



WFSBP CONSENSUS PAPER

Prevention of homicidal behaviour in men with psychiatric disorders

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Abstract

Objectives. Homicide is overwhelmingly committed by men compared to women. Conservative estimates suggest that more than a third of these individuals have a treatable psychiatric disorder. These data present an opportunity to mental health clinicians to assist in the prevention of homicide by improving men's mental health. **Methods.** We review the current literature on men's mental health with a focus on assessing and reducing homicide risk in men with psychiatric conditions. **Results.** Bipolar disorder and schizophrenia appear to share a neural endophenotype that is a risk factor for homicide. Dual disorders, or the presence of a substance use disorder with other major mental illness, are a major risk factor for homicide in males. Dual diagnosis disorders, personality disorders and pathological traits and male depression share emotion dysregulation, irritability, and reactive aggression. Promoting physician education, addressing firearm safety, reducing the reluctance of men relative to women to engage in help-seeking behaviour, and using targeted risk interviews which integrate these data are all currently recommended. **Conclusions.** The main focus in prevention of homicidal behaviour in males with psychiatric disorders should be to identify high risk groups, to provide adequate treatment, and to facilitate compliance with long-term treatment while considering male specific problems and needs.

Key words: homicide; homicide-suicide; men's mental health; endophenotypes; help-seeking behaviour

Introduction

Each year nearly half a million people worldwide, 437,000 in 2012, are murdered in violent crimes (Table I) (United Nations Office of Drugs and Crime Research and Trend Analysis Branch 2013). Almost all of the perpetrators of these violent crimes, about 90%, are men (United Nations Office of Drugs and Crime Research and Trend Analysis Branch 2013; Oliffe et al. in press). Murder is a distinctly male problem.

Many perpetrators of murder suffer from mental illness. Worldwide estimates range from 34% in the United Kingdom (Shaw et al. 2006) and 35% in Canada (Cote et al. 1992) to 53% in Sweden (Lindqvist 1986) and 58% in the United States (Martone et al. 2013); one study found as many as

90% had at least one psychiatric diagnosis (Fazel and Grann 2004). Many of these individuals are profoundly ill; studies have found that 20–23% of homicide defendants exhibited psychosis at the time of the incident (Gottlieb et al. 1987; Fazel and Grann 2004).

To significantly reduce the numbers of murders worldwide, events which affect not only men but also women, families, and societies alike, prevention programs must incorporate these epidemiological data. It is the purpose of this communication to delineate the necessary determinants of an optimal approach to murder reduction among the mentally ill that is based on the available science.

In the creation of this consensus paper, we began with a collection of articles gathered over the last

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Table I. Homicide rates per 100,000 people.

Austria	0.6
Belgium	1.7
Canada	1.6
Croatia	1.4
Czech Republic	1.7
Denmark	0.9
Finland	2.2
France	1.1
Germany	0.8
Greece	1.5
Hungary	1.3
Ireland	1.2
Italy	0.9
Japan	0.4
Kenya	20.1
Korea, Rep.	2.6
Kyrgyz Republic	20.1
Lao PDR	4.6
Lebanon	2.2
Liberia	10.1
Libya	2.9
Lithuania	6.6
Madagascar	8.1
Malawi	36.0
Mali	8.0
Mauritania	14.7
Mexico	22.7
Moldova	7.5
Morocco	1.4
Myanmar	10.2
Nepal	2.8
The Netherlands	1.1
New Zealand	1.1
Nicaragua	13.6
Niger	3.8
Nigeria	12.2
Norway	0.6
Pakistan	7.6
Panama	21.6
Papua New Guinea	13.0
Paraguay	11.5
Peru	10.3
Philippines	5.4
Poland	1.1
Portugal	1.2
Romania	2.0
Russian Federation	10.2
Rwanda	17.1
Senegal	8.7
Serbia	1.2
Sierra Leone	14.9
Singapore	0.4
Slovak Republic	1.5
Somalia	1.5
South Africa	31.8
Spain	0.8
Sri Lanka	3.6
Sudan	24.2
Sweden	1.0
Switzerland	0.7
Syrian Arab Republic	2.3
Tajikistan	2.1
Tanzania	24.5

(Continued)

Table I. (Continued)

Thailand	5.3
Togo	10.9
Tunisia	1.1
Turkey	3.3
Uganda	36.3
Ukraine	5.2
United Kingdom	1.2
United States	4.8
Uruguay	6.1
Uzbekistan	3.1
Venezuela, RB	45.1
Vietnam	1.6
Yemen, Rep.	4.2
Zambia	38.0
Zimbabwe	14.3
World	5.7

2010 (World Bank, 2014).

decade that were assessed to be of importance to the topic. Then, we complemented this collection with a search of the remaining literature through keywords including homicide, men’s mental health, and specific psychiatric disorders. No specific exclusion criteria were used as we included reviews, studies, opinion pieces, perspectives, and commentaries.

Studies demonstrate that individuals with both mental illness and a co-occurring substance use disorder are at the highest risk for violence and murder (Eronen et al. 1996a, 1996b; Putkonen et al. 2004; Palijan et al. 2009b; Sher and Landers 2014). The program advocated in this proposal focuses on dual diagnosis patients as the target population for intervention. The data supporting the high risk status of this population is reviewed. Table II presents recent important studies on this topic in the academic literature, which demonstrate that statistics concerning the relationship between homicide and psychiatric disorders vary widely, that there are significant differences between regions and diagnostic methods, and that it is difficult to obtain accurate statistics. There are additionally important differences between types of murders, especially between sexual and non-sexual violence, and there is a significant body of literature within each sub-type of violence (e.g., regarding sexual violence, Meloy 2000; Chan and Heide 2009) which troubles making generalizations regarding violence and murder as a heterogeneous group. These limitations indicate a need for further study. The current supporting neurobiological evidence is referenced and enumerated.

This communication proceeds into a discussion of a targeted risk evaluation. Risk factors for violence and the process of an optimized targeted clinical interview are discussed and summarized in Table III. Societal-level interventions are discussed with a focus on firearm restriction among patients

Table II. Important findings in the literature.

Citation	Finding
Bogerts B, Möller-Leimkühler AM. 2013. Neurobiological and psychosocial causes of individual male violence. <i>Nervenarzt</i> 84(11):1329–1344.	Overviews epidemiological, neurobiological, genetic, neuropathological, neurochemical/hormonal, developmental and psychosocial theories on male aggression and violence.
Eronen M, Hakola P, Tiihonen J. 1996. Mental disorders and homicidal behavior in Finland. <i>Arch Gen Psychiatry</i> 53(6):497–501.	Analyzes 693 of 994 homicide offenders during an 8-year period in Finland to find that schizophrenia increases the risk of homicidal violence by about 8-fold in men and 6.5-fold in women; antisocial personality disorder increases risk over 10-fold in men and over 50-fold in women; affective disorders, anxiety disorders, dysthymia, and mental retardation did not elevate risk to any significant extent (odds ratio < 5.0).
Eronen M, Tiihonen J, Hakola P. 1996. Schizophrenia and homicidal behavior. <i>Schizophr Bull</i> 22(1):83–89.	Analyzes 93 homicide offenders with schizophrenia among 1423 arrested during a 12-year period to find that the risk of committing a homicide was about 10 times greater for schizophrenia patients of both genders than it was for the general population.
Fazel S, Buxrud P, Ruchkin V, Grann M. 2010. Homicide in discharged patients with schizophrenia and other psychoses: a national case-control study. <i>Schizophr Res</i> 123(2–3):263–269.	Analyzes 47 individuals with schizophrenia and other psychoses who committed a homicide within 6 months of discharge against 105 controls who did not commit any violent offence after discharge to find that poor self-care pre-hospitalization, substance misuse pre- and post-hospitalization, being previously hospitalized for a violent episode, and medication noncompliance post-hospitalization were all associated with homicide.
Fazel S, Gulati G, Linsell L, Geddes JR, Grann M. 2009a. Schizophrenia and violence: systematic review and meta-analysis. <i>PLoS Med</i> 6(8):e1000120.	Meta-analysis of 20 individual studies reporting data from 18,423 individuals with schizophrenia and other psychoses reveals that in men the odds ratio for the comparison of violence in those with schizophrenia and other psychoses with those without mental disorders varied from 1 to 7 with substantial heterogeneity ($I^2 = 86\%$).
Fazel S, Långström N, Hjern A, Grann M, Lichtenstein P. 2009b. Schizophrenia, substance abuse, and violent crime. <i>JAMA</i> 301(19):2016–2023.	Linkage of Swedish registers of hospital admissions and criminal convictions in 1973–2006 reveals that substance abuse is a mediator of the increased risk of violent crime in schizophrenia.
Flynn S, Abel KM, While D, Mehta H, Shaw J. 2011. Mental illness, gender and homicide: a population-based descriptive study. <i>Psychiatry Res</i> 185(3):368–375.	A cross-sectional study of 4572 convicted homicide perpetrators in England and Wales 1997–2004 reveals that gender and the presence of mental illness both influence the characteristics of homicide and outcome of the legal process.
Golenkov A, Large M, Nielsen O, Tsymbalova A. 2011. Characteristics of homicide offenders with Schizophrenia from the Russian Federation. <i>Schizophr Res</i> 133(1–3):232–237.	Analysis of 133 homicide offenders (120 men, 13 women) with schizophrenia from a region with a high total homicide rate (Chuvash Republic of the Russian Federation) reveals that characteristics of homicide offenders with schizophrenia do not appear to differ greatly from those of homicide offenders with schizophrenia from regions with far lower rates of homicide.
Golenkov A, Nielsen O, Large M. 2014. Systematic review and meta-analysis of homicide recidivism and schizophrenia. <i>BMC Psychiatry</i> 14:46.	Recent systematic review and meta-analysis using unpublished data suggest that homicide recidivism is less common than three published reports have suggested (4.3, 4.5, and 10.7% of homicide offenders with schizophrenia had committed an earlier homicide).
Marcell A V, Ford CA, Pleck JH, Sonenstein FL. 2007. Masculine beliefs, parental communication, and male adolescents' health care use. <i>Pediatrics</i> 119:e966–975.	Heightened masculinity is directly associated with fewer receipt of healthcare and particularly mental health services in adolescents and young men.
Masle LM, Goreta M, Juki V. 2000. The comparison of forensic-psychiatric traits between female and male perpetrators of murder or attempted murder. <i>Coll Antropol</i> 24(1):91–99.	A retrospective analysis of 70 female and 70 male homicide offenders reveals men are less likely to be emotionally related to their victims, less likely to have been previously victimized, and more likely to have alcoholism as a circumstantial factor concerning their accountability.
Miquel L, Roncero C, García-García G, Barral C, Daigre C, Grau-López L, et al. 2013. Gender differences in dually diagnosed outpatients. <i>Subst Abuse</i> 34:78–80.	Risk factors for homicide such as stimulant abuse may occur much more frequently in men with dual diagnosis disorders than in women, who more commonly present with psychodepressant abuse.
Möller-Leimkühler AM. 2002. Barriers to help-seeking by men: a review of sociocultural and clinical literature with particular reference to depression. <i>J Affect Disord</i> 71(1–3):1–9.	Reviews sociocultural and clinical factors related to the consistently lower consultation rates and help-seeking patterns in men than in women.
Möller-Leimkühler AM, Schwarz R, Burtscheidt W, Gaebel W. 2002. Alcohol dependence and gender-role orientation. <i>Eur Psychiatry</i> 17(1):1–8.	Analysis of 112 individuals with alcohol dependence reveals that men with alcoholism have a non-traditional undifferentiated or feminine (74%) rather than a traditional masculine gender identity (20%).

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Table II. (Continued)

Citation	Finding
Nielssen O, Bourget D, Laajasalo T, Liem M, Labelle A, Häkkänen-Nyholm H, et al. 2011. Homicide of strangers by people with a psychotic illness. <i>Schizophr Bull</i> 37(3):572–579.	Meta-analysis of the population-based studies of homicide by persons suffering from a psychosis in which the number of subjects who killed strangers revealed that stranger homicides are very rare (1 stranger homicide per 14.3 million people) and their victims are most often adult males.
Nielssen O, Large M. 2010. Rates of homicide during the first episode of psychosis and after treatment: a systematic review and meta-analysis. <i>Schizophr Bull</i> 36(4):702–712.	Meta-analysis of 10 studies that reported details of all the homicide offenders with a psychotic illness showed that 38.5% of homicides occurred during the first episode of psychosis, prior to initial treatment.
Nielssen OB, Westmore BD, Large MM, Hayes RA. 2007. Homicide during psychotic illness in New South Wales between 1993 and 2002. <i>Med J Aust</i> 186(6):301–304.	Analysis of homicides committed during psychotic illness in New South Wales over 10 years from 1993 to 2002 show that people in their first episodes of mental illness should be considered to be at greater risk of committing serious violence than those in subsequent episodes, and that illicit drug use, a history of brain injury, auditory hallucinations and delusional beliefs of immediate danger were particularly associated with lethal assault.
Oliffe J, Han C, Drummond M, Sta Maria E, Bottorff J, Creighton G. (in press). Men, masculinities, and murder-suicide <i>Am J Mens Health</i> .	Men account for 93.4% of murder-suicide offenders in the United States, and this is higher than the men perpetrator homicide rates of 88.3%.
Palijan TZ, Kovacevi D, Radeljak S, Kovac M, Mustapi J. 2009a. Forensic aspects of alcohol abuse and homicide. <i>Coll Antropol</i> 33(3):893–897.	Analysis of 177 males who committed homicide in Croatia from the year of 1990 until 2007 reveals that alcohol intoxication in offenders and victims at the time of murder could strongly affect the modalities of homicide.
Paris J. 2004. Gender differences in personality traits and disorders. <i>Curr Psychiatry Rep</i> 6:71–74.	At least 80% of individuals who meet criteria for antisocial personality disorder, a significant homicide risk factor, are men.
Picchioni MM, Murray RM. 2007. Schizophrenia. <i>BMJ</i> 335:91–95.	Schizophrenia, a major risk factor for homicide, presents 1.4 times as frequently in men as compared to women.
Richard-Devantoy S, Bouyer-Richard AI, Jollant F, Mondoloni A, Voyer M, Senon JL. 2013. Homicide, schizophrenia and substance abuse: a complex interaction. <i>Rev Epidemiol Sante Publique</i> 61(4):339–350.	Meta-analysis of eight prospective studies and six systematic reviews and meta-analysis studies reveals that a co-diagnosis of substance abuse enables division of violent individuals with schizophrenia into “early-starters” and “late-starters” according to the age of onset of their antisocial and violent behavior. Violence of the “early-starters” is unplanned, usually affects an acquaintance and is not necessarily associated with the schizophrenic symptoms.
Soyka M, Graz C, Bottlender R, Dirschedl P, Schoech H. 2007. Clinical correlates of later violence and criminal offences in schizophrenia. <i>Schizophr Res</i> 94(1–3):89–98.	Analysis of criminal offences committed by 1662 patients with schizophrenia treated between 1990 and 1995 in the Psychiatric Hospital of the University of Munich reveals that after 7 to 12 years after discharge, male patients commit violence and criminality more than three times as often as women.
Vega P, Barbeito S, Ruiz de Azúa S, Martínez-Cengotitabengoa M, González-Ortega I, Saenz M, et al. 2011. Bipolar disorder differences between genders: special considerations for women. <i>Women’s Heal.</i> 7:663–676.	Bipolar disorder may present in men as compared to women with more risk factors for homicide, such as substance use.
Wallace C, Mullen P, Burgess P, Palmer S, Ruschena D, Browne C. 1998. Serious criminal offending and mental disorder. Case linkage study. <i>Br J Psychiatry</i> 172:477–484.	Analysis of all individuals convicted in the higher courts of Victoria between 1993 and 1995 found that 25% had prior psychiatric contact. Personality disorders and substance abuse were common as was schizophrenia.
Weizmann-Henelius G, Matti Grönroos L, Putkonen H, Eronen M, Lindberg N, Häkkänen-Nyholm H. 2012. Gender-specific risk factors for intimate partner homicide – a nationwide register-based study. <i>J Interpers Violence</i> 27(8):1519–1539.	Analysis of intimate partner homicide (IPH) and offender characteristics on 642 offenders, 551 of which were men, revealed that gender differences were significant in four risk factors: employment, intoxication of victim, self-defence, and quarrel, mostly related to alcohol as a factor of the offense.
Winkler D, Pjrek E, Kasper S. 2005. Anger attacks in depression – evidence for a male depressive syndrome. <i>Psychother Psychosom</i> 74:303–307.	Depressed men have higher irritability, a greater tendency to overreact, more anger attacks, lower impulse control, and more symptomatic substance intake and hyperactive behaviour compared to depressed women.

with mental illness. Supporting data are reviewed and discussed.

This communication is written in mind that the majority of people with mental illness are nonviolent

(Monahan and Doherty 1993). Stigma is a major problem for individuals with mental illness, and education rather than stigmatization is the goal of this communication. As the community’s perception of

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Table III. Modifiable and unmodifiable risk factors for homicidal behavior.

Risk factor	Possible interventions
Modifiable risk factors	
<i>Illness-related/neurobiological</i>	
Delusions	Antipsychotics, benzodiazepines, long acting injectibles (e.g., in schizophrenia, Gadelha et al. 2012; Hasan et al. 2012).
Hallucinations	Antipsychotics, benzodiazepines, long acting injectibles (e.g., in schizophrenia, Gadelha et al. 2012; Hasan et al. 2012).
Depression	Antipsychotics, antidepressants, psychotherapy, ECT for severe depression (Bauer et al. 2002, 2013; Malhi et al. 2013).
Manic state	Neuroleptics, mood stabilizers (Grunze et al. 2003; Grune et al. 2009).
Alcohol abuse	Detoxification, 12-step programs, psychotherapy, inpatient and outpatient rehabilitation, medication to reduce alcohol craving (Sofuoglu and Kosten 2004; Soyka et al. 2008).
Drug abuse	Detoxification, 12-step programs psychotherapy, inpatient and outpatient rehabilitation, medication to reduce drug craving (Sofuoglu and Kosten 2004; Soyka et al. 2008).
Impulsivity	Antipsychotics, mood stabilizers, psychotherapy (Pattij and Vanderschuren 2008).
Antisocial behavior	Antipsychotics, treat comorbidities, psychotherapy (Klar and Siever 1984; Herpertz et al. 2007).
Angry rumination	Antipsychotics, antidepressants, psychotherapy (Denson 2013).
Insomnia	Antipsychotics, hypnotics, psychotherapy (Sutton 2014).
Pain	Analgesics, psychotherapy (Gatchel et al. 2014).
Chronic medical condition	Referral to consistent medical care, psychotherapy (Kemp 2011).
<i>Psychosocial</i>	
Access to firearms/weapons	Removal, background check
Poor coping skills	Safety plan, psychotherapy
Homicidal ideation	Warning victim/legal support, hospitalization
Isolation/poor communication	Increase family/social supports, psychotherapy
Financial/housing/food stressors	Referral to social services
Unmodifiable risk factors (Kasper et al. 2003; Schatzberg and Nemeroff 2003; Hales et al. 2014).	
Male gender	
Young age	
A history of violence and/or homicidal behavior	
A history of a psychiatric disorder	
A history of a dual disorder	
A history of childhood adversities	

and exposure to violent behaviour by mentally ill individuals is an important cause of non-specific stigma against the mentally ill (Torrey 2011), it is hoped that the treatment-focused message of this communication will serve in the aim of decreasing stigma against persons with mental illness. The goal of this communication is to promote education and to raise discretion in the scientific community and to promote a scholarly discussion and improved understanding to reduce stigma.

Neurobiological considerations

Biological factors may include the role of structural and functional alterations in the prefrontal cortex as an inhibitory centre with its various connections within the adult brain (Bonelli and Cummings 2007; Potegal 2012). A recent meta-analysis suggests that executive functioning and emotional processing deficits that originate through alterations in the prefrontal-limbic functional networks may be common underpinnings of many specific mental disorders (Goodkind et al. 2015). This emerging neurobiological model demonstrates an integrated account

for the neural correlates of well-established risk factors for homicide, including poor impulse control, reactive anger, and the disinhibiting effects of alcohol and drugs.

However, it will be increasingly important for the field of men's mental health to consider the role of male sex hormones upon defined functional neuroanatomic as well as neurotransmitter systems (Berman and Coccaro 1998; Mazur 2006; Wallner and Machatschke 2009; Soyka 2011). There is a significant amount of research to suggest that the serotonergic system plays a significant role in aggressive and impulsive behaviour through putative interactions with testosterone in men (Birger et al. 2003). In fact, significant interaction effects between serotonin and testosterone may only exist in men (Kuepper et al. 2010), suggesting that this may be a locus of violence risk that is specific to Men's Mental Health and worthy of further research.

The neurobiology of homicide is being increasingly understood on the molecular and cellular level, hinting at a future when biomarkers of homicide may be accurately and efficiently obtained in the establishment of risk assessment. To date there is insuf-

ficient evidence in support of these practices, though the use of exogenous testosterone may be considered akin to the substances of abuse and trigger concern for homicidal behaviour.

Specific mental disorders

Bipolar disorder and schizophrenia

Bipolar disorder and schizophrenia are the two major psychiatric illnesses that are likely to predispose to homicide. Notably, these are two disorders which have special characteristics in men that may mediate the association with violence. There are shared biological pathways between schizophrenia and bipolar disorder (Network and Pathway Analysis Subgroup of the Psychiatric Genomics Consortium & International Inflammatory Bowel Disease Genetics Consortium IIBDGC 2015). In bipolar disorder, men are more likely to have co-occurring substance use disorders, and they may have more manic episodes than women (Vega et al. 2011). In schizophrenia, men are diagnosed with the disorder much more frequently than in women – by a factor of 1.4 (Pichioni and Murray 2007). It has been proposed that when a depressed person commits a homicide, the act is likely to be connected with the presence of psychotic thinking (Malmquist 1995). In patients with psychotic depression, homicide may occur during depersonalized states, with later partial amnesia (Malmquist 2006).

Bipolar patients more commonly commit homicide when depressed than when manic (Yoon et al. 2012). In mania, homicide by battery rather than homicide by firearm or alternate means is the more common means of implementation. The motivation of homicide is markedly different between the phases of bipolar disorder: for example, in one study (Yoon et al. 2012), 34% of depressed bipolar patients murdered in order to alleviate a perceived or real burden on the victim (altruistic murder), whereas not a single manic bipolar patient did so. Affective impulsivity was significantly more important during the manic phase of bipolar disorder (50%) versus the depressed phase (11.5%). These characteristics are meaningful to evaluate in conducting a risk assessment.

The relation between schizophrenia and homicide risk has been long appreciated (Planansky and Johnston 1977; Eronen et al. 1996a; Large et al. 2009). There are many neurobiological markers and mechanisms for the association between schizophrenia and violence (Soyka 2011). Many individuals with schizophrenia who have suicidal ideation may also have homicidal ideation – as many as 86% (Volavka et al. 2004). Positive symptoms may also be an important factor in the commission of

murder, particularly persecutory delusions (Bjørkly 2002; Coid et al. 2013). Individuals with psychosis may commit “stranger homicides”: male gender, a history of antisocial conduct, a living-alone status, and fewer negative symptoms are all risk factors for this type of homicide (Nielssen et al. 2011). All these data should be incorporated into an accurate risk assessment, to be discussed below. It has been suggested that homicide in patients with bipolar disorder and schizophrenia occurs mostly among non-treated/non-compliant frequently homeless patients (Elbogen and Johnson 2009).

These two disorders may share a unique risk for homicide by virtue of a shared neural endophenotype (Meda et al. 2012). Deficits in the emotion regulation domain subconstruct may play a major role in both bipolar disorder (Green et al. 2007) and schizophrenia (Horan et al. 2013). Maladaptive mechanisms of regulating negative affect are seen in both (Rowland et al. 2013). Poor emotion regulation is a major risk factor for impulsive violence, which is often the major factor in homicides perpetrated by males with these disorders (Hoptman et al. 2010; Yoon et al. 2012). In fact, unregulated anger may mediate the association in schizophrenia between delusions and homicide risk (Coid et al. 2013). It may be hypothesized that it is the further deterioration of the emotion regulation system through the neurobiological effects of alcohol and other illicit substances that mediates the risk of co-occurring substance use disorders in schizophrenia and bipolar disorder.

Depression and personality disorders

Depression may be characterized by a greater tendency to externalizing behaviours in men than in women following experiences of negative life events (Winkler et al. 2005; Winkler et al. 2006; Rice et al. 2014). These externalizing behaviours may present as acts of aggression, including homicide. Irritability, anger attacks, aggressiveness, and abusive behaviour may all be indicative of male-specific depressive disorders (Möller-Leimkühler et al. 2004) and require a male-specific approach. This may lead to men’s higher risk for premature death compared to women from various causes, including violence (Möller-Leimkühler 2003).

Aggression and violence are commonly associated with personality disorders as well, in particular antisocial and borderline personality disorders (Fountoulakis et al. 2008; American Psychiatric Association 2013; Scott et al. 2014). Antisocial personality disorder is characterized by a persistent pattern of disrespect for, and violation of, the rights of others that begins in childhood or early adoles-

cence and continues into adulthood (American Psychiatric Association 2013). One of the Diagnostic and Statistical Manual of Mental Disorders (DSM5) criteria for antisocial personality disorder is "Irritability and aggressiveness, as indicated by repeated physical fights or assaults" (American Psychiatric Association 2013). It is believed that antisocial personality disorder is much more common in males than in females: at least 80% of those meeting criteria are men (Paris 2004). It should be noted that some researchers suggest that antisocial personality disorder may be underdiagnosed in females (Warner 1978; Paris 2004; Dolan and Völlm 2009). In one study, the presence of any personality disorder was reported to increase the risk of homicide, but the risk was exceptionally high in persons with antisocial personality disorder (Eronen et al. 1996a). According to this study, antisocial personality disorder increased the odds ratio of a man to commit a homicide by 10-fold (Eronen et al. 1996a). Another study has shown that the combination of antisocial personality disorder and substance use disorder conferred higher levels of aggression, impulsivity, and psychopathy relative to substance use disorders only and the control group (Alcorn III et al. 2013).

Dual diagnosis

Dual diagnosis, or the presence of a substance use disorder with a co-occurring major mental illness, such as schizophrenia or bipolar disorder, is a major risk for homicide (Nielssen et al. 2007; Fazel et al. 2009b; Richard-Devantoy et al. 2011). Dual-diagnosis is more frequent in men. There are gender differences in the presentation of dual diagnosis disorders as well. For example, psychotic disorders, anxiety, and stimulant use disorders are more frequent in men, whereas affective disorders and psychodepressant consumption were more prevalent in women (Miquel et al. 2013). These characteristics of dual disorders in men, which increase impulsivity, may further increase male risk as opposed to that of females.

It is important to stress the connection between drug use disorder diagnoses and homicide. In a recent study, 47% of homicide defendants had a drug use-related Axis I disorder, whereas only 5.5% had only non-substance-use-related Axis I disorders (Martone et al. 2013). The study also found that 47% of the defendants had no Axis I diagnosis, 36% had substance abuse related Axis I diagnosis only, and 11.5% had co-morbid substance abuse.

It is important to evaluate common substances of abuse separately, as each substance is associated with its own unique risk profile for violence (World Health

Organization (WHO) 2009). Whereas the limited current knowledge base prevents the dissection of specific illicit substances into risk stratum, there is sufficient evidence to support the broader differentiation between alcohol and drugs of abuse as a valuable organizing structure.

Alcohol

Alcohol plays a major role in homicide even in individuals without any mental illness. Alcohol disinhibits and renders individuals less capable of non-violent conflict resolution. Both volume and hazardous patterns of consumption are associated with homicide rates (Bye 2008).

More than four out of five (82%) of homicides committed in Finland and half of those in Sweden were committed when intoxicated with alcohol (National Research Institute of Legal Policy 2011). Significant but less striking rates are available for Australia (Australian Institute of Criminology 2013) and other countries, including India (30.2%) (United Nations Office of Drugs and Crime 2013).

Alcohol use is particularly troublesome for individuals with mental illness. We have discussed the role of affective impulsivity in individuals with manic bipolar disorder (Yoon et al. 2012); the influence of alcohol may further increase affective impulsivity and raise homicide risk. Chronic use can predispose to alcohol-induced dementias and further produce executive functioning deficits on a much longer time scale.

This is especially true for individuals with schizophrenia (Beaudoin et al. 1993; Eronen et al. 1996b; Räsänen et al. 1998; Fazel et al. 2009b; Belli and Ural 2012). In schizophrenia, alcohol may mediate the increased risk of homicide (Fazel et al. 2009b). Whereas schizophrenia presents a 2-fold risk for murder, schizophrenia with co-occurring substance use presents an 8-fold risk in comparison to the general population (Richard-Devantoy et al. 2013). As many as a third of individuals with schizophrenia have alcohol dependence (Drake et al. 2002), making this a significant population of interest.

Illicit substances

Illicit substance use increases homicide risk through psychopharmacological mechanisms that are substance-specific. They too play a role in murder in people without co-occurring mental illness (Darke 2010). Most, but not all (Meehan et al. 2006), studies suggest that this risk may be less so than that of alcohol, however. For example, only about 20% of homicide perpetrators were intoxicated with illicit

substances at the time of the offence (National Research Institute of Legal Policy 2011). Illicit drugs also raise murder rates through other non-neurophysiological means; for example, as occurs when murders may be committed by dependent individuals to secure access to illicit substances.

In one study, more than a fourth (26%) of individuals with schizophrenia who committed murder were found to have amphetamines in their bloodstreams (Nielssen et al. 2007). In the same study, more than three-quarters (76%) of individuals with schizophrenia who committed murder were found to have cannabis in their system (Nielssen et al. 2007).

There are limitations to the investigation of the role of co-occurring substance use disorders. Substance use disorders are highly associated with social conditions that are independent risk factors for homicide and other risk-taking behaviours (United Nations Office of Drugs and Crime 2013). We have referenced the geographic complexities of the role of substances as well, suggesting greater influence of co-occurring substance use disorders in some countries and locales over others. Many countries do not have available data on these variables of interest, making these assessments insufficiently capable of generalization for all areas. With these limitations in mind, attention to the effect of co-occurring substance use disorders is of great importance.

Homicide–suicide

Homicide–suicide events are defined as the murder of one or several persons followed by suicide of the offender (Liem et al. 2011; Panczak et al. 2013). Men account for 93.4% of murder–suicide offenders in the United States, and this is higher than the men perpetrator homicide rates of 88.3% (Olliffe et al. in press). Male perpetrators are twice as likely to be over the age of 55 years (Eliason 2009). Homicide–suicide is a multifaceted phenomenon involving interrelated multiple factors (Eliason 2009; Liem et al. 2011; Panczak et al. 2013b; Olliffe et al. in press). Homicide–suicides often result from circumstances and living conditions associated with intimate partner tension and general, persistent psychological stress. Murder–suicide may be related to various reasons including power, retaliation, loyalty, profit, jealousy, envy, and terror. Perpetrators who commit homicide–suicide frequently have substance use disorder and/or depression (Eliason 2009). It has been suggested that homicide–suicides represent a distinct entity, with characteristics distinguishing them both from homicides and suicides (Panczak et al. 2013).

Adolescent mass homicide–suicides are a unique phenomenon with high cultural consciousness that may be understood to occur as a result of the adolescent's failure to progress along normative development (Rice and Hoffman in press). This and similar formulations suggest that homicide–suicide perpetrators, particularly those still in adolescence or early adulthood, may be effectively reached through developmentally-informed psychotherapeutic interventions as part of a public health preventative program (Rice in press; Rice and Hoffman in press).

Suicides when they occur in the absence of homicides are other distinct phenomena that is of crucial importance to the psychiatrist and other mental health professionals. The identification of risk factors for suicide and the prevention of suicide has a large literature base (Mann et al. 2005) in individuals with psychiatric disorders (Mann et al. 1999) and has well-established neurobiological correlates (Mann 2003). It is important to note that many of the risk factors for suicide are shared with homicide and, additionally, that androgens play a large role in suicide within men's mental health (Rice and Sher 2013; Sher 2012, 2013a, 2013b; Sher et al. 2012). These findings present additional indications to further explore the role of male sex hormones in homicide.

Sexual violence and homicide

The acts of sexual violence and homicide in individuals with mental illness are often distinct from sexual violence and homicide in non-mentally ill populations. This underscores the importance of investigating sexual homicides as a unique subgroup of homicide and violence (Meloy 2000; Chan and Heide 2009). For example, in most cases, serial rapists and paedophiles do not meet criteria for schizophrenia (Thibaut 2006). In contrast, individuals with paraphilias and paraphilia-related disorders engage in sexual violence to a much higher extent (Briken et al. 2006). Individuals with personality disorders, especially those with antisocial personality disorder and schizoid personality disorder, are also at increased risk for engaging in these types of violence (Hill 2006; Briken 2010). Education of the public and professionals on these findings may help to reduce stigma by preventing the public from conflating premeditated serial from psychotic individuals and others with major traditional psychiatric illness: the vast majority of sex violence and homicides are indeed committed by men without major mental illness. Psychiatrists and other mental health professionals must also tend to this fact when recognizing their limitations in offering services related to sexual violence.

Violence, homicide, and terrorism

It is not clear whether or not homicidal and/or suicidal terrorist acts are associated with psychiatric pathology, but there is limited evidence that homicidal and suicidal terrorism may be related (Sher 2015 Taintor 2015). If the practices of certain terrorist organizations may be generalized to the practices of all, it appears that terrorist organizations reject recruits with signs and symptoms of psychopathology owing to the terrorism organizations' perception that they cannot be expected to function well in fulfilling terrorist objectives (Horgan 2005). Simultaneously, terrorists are known to draw such different meanings from terrorist events in contrast to the general public that their reality testing may be suspect and thus so psychiatric considerations have become more relevant (Taintor 2015). Though this young field of study will certainly require additional research, it promises high relevance to the contemporary sociocultural landscape of the twenty-first century.

Homicide offenders with or without psychiatric illness

A recent study compared homicide perpetrators with and without mental illness at the time of offense (Oram et al. 2013). With regard to intimate partner murder, when comparing the sociodemographic characteristics of perpetrators with and without mental illness at the time of offense, the authors found that perpetrators of intimate partner homicide who had symptoms of mental illness at the time of offense were more likely to be older, male, and employed. No differences were identified with respect to racial-ethnic minority group, marital status, or living arrangement. With regard to behavioural characteristics, perpetrators with symptoms of mental illness at the time of offense were less likely to have previous convictions, including convictions for violence, threats of violence, criminal damage, and possession of weapons. Perpetrators with symptoms of mental illness were less likely to have ever abused alcohol. The prevalence of a history of self-harm was also lower among perpetrators with symptoms of mental illness at the time of offense.

With regard to adult family homicide, when comparing the sociodemographic characteristics of adult family homicide perpetrators with and without symptoms of mental illness at the time of offense, the authors identified no differences in respect to sex, age, racial-ethnic minority status, marital status, or living arrangement. Perpetrators with symptoms of mental illness were, however, less likely to

be employed. In regard to behavioural characteristics, perpetrators with symptoms of mental illness at the time of offense were less likely to have any previous convictions or convictions for violence or criminal damage. Perpetrators with symptoms of mental illness were also less likely to have ever abused alcohol.

Another study investigated homicide crime scene behaviour (Häkkinen and Laajasalo 2006). Homicide offenders with schizophrenia and offenders with substance use disorder had some unique features in their crime scene behaviours and choice of victims. Offenders with schizophrenia were more likely to kill a blood relative, to use a sharp weapon, and to injure the victim's face. Offenders with substance use disorder more frequently stole from the victim and tried to cover up the body.

Another study examined diagnostic differences between perpetrators who commit homicide by differing methods (Rodway et al. 2009). Perpetrators with schizophrenia were more likely to use a sharp instrument and predominantly killed a family member or spouse in the home; a significant majority were acutely ill at the time of the offense. Perpetrators diagnosed with affective disorder were more likely to use strangulation or suffocation. Alcohol-dependent perpetrators used hitting or kicking significantly more often, primarily to kill acquaintances. Finally, drug-dependent perpetrators were more likely to use non-violent methods, particularly poisoning.

A study of homicide offenders guilty of mutilation found that educational and mental health problems in childhood, inpatient mental health contacts, self-destructiveness, and schizophrenia were significantly more frequent in offenders guilty of mutilation (Hakkanen-Nyholm et al. 2009).

Help-seeking behaviour

Men often do not seek help when they are in need. This is true for both mental health (Marcell et al. 2007) and general medical care (Mulye et al. 2009). Young men are less frequently insured than young women (Adams et al. 2007), and less than half of male adolescents make their yearly preventative visit (Centers for Disease Control and Prevention 2011). Without routine preventative care, risk factors and warning signs for homicide can go unobserved and unaddressed. Among men, heightened masculinity is directly associated with less receipt of healthcare and particularly mental health services (Marcell et al. 2007). The fact that men do not seek help may be related to stigma of mental illness (Vogel et al. 2011).

Additionally, low entry to care among males may be a product of a failure of medical education. High levels of substance use among medical students and young physicians may have a normalizing effect on perceptions of excessive consumption (Roncero et al. 2014). This may impair the detection of individuals with addiction, particularly among males. It is important to train medical students and make them aware of addiction. Given the social importance of addictions, education in this area should be mandatory, as the training of health science students can modify their attitudes towards patients. Lack of help-seeking among men with a history of substance use and/or antisocial/criminal behaviour may also be related to the fact that some mental health professionals may not always be compassionate, attentive, and helpful when they see a man with a history of substance use and/or antisocial/criminal behaviour. In fact, these men should get a lot of attention if we want to reduce violence/homicidal behaviour. Research, clinical work, and public health interventions targeting misconceptions among males that a lifestyle involving poor self-care is masculine, mental health stigma, and biases among professionals may be of value.

Homicide risk-oriented interview

The American Psychiatric Association (APA) and the American Academy of Child and Adolescent Psychiatry (ACAAP) both have published guidelines for the assessment of suicide risk and suicidal behaviours (American Academy of Child and Adolescent Psychiatry 2001; American Psychiatric Association 2003). However, these associations do not have guidelines for the assessment of violence and homicide risk. An assessment of homicide risk shares many similarities with that of a suicide risk. The recommended protocol for such an evaluation which is based on the existing literature (Thienhaus and Piasecki 1998; American Academy of Child and Adolescent Psychiatry 2001; American Psychiatric Association 2003) presented and discussed below.

1. Make your safety the priority. Patients must have been searched and disarmed before meeting with the evaluating clinician. Ensure a clear path to the exit is available and do not hesitate to end and/or terminate the interview should you feel unsafe at any point. Always keep the distance of 1–2 meters, take the position “face to face” or with stance directed at a slight angle to attempt to deescalate a face-to-face confrontation, behave with confidence, in a calm manner, and emotionally neutral, avoid a direct eye con-

tact, try to conciliate the patient and to make him/her feel safe. Ask simple questions; agree with the most emotionally charged assertions; avoid answers to provocative questions. Always keep your control over the interview. If you feel diffidence, it is better to stop the interview. Be cautious; carefully observe the patient’s mimic, behaviour and speech, as first signs of aggression could be noticed before the act.

2. Conduct a psychiatric evaluation. This includes an identification of specific signs and symptoms of mental disorders, with an attention to substance use disorders. Substance of choice, extent of use, and treatment compliance should be defined. In addition, treatment history, family history, current stressors, and strengths are included. Particular attention should be paid to past behaviours, as past behaviours are one of the strongest risk factors for repeat behaviours.
3. Specifically inquire about homicidal ideation, plans, and behaviours.
4. