Profiling Homicides Based on Impulsive or Proactive Natures in Male Schizophrenia Patients

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The main aim of this study was to ascertain whether a relationship existed between the *modus operandi* and motivation of homicide, clinical characteristics, and psychopathic traits in schizophrenia. Forty-seven male homicide perpetrators with schizophrenia were included in the study. We classified types of homicide perpetrated by the patients as predominantly impulsive (n = 27) or proactive (n = 20) in nature. We also evaluated the psychotic motivation accompanying the homicide. Forty-four (93.6%) of the homicides were psychotically motivated. The victim was a stranger in only 8.5 percent of the homicides. Use of firearms as a killing method was significantly higher in predominantly proactive homicides (30%) compared with impulsive homicides (3.7%). Infidelity delusions were more frequent in proactive homicides than in impulsive homicides. According to regression models, a predominantly proactive homicide was significantly associated with being married, older age at illness onset, killing with firearms, infidelity delusions and a high PCL-R affective facet score in univariate analyses. Multivariate analyses showed a significant association with infidelity delusions and a high PCL-R affective facet score. Our results confirm that certain predispositions, as well as contextual factors, may be associated with the violent subtype of homicidal behavior in perpetrators with schizophrenia.

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A modest association is thought to exist between violence and schizophrenia and other psychoses,[1–5] keeping in mind the heterogeneity in study designs and varying outcome measures such as the definition of violence. Studies have identified certain characteristics, mostly sociodemographic, that are related to an elevated risk of homicide among people with schizophrenia.[6–10] The literature currently lacks a framework that addresses the motivational, contextual, and dispositional influences on the distinctive types and nature of severe violence and homicide that are unique to offenders with schizophrenia.

Based on research carried out with animal models, Anderson and Bushman[11] supported a dichotomous conceptualization of aggression, namely impulsive (reactive/hostile) aggression and proactive (instrumental/premeditated) aggression. These two forms of aggression fundamentally differ from each other on the basis of proximate and ultimate goals and the neural mechanisms involved. Both forms of aggressive behavior are controlled by components of the limbic system and governed by serotonergic and dopaminergic pathways.[12] Impulsive aggression occurs in the context of provocation, frustration and anger and is typically an immediate reaction in the absence of a clear secondary goal, whereas the proactive type is goal-oriented and motivated by external rewards. In both animals and humans, impulsive aggression is associated with marked sympathetic output and

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requires activation of the medial hypothalamus and midbrain periaqueductal gray, while activation of the lateral hypothalamus and cortical involvement are required for the expression of proactive aggression.[12,13] This bimodal approach of aggression was shown to be applicable to homicide offenders without mental illness.[14,15] Impulsive and premeditated aggressive subtypes of homicide carried out by nonpsychiatric offenders have distinctive features compared with psychotic offenders.[15,16] Financial gain, which is uncommon in psychotic patients, is one of the most prominent motivations among nonpsychotic proactive homicides.[17] Additionally, retrospective file reviews support the presence of either impulsive or proactive qualities in the homicidal behavior among psychotic patients,[17–19] with the impulsive subtype reported to be more prevalent than the proactive type.[19–21]

Positive psychotic symptoms, particularly paranoid delusions and command hallucinations, appear to play an important role in motivating and facilitating violent behavior in patients with schizophrenia.[20,22,23] Some authors regard psychotic violence as a separate and third violence subtype, distinct from impulsive and proactive violence in patients with mental illnesses.[22,24] Such an approach may overlook the behavioral characteristics of psychotically motivated violent behavior. Violence resulting from psychotic experiences might be better characterized along an impulsive-proactive continuum.[25] Psychotically motivated violent acts may either be premeditated and highly calculated instrumental acts or may lack premeditation, occurring in the context of an emotion-laden dispute or in self-defensive response to a situational provocation led by psychotic symptoms.[23,26]

Such features encourage researchers to analyze the characteristics of violent behavior in depth to identify the predominant nature of lethal violence in patients with psychosis. It would be useful to develop a distinctive and structured profile of the type of violence (including whether psychotic motivation is involved) in homicidal incidents that are perpetrated by schizophrenia patients. In fact, such profiling is important for applied forensic and clinical work because it has the potential to better define the scope of the impulsive-proactive continuum of the psychotically motivated homicide. There is also a need for better identification of possible dispositional, contextual, and motivational differences between individuals who commit the same type of crime in different ways. Moreover, understanding the manner in which a homicide is committed (*modus operandi*) may be helpful to derive inferences on the functional subtype of homicidal behavior as well as the significant psychopathologic and background characteristics of an offender patient.[19] Indeed, such a multidimensional examination may invigorate risk assessment strategies since perpetrators of proactive/premeditated offenses are considered to be at increased risk for reoffending.[27] Furthermore, tailored treatment for distinct subtypes of violent behavior may yield more effective violence prevention and intervention programs.[28,29]

Psychopathic and impulsive traits may predispose patients with schizophrenia to lethal violence, similar to the general population.[30] Among the general offender population, there is a link between higher level of psychopathy and premeditated homicide.[31] Psychotic patients may commit clearly different types of violent acts on different occasions because of the involvement of certain personality traits.[26,30] The heterogeneity and circumstantial nature of violence present formidable methodological challenges for research. Little is known about the functional subtypes of homicidal behavior that are associated with certain predisposing traits, motivational influences and the *modus operandi* in this patient population. Therefore, in the current study, we tested the hypothesis that specific personality traits, particularly psychopathic and contextual factors (such as the presence of accompanying psychotic symptoms and homicide method) are associated with the nature of homicide in schizophrenia. To address our hypothesis, we delineated the predominant violent subtype and motivation of homicide acts committed by schizophrenia patients. We further examined the association of psychopathic and impulsive traits, considered to be important for predisposition to violence, with the violent subtype of homicide in this group of patients. We also evaluated the background features of the perpetrators and offense-related characteristics of each homicide in the context of motivation for the homicide.

Methods

Study Participants and Selection Criteria

The study was approved by the local Ethics Committee [IRB: 05.06.2018 – 2018/19081]. This cross-sectional study consisted of male DSM-5-diagnosed schizophrenia patients, who had pleaded guilty to at least one act of deliberate killing before

admission and were either detained for assessment or under compulsory treatment through a court order prescribed by the Turkish Criminal (Penal) Code (TCC).[32] Patients were recruited from those who were admitted to the Forensic Psychiatry Inpatient Unit at the Bakirkoy Prof. Mazhar Osman Training and Research Hospital for Psychiatry, Neurology and Neurosurgery (Istanbul, Turkey), between December 2018 and December 2021. This hospital is the largest of its kind in the country and its forensic psychiatry unit is specialized for assessment and treatment of offenders with mental illnesses.[33]

In Turkey, criminal courts or public prosecution decide whether a forensic psychiatric examination should be performed in the course of the criminal proceeding. Article 32 of the TCC defines the basic principles and applications for insanity defense and related criminal responsibility of the suspect or the defendant.[34] A medical board comprising psychiatrists carries out conclusive forensic psychiatric evaluations and reporting of criminal responsibility. According to the legislation, individuals who cannot comprehend the legal meaning and consequences of the act they have committed because of the existence of a mental disorder at the time of the offense, and individuals whose ability to control their behavior is significantly diminished, have security measures imposed instead of punishment. According to TCC Article 57, such compulsory measures are accommodated and facilitated in a high-security unit with appropriate treatment and rehabilitation for an indeterminate period, until the patient's danger to the society because of their mental disorder no longer exists or is considerably diminished, as decided by a medical board. The legislation in Turkey is quite different from the criminal jurisdictions in countries that have enshrined the Anglo-American criminal law system (common law), in which a lack of the *mens rea* element of a crime as a result of a mental illness is generally rendered in a not guilty by reason of insanity verdict, despite the *actus reus* presented.[35] In the Turkish criminal law system, which is similar to the legislation in the countries in mainland Europe, even if the defendant has committed an offense under the influence of severe mental illness and is not held culpable for it, the defendant is subjected to a compulsory treatment order following a guilty verdict.[36] Of note, "a finding of not guilty by reason of insanity" has been used interchangeably with "being not criminally responsible" in several sources.[37]

Within the designated time frame of the study, 61 consecutive homicidal male schizophrenia patients between 18 and 65 years of age were initially identified and enrolled in the study. We screened only male patients because the number of homicidal female schizophrenia patients admitted to the forensic unit during the study period was low; this precluded the acquisition of statistically meaningful data. Written informed consent was obtained from all patients and, when applicable, their legal representatives or guardians following a thorough explanation of the study procedure. Several of these patients met the exclusion criteria, such as having a criminal record prior to the diagnosis (n = 1), having missing case files and records that prevented obtaining comparable data (n = 2), illiteracy (n = 3), presence of a comorbid neurological disorder (n = 2) or intellectual disability (n = 2), refusal of consent (n = 2), or uncooperativeness to psychometric instruments (n = 2). After applying the exclusion criteria, the final study sample consisted of 47 patients.

