

incidents. If the policy goal is to maximize public safety, then effective risk reduction for these individuals seems a priority. For example, high-risk patients often have histories of arrest (suggesting that they were once involved in the correctional system), and meta-analytic studies indicate that correctional services are most effective in preventing recidivism when they intensively treat high-risk individuals (Andrews, 2012).

What *kind* of mental health services are patients with repeated violence likely to receive? Services seem particularly likely to target psychotic symptoms because they are (a) salient and distinctive features of mental illness (compared with symptoms like anger, which are also

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found in the general population; Novaco, 2011) and (b) prominently featured in discourse about violence (Douglas, Guy, & Hart, 2009). Advocates of involuntary treatment (Torrey, 2011) assert that untreated psychosis can lead directly to violence. This assertion leverages the conclusion of research reviews in the 1990s, which suggested that “it is not simply the presence of mental illness that induces violence, but rather the specific presence of delusions and hallucinations” (Junginger, 1996, p. 92). For example, a patient with persecutory delusions may preemptively strike out to “protect” herself or himself (Link & Stueve, 1994).

Some research has drawn the strength of these early conclusions into question (Appelbaum, Robbins, & Monahan, 2000; Skeem et al., 2006; Ullrich, Keers, & Coid, 2013) and indicated that psychosis and violence are more weakly correlated in clinical than community samples (Douglas et al., 2009). Among psychiatric patients, psychosis may only occasionally precede violence. In one of the most rigorous studies conducted, the MacArthur Violence Risk Assessment Study, researchers repeatedly interviewed former inpatients for 1 year after discharge. Patients were asked to describe what they were thinking and feeling at the time of each violent incident, and their descriptions were later rated by clinicians. Only 11% of incidents involved patients who were delusional or experienced hallucinations at the time of the incident (Monahan & Steadman, 2012). Similar results have been obtained in studies of psychosis and criminal behavior among justice-involved people with mental illness (4% of arrests: Junginger, Claypoole, Laygo, & Cristiani, 2006; Peterson, Skeem, Kennealy, Bray, & Zvonkovic, 2014; 5% of people: Peterson, Skeem, Hart, Vidal, & Keith, 2010).

It is unclear whether these results generalize to high-risk patients. Some speculate that a small group of individuals are caught in a “revolving door” of hospitalization or imprisonment because cycles of untreated symptoms repeatedly lead to violence and other criminal behavior (e.g., Baillargeon, Binswanger, Penn, Williams, & Murray, 2009; Lamberti, 2007). Others have found little evidence for this proposition (see Oyffe, Kurs, Gelkopf, Melamed, & Bleich, 2009, though this context involves longer hospitalizations).

In this study, we use MacArthur data to address two questions relevant to risk reduction efforts for individuals with repeated involvement in violence (i.e., “high-risk” individuals):

1. For the high-risk group *as a whole*, how often do delusions or hallucinations immediately precede violent incidents? Given past findings for patients with varying risk (Monahan & Steadman, 2012) and the weak relationship between psychosis and violent reoffending (Skeem, Manchak, & Peterson,

2011), we hypothesize the answer will be “occasionally” (<15% of incidents).

2. *Within* high-risk individuals, how *consistently* does psychosis precede violence over time, across incidents? Even if psychosis rarely precedes violence for the group as a whole, it may consistently precede violence for a subgroup. We hypothesize that the relationship between psychosis and violence will be moderately consistent—that psychosis will consistently precede violence for a small minority of individuals, and consistently *not* precede violence for the remainder. This expectation is based on (a) theory that, for most individuals, mental illness is either independent of violence or causes it indirectly, by creating vulnerability to general risk factors like substance abuse (Skeem et al., 2011), and (b) observations that a small subgroup of justice-involved people with mental illness have a pattern of criminal behavior directly motivated by psychosis (Peterson et al., 2010)

To our knowledge, this study is the first to address the “consistency” question. Rather than directly test the hypothesis that psychosis-related (or -unrelated) incidents cluster within patients, investigators tend to overlook this issue and use a single unit of analysis (i.e., incidents, arrests, or individuals; Junginger et al., 2006; Monahan & Steadman, 2012; Peterson et al., 2010).

If high-risk patients systematically differ in the relevance of psychosis to violence, different strategies for monitoring and reducing risk can be pursued. For individuals whose violence is directly preceded by psychosis, effective treatment of psychosis could prevent violence. For the remainder, this is unlikely to be the case. Based on samples of patients with schizophrenia, Swanson et al. (2008) found differences in the correlates of violence for those with versus without childhood conduct problems:

The fact that adherence to antipsychotic medication did not significantly reduce violent behavior in patients with childhood antisocial history is consistent with the view that much of the violence in these patients was not caused by their psychosis, and thus was not likely to be reduced by antipsychotic medications. (p. 42)

For this larger group, risk reduction efforts might focus on factors like anger, which robustly predict violence (Novaco, 2011; Skeem et al., 2006).

On the other hand, if psychosis-driven incidents randomly “pepper” the larger pool of violence, there is little basis for a differential service approach. Instead, treatment of psychosis (as needed) would be part of the

Table 1. Characteristics of Sample With Repeated Violence ($n = 100$), Compared to Patients With One Incident ($n = 145$) or No Violence ($n = 891$)

Characteristic	Categories	a. Multiple incidents	b. Single incident	c. No violence	Effect size (ϕ), a vs. b (LL, UL)	Effect size (ϕ), a vs. c (LL, UL)
Sex	Male % (n)	8.7 (58)	14.4 (96)	76.9 (513)	-0.09 (-0.21, 0.04)	0.00 (-0.06, 0.06)
	Female % (n)	9.0 (42)	10.2 (48)	80.8 (379)		
Ethnicity	White % (n)	6.4 (50)	12.2 (96)	81.4 (639)	0.17*** (0.05, 0.29)	0.15*** (0.09, 0.21)
	Black % (n)	13.6 (45)	13.6 (45)	72.7 (240)		
	Hispanic % (n)	14.3 (3)	23.8 (5)	61.9 (13)		
Major diagnostic group	MMNAS % (n)	5.0 (23)	8.9 (41)	86.1 (398)	-0.06 (-0.30, 0.19)	-0.13*** (-0.22, -0.04)
	MMAS % (n)	11.3 (53)	14.7 (69)	73.9 (346)	0.05 (-0.13, 0.23)	0.09** (-0.01, 0.19)
	SANMM % (n)	11.9 (22)	14.6 (27)	73.5 (136)	0.04 (-0.24, 0.32)	0.06 (-0.10, 0.21)

Characteristic	a. Multiple incidents M (SD)	b. Single incident M (SD)	c. No violence M (SD)	Effect size (d), a vs. b (LL, UL)	Effect size (d), a vs. c (LL, UL)
PCL:SV Factor 1	4.82 (3.36)	3.97 (3.01)	2.69 (2.81)	0.27 (0.01, 0.52)	0.74 (0.53, 0.95)
PCL:SV Factor 2	7.99 (2.90)	6.79 (2.86)	4.75 (3.16)	0.42 (0.16, 0.67)	1.03 (0.92, 1.25)
Arrest frequency	1.91 (1.26)	1.53 (1.34)	1.01 (1.27)	0.30 (0.03, 0.55)	0.71 (0.50, 0.92)
Age in years	28.7 (5.8)	29.0 (6.0)	30.0 (6.3)	-0.05 (-0.31, 0.20)	-0.21 (-0.41, -0.01)

Note: LL = 95% confidence interval lower limit; MMAS = major mental disorder substance abuse; MMNAS = major mental disorder no substance abuse; SANMM = substance abuse no major mental disorder; PCL:SV = Psychopathy Checklist, Screening Version; UL = 95% confidence interval upper limit.

** $p < .01$. *** $p < .001$.

risk-reduction approach, with the understanding that this would prevent a limited number of incidents. To reduce violence on a large scale, the model would also need to embrace stronger causal risk factors.

Method

We defined violence as acts of battery that resulted in physical injury, sexual assaults, assaultive acts that involved the use of a weapon, and threats made with a weapon in hand (Monahan et al., 2001). First, we identified patients in the MacArthur study who were involved in two or more incidents of violence during the year after hospital discharge. Of these 100 repeatedly violent patients, 56 were classified as experiencing delusions or hallucinations during the year after discharge. Second, we analyzed the degree to which patients' violence was (consistently/inconsistently) preceded by psychosis, both for the full sample and the subgroup with psychosis during the follow-up.

Larger study synopsis

In the MacArthur study, researchers recruited 1,136 patients at three psychiatric hospitals and interviewed them to assess potential risk factors. Eligibility criteria included (a) 18 to 40 years old, (b) English-speaking, and (c) chart diagnosis of schizophrenia, schizophreniform disorder, schizoaffective disorder, major depression, dysthymia, mania, brief reactive psychosis, delusional disorder, alcohol or drug abuse or

dependence, or a personality disorder. After patients were discharged, researchers attempted to locate them in the community and interview both the patient and a collateral informant every 10 weeks for approximately 1 year, focusing on whether the patient had been involved in violence. When patients or collaterals reported a violent incident, a narrative account was elicited, including whether psychosis preceded the incident.

Participants

Sample. Participants were included in the present analyses if they completed at least one follow-up interview and were involved in multiple violent incidents during the year after discharge (given our focus on the *consistency* of the relationship between violence and psychosis). This yielded a subsample of 100 participants who constitute 9% of the MacArthur sample ($n = 1,136$), but account for 50% of the violent incidents detected ($n = 608$; Monahan et al., 2001). Participants were involved in a median number of three incidents (IQR = 2–4).

Table 1 describes participant characteristics, including research diagnoses based on the *DSM-III-R* Checklist (Janca & Helzer, 1990), as grouped into major categories developed for the main study. Participants' most common primary diagnoses were depression (53%), bipolar disorder (13%), and schizophrenia/other psychotic disorders (15%). Table 1 includes scores on the Psychopathy Checklist: Screening Version (PCL:SV; Hart, Cox, & Hare, 1995), which was the strongest predictor of violence in

the MacArthur study, based more on its assessment of general antisocial features (Factor 2) than interpersonal and affective traits of psychopathy (Factor 1; Skeem & Mulvey, 2001).

As shown in Table 1, we compared these 100 participants with repeated violence to the larger samples of participants with zero ($n = 891$) or one incident ($n = 145$). Our sample had more risk factors for violence than those with zero incidents, but was generally comparable to those with one incident. The present sample appears fairly representative of patients with violence in the MacArthur study.

Subsample with psychosis during follow-up. At each of the five follow-up interviews patients were asked a set of questions drawn mostly from the Diagnostic Interview Schedule (Robins, Helzer, Croughan, & Ratchff, 1981) to determine whether they had experienced hallucinations or delusions at any point during the past 10 weeks. When patients endorsed apparently delusional ideas, interviewers later judged whether they constituted delusional beliefs (“yes”) or reflected reality (“no”). To ensure that these judgments were consistent, the last author reviewed patients’ written or audiotaped descriptions of their beliefs. Patients were identified as having concurrent psychosis when they were rated as having experienced hallucinations or delusions at some point during one or more of the follow-up periods.

We compared the 56 high-risk participants who experienced psychosis during follow-up compared with the remaining 44 high-risk participants who did not on the variables listed in Table 1 and found small but statistically significant differences. Specifically, patients who experienced psychosis during the follow-up were older ($d = -0.42$), had higher arrest frequencies ($d = -0.31$) and Factor 2 scores ($d = -0.18$), and had lower Factor 1 ($d = 0.23$) scores. Those who experienced psychosis also were more likely to be minorities ($\phi = 0.16$) with a “mental disorder and no substance abuse” ($\phi = 0.10$) and less likely to have “substance abuse without mental disorder” ($\phi = -0.11$). There were no group differences in sex or presence of “mental disorder and substance abuse.”

Measures

Violence. At each follow-up interview, patients and collaterals were asked whether patients had engaged in any aggressive acts in the past 10 weeks, using a structured scale. Hospital and arrest records were also obtained and rated for violence. We used the definition of violence developed for the larger study.

Psychosis-preceded violence. When patients indicated that a violent incident had occurred, researchers asked a

series of questions designed to discern whether the incident was preceded by psychosis, for example, “What were you thinking before those things were taking place?” and “Were you hearing voices just before this happened?” When interviewers rated patients’ answers to either question as indicating yes (presence of delusions or hallucinations), we classified the violent incident as “psychosis-preceded” (otherwise, as “non-psychosis-preceded”).

Supplemental measures. We used additional measures to compare patients with different violence types, including diagnoses of antisocial personality disorder and symptom counts for conduct disorder from the Structured Interview for the *DSM-III* Personality Disorders (Pfohl, Blum, Zimmerman, & Stangl, 1989), patients’ self-reported frequency of arrest, patients’ self-reported frequency of childhood abuse, anger disposition from the Novaco Anger Scale (NAS; Novaco, 1994), and verbal IQ estimates from the Vocabulary subtest of the Wechsler (1999) Adult Intelligence Scale–Revised.

Results

To determine the extent to which former inpatients with repeated violence were consistently involved in incidents preceded by psychosis, we (a) examined distributions to describe the frequency of psychosis-preceded incidents, (b) classified participants by violence type and calculated individual standard deviations to explore the within-individual consistency of psychosis-preceded incidents, and (c) tested for clustering of psychosis-preceded incidents within participants and estimated the variance in violence type accounted for by individuals. We did so for both the full sample and the subset who experienced psychosis during the follow-up.

Distributions: Psychosis-preceded violence is uncommon

Of the 305 violent incidents in which high-risk patients were involved, only 11.5% of incidents were preceded by psychosis. This distribution does not appear unduly influenced by participants with especially high rates of violence (given the similar proportion of psychosis-preceded incidents for those with two versus three-or-more incidents), $\chi^2(1, n = 100) = 0.36, ns$.

For those who experienced *both* psychosis and repeated violence during the follow-up, psychosis preceded 19.2% of their 182 violent incidents. With this understanding that psychosis-preceded incidents are uncommon at the group level, we next turned to whether these incidents were concentrated within a subset of participants.

Consistency: Few individuals exclusively have psychosis-preceded violence

Classifications. Based on their distribution of incident types, we classified each participant as exclusively non-psychosis-preceded (0% psychosis-preceded incidents), exclusively psychosis-preceded (100% psychosis-preceded incidents), or mixture (all others). For the full sample, 80.0%, 15.0%, and 5% of individuals were classified with exclusively non-psychosis-preceded, mixture, and exclusively psychosis-preceded violence, respectively. For the subsample with psychosis during follow-up, classifications were 64.3%, 26.8%, and 8.9%, respectively. Thus, the majority of individuals are exclusively involved in non-psychosis-preceded violence, with distinctly smaller subsets involved in mixture- or exclusively psychosis-preceded violence.

Individual variance. We also computed each individual's standard deviation (ISD) to represent the degree to which incidents varied in type over the follow-up period. For the full sample, the average ISD was 0.08 ($SD = 0.19$), indicating low intraindividual variability in violence type (where types are psychosis-preceded vs. non-psychosis-preceded). This probably reflects the fact that 80.0% had exclusively non-psychosis-preceded incidents. Like the full sample, the subsample with psychosis during the follow-up also showed low variability (average $ISD = 0.14$, $SD = 0.24$).

We also examined the few participants with at least one psychosis-preceded incident ($n = 20$). They showed substantial variability in violence type (average $ISD = 0.40$, $SD = 0.24$), given that 75% also had non-psychosis-preceded incidents. With this description of intraindividual variability, we now test for clustering of violence-type within individuals.

Clustering: Patients account for "fair" variance in violence type

Approach. To address the question of primary interest (Does violence type [i.e., psychosis-preceded vs. non-psychosis-preceded] cluster within patients?), we fit a series of multilevel models with the "xtmixed" command in Stata 12. In each case, we used chi-square to test whether a model that added clustering of violence type within participants fit better than a model without clustering.

To estimate the proportion of variance in violence type that is attributable to participants, we computed intraclass correlation coefficients (ICC). Conceptually, the ICC represents the similarity of items (incident types)

within a certain "cluster" (individuals; West, Welch, & Galecki, 2007). If participants were completely consistent in violence type across incidents (i.e., exclusively psychosis-preceded or non-psychosis-preceded), then all variance would be due to differences between patients, and the ICC would be 1 (Chakraborty, Moore, Carlo, Hartwell, & Wright, 2009). We apply Shrout's (1998) ICC labels to describe the degree of participant consistency in violence type: virtually none (.00–.10), slight (.11–.40), fair (.41–.60), moderate (.61–.80), and substantial (.81–1.0).

Results. For the full sample, including nesting by participant significantly improved the model, $\chi^2(1, n = 100) = 47.16$, $p < .001$. There was a "fair" degree of consistency in violence type by patient (ICC = .42). We obtained similar results for the subgroup of participants with psychosis during the follow-up: incorporating nesting significantly improved the model, $\chi^2(1, n = 56) = 23.68$, $p < .001$, and the ICC was .39. ICC values can be constrained when there is little between-subject variability (as is the case here, with most participants exclusively non-psychosis-preceded). Thus, we interpret our ICC as representing a modest but meaningful clustering effect.

This effect, however, appears mostly attributable to those with violence never preceded by psychosis. Results were distinctly different for the few participants with at least one psychosis-preceded incident: Incorporating nesting by patient did not significantly improve the model, $\chi^2(1, n = 20) = 0.74$, ns , and the ICC of 0 indicated virtually no clustering.

Testing the effect of interrupted observations and length of time. Participants were included in this study if they had completed one or more follow-up interviews. It is possible that interruptions in the 1-year observation period artificially deflated our estimate of clustering. These interruptions could reflect a missed follow-up interview(s) or time spent in an institution (and not at risk for community violence). For example, a minority of participants reported being arrested (20%) or hospitalized (13%) after a violent incident(s) detected in this study. Greater consistency in violence type within individuals might be found (a) among those whose incidents were not detected by the authorities (and who were thus continuously in the community) or (b) among violent incidents closer together in time.

To rule out these possibilities, we ran three supplemental analyses. First, we tested for nesting only among participants whose violent incidents were not followed by rehospitalization or arrest ($n = 73$). We found that incorporating nesting significantly improved the model, $\chi^2(1, n = 68) = 39.07$, $p < .001$, and there was "fair"

consistency in violence type ($ICC = .48$). Second, we tested for nesting only among participants with repeated violence during the first two consecutive follow-up interviews ($n = 49$), when data were most complete: Incorporating nesting by individual significantly improved the model, $\chi^2(1, n = 49) = 25.34, p < .001$, and there was “fair” consistency ($ICC = .44$). Third, we tested for nesting only among participants with repeated violence within a *single* 10-week follow-up period ($n = 68$). Again, incorporating nesting significantly improved the model, $\chi^2(1, n = 68) = 41.94, p < .001$, and there was fair consistency ($ICC = .50$). Thus, although constraining the length of the observation period modestly increases patient consistency in violence type, results generally mirror those observed for the full sample.

Summary. For both the full sample and subsample with psychosis during the follow-up, there is fair consistency in violence type. However, no clustering is observed for the few participants with at least one psychosis-preceded incident. Together, our findings suggest that a broad distinction may be made between individuals with exclusively non-psychosis-preceded violence and individuals with a mixture of psychosis-preceded and non-psychosis preceded violence. There is little evidence for a subgroup with exclusively psychosis-preceded violence.

Exploring distinctive characteristics of “mixture” patients

From a risk reduction perspective, it would be useful to identify characteristics that distinguish between high-risk former inpatients whose violence is *sometimes* preceded by psychosis ($n = 20$) and those whose violence is exclusively non-psychosis-preceded ($n = 80$). Thus, we explored differences between these groups across theoretically relevant variables like conduct disorder (see Skeem et al., 2011) and robust predictors of violence in the MacArthur study (Monahan et al., 2001). Given the small size of the mixture group, power was limited for detecting anything but a large effect. Thus, results are viewed as exploratory and emphasis is placed on interpreting effect sizes, based on Cohen’s (1988) guidelines: 0.2, 0.5, and 0.8 d values and 0.10, 0.30, and 0.50 ϕ values correspond to small (“modestly”), medium (“moderately”), and large (“substantially”) effect sizes.

As shown in Table 2, compared with the mixture group, those with no psychosis-preceded violence had *moderately* lower verbal intelligence and *modestly* greater social deviance (PCL:SV Factor 2), arrest frequency, and childhood abuse frequency. Conversely, the mixture group was *moderately* more likely to meet criteria for bipolar disorder and *modestly* more likely to meet criteria for schizophrenia or “mental disorder with no substance

abuse” than the larger group. The groups were similar in almost uniformly meeting criteria for antisocial personality disorder, having dense histories of conduct problems, and having difficulties with anger control.

Discussion

Over recent years, a few cases of extreme violence by individuals who ostensibly have a mental illness have been highly publicized. Less attention has focused on the high-risk fraction of the patient population where violence tends to be concentrated. This study of former inpatients with repeated involvement in violence yielded three main findings. First, delusions and hallucinations occasionally preceded the many violent incidents in which these individuals were involved (12% of 305 incidents). Second, partly as hypothesized, patients were “fairly” consistent in their type of violence, across violent incidents ($ICC = .42$). We conclude that a large group of high-risk individuals with exclusively non-psychosis-preceded violence (80%) can be distinguished from a small group who also has *some* psychosis-preceded violence (“mixture,” 20%). There is little support for our expected group with violence *exclusively* preceded by psychosis. Third, although “mixture” patients largely share characteristics with the larger “non-psychosis-preceded” group (e.g., antisocial features), there is preliminary evidence for a few distinguishing characteristics (e.g., bipolar symptoms). Before contextualizing these findings, we note the study’s limitations.

Limitations

This study’s main limitation involves the operationalization of the relationship between psychosis and violence. First, this measure focused on temporal ordering (i.e., whether the patient experienced psychosis before an incident occurred) and does not convey the extent to which psychosis was causally *linked* to violence (see Kraemer et al., 1997). Second, the operationalization relied on interviewers’ ratings of patients’ responses, and interrater reliability data for these ratings are not available. The fact that interviewers reliably rated similar constructs like delusions at each follow-up mitigates, but does not eliminate, this concern. Third, because participants’ accounts of recent violence are subject to problems with accurate recall and reporting, some incidents may be misclassified. These doubts about participants’ accounts are only indirectly alleviated by recognizing that self-report was the most comprehensive source of data on violence in the MacArthur study (with patients reporting more incidents than collateral informants and records; Steadman et al., 1998).

This study also has strengths. The MacArthur study is one of the largest investigations of violence among former

Table 2. Characteristics of Patients With Exclusively Non-Psychosis-Preceded Violence ($n = 80$) Versus One or More Psychosis-Preceded Incidents ($n = 20$)

Characteristic	Exclusively non-psychosis-preceded, % or M (SD)	One or more psychosis-preceded, % or M (SD)	Effect size (ϕ or d)	Effect size confidence interval (LL, UL)
Major diagnostic group				
MMNAS % (n)	65.2% (15)	34.8% (8)	0.20*	0.00, 0.38
MMAS % (n)	81.1% (43)	18.9% (10)	-0.03	-0.23, 0.17
SANMM % (n)	90.9% (20)	9.1% (2)	-0.15	-0.34, 0.05
Specific mental disorder				
Depression % (n)	86.8% (46)	13.2% (7)	-0.18	-0.36, 0.02
Bipolar disorder % (n)	38.5% (5)	61.5% (8)	0.40***	0.22, 0.55
Schizophrenia % (n)	53.3% (8)	46.7% (7)	0.28**	-0.09, 0.45
Antisocial/psychopathic features				
Antisocial personality disorder (SID-P)	79.5% (70)	20.5% (18)	-0.11	-0.30, 0.09
Conduct disorder symptom count (SID-P)	4.90 (2.64)	4.68 (1.86)	-0.09	-0.58, 0.40
PCL:SV Factor 1 score	4.88 (3.41)	4.56 (3.20)	-0.09	-0.59, 0.40
PCL:SV Factor 2 score	8.11 (2.94)	7.50 (2.79)	-0.21	-0.70, 0.28
Arrest frequency	1.97 (1.24)	1.67 (1.37)	-0.24	-0.73, 0.25
Child abuse frequency	3.11 (1.24)	2.85 (1.42)	-0.20	-0.69, 0.29
Anger disposition (NAS)	73.02 (13.71)	73.75 (11.44)	0.05	-0.44, 0.54
Verbal IQ	26.54 (15.46)	31.72 (11.74)	0.35	-0.14, 0.84

Note: LL = 95% confidence interval lower limit; MMAS = major mental disorder substance abuse; MMNAS = major mental disorder no substance abuse; NAS = Novaco Anger Scale; PCL:SV = Psychopathy Checklist, Screening Version; SANMM = substance abuse no major mental disorder; UL = 95% confidence interval upper limit. ϕ reported for categorical variables and d for continuous variables.

* $p < .05$. ** $p < .01$. *** $p < .001$.

inpatients conducted to date. Large samples are necessary when the goal is to isolate the small group of patients who are repeatedly involved in violence. Moreover, the study involved five follow-up interviews during the year after discharge, allowing for examination of psychosis-preceded incidents without heavily taxing patients' memories. Finally, symptoms of psychosis were based on systematic inquiry, not unstructured clinical evaluation.

This study specifically focuses on a small but policy-relevant subgroup: former inpatients with repeated violence. Given that the association between psychosis and violence differs across sample types, these results may not generalize to community, lower-risk psychiatric, or forensic/correctional samples. This is not a study of whether psychosis is a risk factor for violence, nor is it a study of the prevalence of psychosis-preceded incidents in the general population. Instead, the focus is on how often, and how consistently, psychosis precedes violence among high-risk former inpatients.

Contextualizing findings

Psychosis-preceded incidents are uncommon. Our finding that psychosis immediately preceded 12% of violent incidents for high-risk patients is similar to results based on the entire MacArthur sample (11%; Monahan & Steadman, 2012). It is substantially higher, however, than past estimates of the causal relationship between

psychosis and arrests among *justice-involved* people with mental illness (4% arrests, Junginger et al., 2006; Peterson et al., 2014).

There are two plausible explanations for this discrepancy. First, the discrepancy may reflect reality. Based on a meta-analysis of 204 samples, Douglas et al. (2009) found a small correlation between psychosis and violence in psychiatric settings ($OR = 1.69$), but no meaningful correlation in forensic ($OR = 0.91$) and correctional ($OR = 1.27$) settings. Given that correlation is a prerequisite for establishing that a risk factor is causal, psychosis-based incidents could be more common in clinical than forensic/correctional samples. Second, this discrepancy may reflect an artifact. The present study may *overestimate* how often violent incidents are causally related to psychosis because the estimate is based only on temporal precedence. The correctional studies specifically assessed for causal relationships.

Individuals are fairly consistent in violence type (because exclusively non-psychosis-preceded people dominate the group). Our most important finding is that high-risk participants are fairly consistent in their violence type: We found a significant patient clustering effect, with patients accounting for 42% of the variance in violence type.

How are these patient clusters best described? We expected psychosis exclusively to precede violence for a

minority of patients and exclusively to *not* precede violence for the vast majority. The findings do not conform neatly to these expectations. There is evidence of a large group whose violence consistently is *not* preceded by violence. However, within the few patients who had psychosis-preceded incident(s), most also had incidents that were driven by something else—and there was no evidence of clustering ($ICC = .00$). Together, our findings suggest that high-risk individuals can be disaggregated into an exclusively “non-psychosis-preceded” group and a small “mixture” group peppered by psychosis-preceded incidents.

The study most relevant to contextualizing our findings focused on whether symptom-related crimes cluster within offenders. Based on a retrospective survey of 112 individuals with mental illness and multiple past crimes, Peterson et al. (2014) rated the extent to which each crime was directly motivated by symptoms. The authors found no significant clustering of “direct motivation” crime ratings by person ($ICC = .00$). Our findings may differ than theirs because the relationship between psychosis and violence is stronger in clinical than forensic/correctional samples (Douglas et al., 2009), and this stronger association may permit greater clustering. Alternatively, the tighter focus of the present study than that of Peterson et al. (2014) may yield greater sensitivity to clustering. Peterson et al. examined all symptoms (not just psychosis) and all crimes (not just violence) over the period of an individual’s lifetime (not just one year). Given this broad focus, their detection of “no” offender consistency does not necessarily contradict our detection of “fair” patient consistency. We observed that individuals’ consistency in violence type modestly increases, as the observation period is constrained ($ICC = .50$ within a 10-week period).

Few characteristics distinguish the “exclusively non-psychosis-preceded” and “mixture” groups. We explored differences between exclusively “non-psychosis-preceded” and “mixture” groups because distinctions between them seem policy-relevant. Not surprisingly, these high-risk patients share many characteristics, including frequent co-occurring mental and substance abuse disorders, problems with anger control, and anti-social features (including early conduct problems).

Nevertheless, there are a few distinguishing characteristics. First, mixture individuals were relatively likely to meet criteria for bipolar disorder, and, to a lesser extent, schizophrenia or a “mental disorder *without* substance abuse.” This is consistent with Peterson et al.’s (2014) finding that participants with bipolar disorder accounted for 62% of crimes based directly on symptoms. As those authors note, bipolar disorder includes impulsivity, anger/irritability, and other externalizing features that increase risky behavior.

Second, the exclusively non-psychosis-preceded group had *moderately* lower verbal intelligence and *modestly* greater social deviance (PCL:SV Factor 2), arrest history, and childhood abuse history than the “mixture” group. Although such features mark “life course persistent” offenders (Gibson, Piquero, & Tibbetts, 2001), effect sizes are limited and none attained statistical significance.

These differences provide directions for future research, but should be interpreted with caution. We specifically advise readers to avoid making a false (and disrespectful) distinction between “mad” (i.e., those with bipolar disorder/schizophrenia) and “bad” (i.e., low verbal IQ/socially deviant/abused) people with repeated violence. The degree of individuals’ consistency in violence type was “fair.” The vast majority of participants had no psychosis-preceded incidents, and three-quarters of those with one psychosis-preceded incident were involved in others that cannot be attributed to symptoms. In short, there are dense shades of gray between these groups of high-risk people.

Implications

This study also has implications for practice with former inpatients with repeated involvement in violence. For those recently or currently experiencing psychosis, symptoms should be monitored and treated—understanding that psychosis immediately precedes about one fifth of this group’s incidents. Similarly, for the few whose violence *has* been preceded by psychosis in the past year, delusions and hallucinations should be a target for violence prevention—understanding that violence may also have other precipitants.

Generally, our findings provide limited support for the notion of differential services. They suggest that effective treatment of psychosis will have negligible direct effects on violence for most patients and important but partial effects for the remainder. These results are generally consistent with those of Swanson et al.’s (2008) studies of patients with schizophrenia. For large-scale violence reduction, the focus of programming for individuals with repeated violence may need to encompass factors associated with social deviance, whether patients occasionally engage in acts of violence related to psychosis or not.

Author Contributions

J. Skeem developed the study concept, performed secondary analyses, and drafted most of the article. P. Kennealy performed primary analyses and drafted part of the results section. J. Monahan and P. Appelbaum helped design and implement the larger study from which data were drawn and provided critical revisions of the article. J. Peterson conducted preliminary analyses. All authors approved the final version of the article for submission.

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