Procedure

The first author of the current study conducted comprehensive clinical, forensic, and research interviews with each patient. The first and the second authors reviewed the records and used a semi-structured and extensive data form to record sociodemographic, historical, clinical, and forensic information, using multiple sources. Sources included interviews with the patients' family members, hard copies of files and electronic databases for forensic and medical case records, reports from social workers and police officers, criminal records, and statements and questionnaires completed by family members, witnesses and other parties regarding the homicide offense. The reviewers recorded detailed characteristics surrounding each homicidal act for statistical comparisons, including: victim-perpetrator relationship, homicide method and place, intoxication status, and psychotic experiences at the time of the offense. A trained clinician (first author) administered the Turkish version of the PCL-R to evaluate psychopathic traits of the patients. The participants completed the Barratt Impulsiveness Scale (BIS-11) to measure trait impulsiveness. For offenders with multiple victims in one or more incidents, the most recent homicide offense that led to the current involuntary hospital admission for evaluation or treatment was considered as the index homicide. Offenders

were next compared in terms of their background features, personality traits, motivation, and *modus operandi* characteristics according to the predominant violent subtype of index homicide.

Violent Subtype of Homicide

Using the comprehensive and exhaustive data collected from the participants, two authors of the current study (first and the third authors), who are senior psychiatrists and have experience in forensic psychiatry, classified the violent subtypes of homicide. The authors were blinded to each other's ratings. Classification was based on previous studies that promoted deconstructing and mapping of the subtypes of violence committed by patients with schizophrenia, which is consistent with the Research Domain Criteria (RDoC) approach.[20,26,38] The homicides were classified as impulsive (n = 27) or proactive (n = 20), and whether they were psychotically motivated (n = 44).

In line with previous research on impulsive and proactive aggression among homicide offenders,[39–43] we assessed impulsive and proactive violence by the level of premeditation exhibited by the offenders during the homicide. Each homicide incident was evaluated on a two-point premeditation scale (inter-rater reliability = .85, $P < .001$). A score of 1 was given when a homicide was committed with no or little evidence of premeditation, permitting the identity of "predominantly impulsive" homicides. Such acts were considered unplanned and were associated with anger, usually triggered by frustration and provocation, and appeared as a quick reactive response to the unpleasant effect of the perceived threat. A score of 2 was given when a rigorously planned homicide was committed or certain elements of premeditation were involved; this was classified as a "predominantly proactive" homicide. Predominantly proactive behaviors were planned, goal-oriented, and purposeful, occurred with less emotional charge, were initiated without any provocative stimulus, and motivated by a goal of obtaining a valuable, concrete, or tangible gain for the person performing the action. The predominant subtype of each homicide was determined with this coding system, even though impulsive and proactive qualities of the behavior overlapped in some cases. After the completion of the rating of aggressive subtypes of each homicide, inconsistencies between raters were resolved and the predominant type in the overlapping cases (n = 2) was determined through consensus.

After the identification of bimodal aggressive subtypes, the same two raters next reviewed each case together for psychotic motivation. If the homicide was driven or accompanied by delusions or hallucinations, it was considered to be a psychotically motivated act. According to our hypothesis, all psychotic homicides predominantly involve either impulsive (reactive/hostile) or proactive (instrumental/premeditated) qualities. If the action was preceded by a sudden perception of threat, frustration, anger, excitement, anxiety, or fear caused by delusions or hallucinations, we categorized it as an impulsive homicide with psychotic motivation (i.e., instant killing of a victim while experiencing threat-control/override symptoms, such as when a victim stared at the perpetrator in a manner that was perceived by the perpetrator to be threatening). If the patient executed the act in a purposeful and planned manner or for predatory gain in line with psychotic experiences or misinterpretation, then it was categorized as a proactive homicide with psychotic motivation (i.e., the planned killing of a wife related to a delusional belief of her infidelity, or target-specific homicide related to protracted delusional perception of being controlled by the victim).

Psychometric Instruments

The Barratt Impulsiveness Scale

The Barratt Impulsiveness Scale, version 11 (BIS-11)[44,45] is a self-report scale used to assess long-term patterns of behavior and levels of trait impulsiveness across a variety of populations.[46] It consists of thirty items and has three subscales: attention (inattention, cognitive dysregulation), motor (motor impulsiveness, impatience) and nonplanning (inability to control, intolerance to cognitive confusion). The higher the total BIS-11 score, the higher the patient's impulsiveness level. The Turkish validity and reliability study of the BIS-11 was performed by Güleç *et al.*[47]

Psychopathy Checklist-Revised

The Psychopathy Checklist (PCL) was developed by Hare in 1990 to evaluate features of psychopathy; this checklist was revised in 2003 (PCL-R).[48,49] The PCL-R has a two-factor structure consisting of 20 items in total. Factor 1 defines an affective/interpersonal dimension, and represents a cluster of emotional and interpersonal tendencies. Factor 2 defines antisocial behaviors or an irresponsible lifestyle dimension.[50] Hare and others have argued that it is appropriate to

evaluate the psychopathy level via the PCL-R dimensionally without a cutoff score.[51] Validity and reliability of the Turkish version of the PCL-R were reported by Tutuncu *et al.*[52] in an antisocial personality disorder sample in which Cronbach's alpha internal consistency coefficient was .977. In the current study, we used the Turkish version of the PCL-R, with permission from Ger and Oncu who translated the inventory and obtained the copyright permission to use the translated version from its developer.

Statistical Analysis

Statistical analyses were performed using the IBM Statistical Package for the Social Sciences (SPSS) for Mac OS, Version 23.0 software (Armonk, NY: IBM Corp.). After analysis of the descriptive data, including background information and homicide characteristics, we used either chi-square or Fisher's exact test to compare qualitative data for between groups assessments. Mann-Whitney *U* test was used as a nonparametric test for numeric data that were not normally distributed and Student's *t* test was used as a parametric test for normally distributed continuous variables. Univariate and multivariate logistic regression analyses were used to determine certain background and offense-related characteristics and personality dimensions as potential predictors of belonging to the predominantly proactive homicidal patient group. Statistical significance was accepted as $P < .05$.

Results

Background of Perpetrators

Among all homicide incidents, 27 (57.4%) were predominantly impulsive, and the remaining 20 were predominantly proactive (42.6%). The mean age was 44.74 ± 10.89 years (range 20–62), while education in years was 7.98 ± 3.76. Age and education level did not differ between impulsive and proactive homicidal groups. Among the participants, 76.6 percent were unmarried/single, 85.1 percent were unemployed, and 17 percent were homeless or without social support at the time of the index homicide. The incidence of a history of childhood adversity was 53.2 percent, presence of DSM-5 alcohol or substance use disorder for at least one period in the past was 36.2 percent and 23.4 percent, respectively. The mean age at the onset of illness was 26.78 ± 9.15 (range 16–54) years, while the mean age at first offense was 32.36 ± 10.83 (range 14–57) years. Being married was more frequent ($\chi^2 = 5.349$; $P < .05$), while age at illness onset was higher ($Z = -2.621$; $P < .05$) in offenders with predominantly proactive index homicide. Other descriptive and comparative sociodemographic, historical, clinical and forensic characteristics of the patients are presented in Table 1.

Characteristics of the Homicide Offenses

Forty-four (93.6%) of the homicide incidents were psychotically motivated. Three patients, all of whom were in the impulsive homicide group, committed the homicide without a drive of psychotic experiences. Twenty-four (88.9%) of the predominantly impulsive homicides and all of the predominantly proactive homicides (100%) involved psychotic motivation. The presence of a psychotic motivation was statistically similar between the groups ($\chi^2 = 2.374$, $P > .05$). Treatment nonadherence at the index homicide was as high as 89.4 percent. The primary victim (the main target or person who was attacked first) was a parent in 14 cases (29.8%), an intimate partner in five cases (10.6%), and a stranger in four cases (8.5%). Five patients (10.6%) killed a second victim in the same homicidal incident. Victim pairs of these five cases of double homicides were as follows: friend-friend, wife-daughter, brother-brother, brother-neighbor, and mother-father. Impulsive and proactive homicides did not differ in terms of the victim-perpetrator relationship ($\chi^2 = 8.096$, $P > .05$). Use of sharp instruments was the most frequent method of homicide and was used in 32 homicides (68.1%). Killing with firearms was significantly more frequent in proactive homicides (n = 6, 30%) compared with impulsive homicides (n = 1, 3.7%) ($\chi^2 = 8.646$, $P < .05$). The location of the homicide was a public place in 18 cases (38.3%) and did not differ significantly between the violent subtypes of homicides ($\chi^2 = 2.605$, $P > .05$). Intoxication status did not differ between the two groups. Among the accompanying psychotic symptoms, the groups differed only in delusions of infidelity, which was more frequent in the proactive homicide group (n = 6, 30%) than the impulsive homicide group (n = 2, 7.4%) ($\chi^2 = 13.653$; $P < .05$). Other characteristics of the homicides are presented in Table 2.

Personality Traits

Total and subscale scores of the BIS-11 did not differ between offenders with the two predominant

Table 1 Background Characteristics of the Study Sample

	All Subjects (N = 47)	Predominantly Impulsive (n = 27)	Predominantly Proactive (n = 20)	
	Mean±SD / n (%)	Mean±SD / n (%)		Test Statistics, p
Age	44.74 ± 10.89	42.07 ± 11.61	48.35 ± 8.89	t = −1.646; p = .107
Education (years)	7.98 ± 3.76	7.93 ± 3.35	8.05 ± 4.36	Z = −.362; p = .717
Unmarried at the time of index offense	36 (76.6)	24 (88.9)	12 (60)	χ^2 = 5.349; p = **.035**[a]
Unemployed/irregular work at the time of index offense	40 (85.1)	24 (88.9)	16 (80)	χ^2 = . 716; p = .438[a]
Poor social support at the time of index offense	8 (17)	7 (25.9)	1 (5)	χ^2 = 3.562; p = .114[a]
Childhood adversity	25 (53.2)	14 (51.9)	11 (55)	χ^2 = . 046; p = .831
History of AUD	17 (36.2)	11 (40.7)	6 (30)	χ^2 = . 574; p = .449
History of SUD	11 (23.4)	7 (25.9)	4 (20)	χ^2 = . 225; p = .737[a]
Criminal history in a next of kin	17 (36.2)	11 (40.7)	6 (30)	χ^2 = . 574; p = .449
Age at illness onset	26.78 ± 9.15	24 ± 7.95	30.55 ± 9.48	Z = −2.621; p = **.009**
Duration of illness (years)	18.02 ± 10.51	18.15 ± 10.66	17.85 ± 10.58	t = .095; p = .925
Any conviction prior to homicide	7 (15.9)	6 (22.2)	1 (5.9)	χ^2 = 2.082; p = .220[a]
Age at first offense	32.36 ± 10.83	30 ± 10.53	35.55 ± 10.66	t = −1.777; p = .082
Age at the index homicide	33.42 ± 10.3	31.48 ± 9.81	36.05 ± 10.61	t = −1.524; p = .134
Reoffending	17 (36.2)	10 (37)	7 (35)	χ^2 = . 021; p = .886
Recidividated homicide	5 (10.6)	2 (7.4)	3 (15)	χ^2 = . 697; p = .638[a]

SD: Standard deviation; AUD: Alcohol use disorder; SUD: Substance use disorder.
[a]Fisher's exact test, p < .05 (Bold values).

types of index homicides ($P > .05$). Among the PCL-R subscores, only the affective facet score differed between the two groups; a significantly higher affective facet score was obtained in offenders with predominantly proactive index homicide ($Z = -2.760$, $P < .05$) (Table 3).

Predictors of Proactive Homicide Group

Regression analyses were performed using potential background and offense-related characteristics with personality traits as independent variables to evaluate factors that could predict being in the predominantly proactive homicide group among the offender patients (n = 47). In the univariate analysis, marital status (being unmarried) ($\beta = 1.67$, $P < .05$), age at illness onset ($\beta = .09$, $P < .05$), method (firearms) ($\beta = 2.41$, $P < .05$), infidelity delusions ($\beta = 2.41$, $P < .05$) and PCL-R Facet 2 ($\beta = 1.73$, $P < .05$) were significantly associated with predominantly proactive homicide. The multivariate model revealed that the presence of infidelity delusions at the time of the offense ($\beta = 3.72$, $P < .05$) and PCL-R Facet 2 ($\beta = 1.18$, $P < .05$) were significantly associated with predominantly proactive homicide ($\chi^2(38.176) = 25.934$, $P < .001$ with an R^2 of .57) (Table 4).

Discussion

The present study is the first to examine the relationship between a violent subtype of homicide, *modus operandi* characteristics of the homicidal act, offender characteristics, and psychopathic and impulsive traits as distinctive personality traits that might be related to the type of violence. Our data highlight interesting associations between motivation and methods of homicide, and certain distal and static factors and the affective dimension of psychopathy. The findings of this study indicate that in a subgroup of male schizophrenia patients, infidelity delusions with higher psychopathic affective dysregulation was related to homicides that were proactive in nature.

Large-scale studies have already reported that treatment nonadherence is a risk factor for violent behavior and that adherence to antipsychotic medication can reduce any type of violence in patients with schizophrenia.[7,53,54] In our sample, very few of the patients who had been prescribed antipsychotic drugs were actually taking them at the time of the offense, which highlights the problem of nonadherence to medication. This noncompliance, however, was unrelated to the violent subtype of the homicide committed.

Table 2 Comparison of Characteristics Surrounding the Homicides Between Predominantly Impulsive and Proactive Groups

	All Subjects (N = 47)		Predominant Impulsive (n = 27)		Predominant Proactive (n = 20)		
	n	%	n	%	n	%	Test Statistics, p
Psychotically motivated homicide	44	93.6	24	88.9	20	100	$\chi^2 = 2.374$; p = .251[a]
Multiple victims	5	10.6	3	11.1	2	10	$\chi^2 = .015$; p = 1.000[a]
Treatment nonadherence in the index homicide	42	89.4	24	88.9	18	90	$\chi^2 = .015$; p = 1.000[a]
Victim-perpetrator relationship							$\chi^2 = 8.096$; p = .424
Parents	14	29.8	8	29.6	6	30	
Intimate partner	5	10.6	1	3.7	4	20	
Children	1	2.1	0	0	1	5	
Siblings	6	12.8	4	14.8	2	10	
Nonfamily acquaintance	17	36.1	11	40.8	6	30	
Stranger	4	8.5	3	11.1	1	5	
Method/weapon							$\chi^2 = 8.646$; p = **.029**
Sharp instrument	32	68.1	21	77.8	11	55	
Firearms[b]	7	14.9	1	3.7	6	30	
Blunt	5	10.6	4	14.8	1	5.0	
Strangulation	2	4.3	1	3.7	1	5	
Pushing from a height	1	2.1	0	0	1	5	
Place							$\chi^2 = 2.605$; p = .107
Public place	18	38.3	13	48.1	5	25	
Private property	29	61.7	14	51.9	15	75	
Intoxicated offender							$\chi^2 = 1.897$; p = .387
No	39	83	21	77.8	18	90	
Alcohol	6	12.8	4	14.8	2	10	
Drugs	2	4.3	2	7.4	0	0	
Accompanying delusions							$\chi^2 = 13.653$; p = **.006**
No	4	8.5	4	14.8	0	0	
Persecutory/threat	15	31.9	11	40.7	4	20	
Referential/Control-override	6	12.8	5	18.5	1	5	
Infidelity[b]	8	17	2	7.4	6	30	
More than one type	14	29.8	5	18.5	9	45	
Accompanying hallucinations							$\chi^2 = 3.758$; p = .289
No	34	72.3	18	66.7	16	80	
Auditory-Command	10	21.3	7	25.9	3	15	
Auditory-Elementary	2	4.3	2	7.4	0	0	
Visual	1	2.1	0	0	1	5	

[a]Fisher's exact test.
[b]Post-hoc between-group proportions (impulsive vs. proactive) show significant differences.
$p < .05$ statistically significant (bold values).

Previous studies have highlighted that homicide and most forms of serious interpersonal violence committed by psychotic patients are strongly associated with cross-cutting socio-cultural determinants, including low level of education, poor financial status and unemployment, lack of social support, alcohol and substance misuse, and access to weapons.[9,55] Studies from the United States and Europe suggest that the level of education of schizophrenia patients who committed homicides was higher (>10 years)[19,56,57] than the sample in the current study and in studies reported from Turkey,[58,59] and other Eastern countries, including China,[60] Russia,[61] Egypt,[62] and Tunisia.[63] We found that more than four fifths of the homicidal patients were unemployed at the time of the offense; this rate is corroborated by findings from other studies carried out on homicidal schizophrenia patients from different cultural contexts.[7,59,62,64,65] Interestingly, the presence of social support for the homicidal patients was relatively higher in our sample compared with those reported from Western countries.[8,19] This is most likely related to the existence of traditional forms of social support from the extended family in Turkey. A history of alcohol or substance misuse was also less frequently observed in our sample compared with recent findings from the same patient group in European studies,[8,19] which can be attributed to cultural influences. Many studies suggest that regardless of the socio-cultural context, the majority of homicides perpetrated by patients with schizophrenia

Table 3 Impulsiveness and Psychopathy Scores of the Subjects According to the Predominant Violent Subtype of the Index Homicide

	Predominantly Impulsive (n = 27) (Mean±SD)	Predominantly Proactive (n = 20) (Mean±SD)	t/Z	p
BIS-11 Total[a]	78.59 ± 11.70	74.55 ± 11.89	1.163	.251
Attention[a]	19.96 ± 3.41	20.00 ± 4.60	−.032	.975
Motor[a]	25.67 ± 5.49	23.65 ± 4.23	1.367	.178
Nonplanning[a]	32.96 ± 4.75	30.90 ± 5.02	1.438	.157
PCL-R Total[a]	17.37 ± 6.90	17.80 ± 5.02	−.236	.815
PCL-R Factor 1[b]	8.30 ± 3.48	9.35 ± 2.18	−1.140	.254
Facet 1[b]	2.30 ± 2.25	2.15 ± 1.56	−.110	.913
Facet 2[b]	5.96 ± 1.91	7.20 ± 1.28	−2.760	**.006**
PCL-R Factor 2[a]	9.04 ± 3.51	8.45 ± 3.25	.584	.562
Facet 3[b]	6.52 ± 2.41	5.80 ± 2.28	−1.142	.254
Facet 4[b]	2.67 ± 1.49	2.65 ± 1.69	−.324	.746

SD: Standard deviation; BIS-11: Barratt Impulsiveness Scale; PCL-R: Psychopathy Checklist-Revised.
[a]Student's t test.
[b]Mann-Whitnet U test.
$p < 0.05$ statistically significant (bold values).

are committed using sharp implements; one half to two thirds of cases involved death by sharp instruments, a finding that is corroborated in the current study.[17,19,60,66] It is worth noting that weapon availability varies among countries. For instance, easy availability of a kitchen knife may be a broader problem in English society,[67] and gun availability more of a problem in countries such as the United States[68] and several regions of Russia.[69] Nevertheless, these determinants related to cultural context have not been evaluated with regard to the violent subtype of homicidal behavior previously and requires further examination.

In the current study, being single/unmarried was significantly associated with the classification of the crime committed by the homicide perpetrator, which is a novel finding. In a recent study carried out on male offenders with and without antisocial personality disorder, being single/unmarried was associated with higher severity of violence of the index crime; however, it was not correlated with the impulsive or premeditated dimensions of aggression.[70] There are conflicting results on whether being married is a protective factor for homicidal behavior in schizophrenia.[62,71] For instance, Swanson *et al.*[72] reported that being married or living with a partner was protective for patients with severe mental disorder who are stable; however this factor may increase the risk of violence in acutely ill patients. Our results indicate that further studies are needed to address the relationship between marital status and violent subtype of homicidal behavior in schizophrenia patients.

No significant difference in the victim-perpetrator relationship between impulsive and proactive cases was identified in the current study. Cornell *et al.*[73] reported that the victims of instrumental/proactive violent offenses committed by the general offender population were often strangers. In fact, the literature suggests that homicide offenders with schizophrenia are more likely (over 50%) to kill a relative or an acquaintance.[8,17,58,60,66,74,75] In the current study, only 8.5 percent of homicide victims were strangers, which argues that the schizophrenia-homicide nexus has a unique characteristic of victim-perpetrator

Table 4 Univariate and Multivariate Regression Analyses for Prediction of Being in the Predominantly Proactive Homicide Group

	Univariate				Multivariate[a]			
	β	Sig.	Exp (B)	[%95 CI]	β	Sig.	Exp (B)	[%95 CI]
Marital status (married)	1.67	**.028**	5.333	[1.194–23.829]	2.30	.130	10.016	[.508–197.599]
Age at illness onset	.09	**.025**	1.095	[1.012–1.186]	.01	.879	1.011	[.877–1.166]
Method (firearms)	2.41	**.033**	11.143	[1.217–102.029]	1.63	.203	5.100	[.416–62.516]
Infidelity delusions	2.41	**.033**	11.143	[1.217–102.029]	3.72	**.026**	23.268	[1.549–309.495]
PCL-R Affective (Facet 2)	1.73	**.025**	1.734	[1.071–2.808]	1.18	**.021**	3.194	[1.189–8.576]

PCL-R: Psychopathy Checklist-Revised.
[a]Results from binomial logistic regression, Model summary; $\chi^2(38.176) = 25.934$, $p < 0.001$, Percent correct classification 81% with R^2 of 0.57.
$p < .05$ statistically significant (bold values).

relationship that is independent of the motivation of the homicidal act.

Killing with firearms was significantly related to proactive homicides rather than impulsive ones. Perpetrators with mental illness show correlation between the degree of planning and selection of firearms as a homicide method.[68] Previous studies reported that while the availability of firearms varies across different countries, the lucid determination of paranoid patients and their capacity to plan a crime can often direct them toward the weapon most likely to guarantee the desired results, such as firearms.[18,66] In the present study, about 68 percent of all homicide incidents were committed with sharp instruments, which is in accordance with previous findings.[8,74] There is limited but consistent data suggesting that sharp implements are used more often in impulsive and unplanned homicides in the offender population with schizophrenia and other mental disorders because of their immediate availability.[67,68] Furthermore, it was reported that individuals with schizophrenia tend to carry easily accessible sharp instruments and use them mainly in sudden and unplanned responses to paranoid thinking and increased perception of threat from others.[76] There was not, however, a significant association between the choice of sharp instruments and impulsive homicides in the current study sample.

To date, there is some evidence that the presence of specific psychopathic traits without overt levels of psychopathy might elevate the likelihood of different types of violent behavior in schizophrenia patients.[77] Psychopathic personality features seem to be important determinants for the motivation and nature of homicidal behavior among the offender population. Woodworth and Porter reported that almost all homicides (93%) committed by individuals with high psychopathy were primarily proactive in nature, compared with those carried out by counterparts with low level of psychopathy (48%).[78] Individuals with high psychopathy may be predisposed to engage in instrumental violence related to their low levels of autonomic arousal, emotional detachment, and lack of empathy.[41] In our study, the total level of psychopathy was not directly related to the main motivation for homicide; however, high affective facet scores were associated with proactive homicide behavior. This suggests that certain traits of psychopathy can differentiate the motivation and quality of homicidal behavior in schizophrenia more robustly. There is a lack of documented evidence regarding the association between psychopathy dimensions and the motivation for homicide or serious violent crime in offenders with schizophrenia. Using data collected from a forensic psychiatric sample, including offender patients with various diagnoses, Laurel *et al.*[79] reported that the interpersonal-affective dimension (Factor 1) was related to instrumental/proactive violence and the severity of the violent crime. High scores in the affective facet of psychopathy (which refers to deficient affective experience and is characterized by callousness, lack of remorse and empathy, shallow emotions, and failing to take responsibility for actions), was associated with an increased likelihood of instrumental violence among incarcerated offenders.[80] A recent study reported that nonpsychotic homicide offenders, who had higher deficits in Facet 2 (affective) traits, tended to plan their homicides.[43] Vitacco *et al.*[81] suggested that deficits in autonomic functioning were linked to affective deficits, which were attributable to psychopathic callousness. Impulsiveness is considered to be a core feature of schizophrenia and psychopathy. Data from the current study, however, support the idea that impulsive violence is not always related to impulsive traits. Rather, impulsive violence is associated with specific temperamental traits that are not restricted to impulsiveness.[82] In the current study, a high score in the affective facet of psychopathy independently predicted being in the predominantly proactive homicide group in regression analyses, suggesting that a high level of the affective dimension of psychopathy is an illness-specific indicator of callous homicides among schizophrenia patients.

About 94 percent of homicides in the current study were psychotically motivated, supporting previous findings.[57,76] A majority of psychotically motivated violence embodies a comorbid impulsive nature, involving excessive reactivity to a perceived threat. On the other hand, both proactive and psychotic violence may also emerge synchronously because of the coexistence of a misinterpreted environmental stimulus (leading to the planned violence) and deficient fear control in the amygdala.[20,77]

The presence of delusions of infidelity was an independent predictor of being in the predominantly proactive homicide group in the current study. Delusional jealousy or infidelity delusions are among the less frequent psychotic drivers of violence in patients with psychosis.[83] In this type of delusion, the patients may gather evidence based on random

events, bits of conversation, or misplaced household items to support their suspicions. The degree of jealousy or belief in the infidelity of one's spouse reaches delusional intensity and may result in homicide in which the victim is generally the spouse.[84] On the other hand, when symptoms such as paranoia and bizarre thinking, including infidelity delusions, manifest themselves in a person possessing psychopathic traits (such as lack of remorse, novelty-seeking, and callousness), the results are much more likely to be detrimental and dangerous.[85] Nevertheless, there is a lack of supportive data on what kinds of delusions contribute to the emergence of which subtype of homicide in psychotic patients. It is worth mentioning that there is no clear evidence in the literature that *modus operandi* characteristics and circumstances of homicidal acts committed by offenders with schizophrenia varies across different cultural contexts; this aspect therefore deserves further investigation.

There are several limitations of the current study. The sample size was small because of the low number of homicide perpetrator patients admitted within the duration of the study. Furthermore, any self-report measure, including BIS-11, must be interpreted with caution, particularly in forensic settings. We could not include female subjects because of insufficient data. Gender differences regarding the specific predispositions of different violent subtypes in schizophrenia may provide additional understanding in future research. The coding system of violent subtype used in the current study may be inherently subjective. Despite our efforts in careful evaluation and discussion during the process of classifying the predominant violent subtype of homicide, aggressive behavior may be complex and involve both impulsive and proactive natures. Part of the test data were obtained a considerable time after the offense had been committed and this may limit the validity and role of these characteristics and the motives for homicide. The cross-sectional nature of the study design precluded access to longitudinal data in a follow-up period to evaluate time at risk. Since few offenders had more than one homicidal incident, characteristics of nonindex homicides were not considered. Despite using comprehensive and varying sources for data on the patients, a verification system for historical and forensic data was not available.

Conclusions

Despite its limitations, the current study ascertained that certain background, contextual and trait characteristics were associated with certain types of homicidal behavior, rather than with the diagnosis of schizophrenia. Delusions of infidelity, as well as high affective dysregulation as a function of psychopathy, were attributed to goal-oriented, planned, and callous homicide in schizophrenia patients. We believe that homicidal acts with different motivations are distinctive phenomena and should be, at least on occasion, examined separately in studies with established diagnostic homogeneity. Results of the current study confirm that perpetrators with schizophrenia may have illness-specific homicide methods and characteristics that are distinctive to other perpetrators. Based on our data, we suggest that it is important to understand specific motivations and the *modus operandi* of homicidal acts. Distal and proximal risk factors with certain personality dimensions that can predispose individuals to different types of severe violence need to be identified. More importantly, efforts to increase adherence to antipsychotic medication are urgently needed since nonadherence to treatment at the time of lethally violent offenses was very high, regardless of the violent subtype. Individualizing preventive programs or treatments and tailoring violence interventions as a function of violence may be effective in reducing different subtypes of serious violence in this patient population.

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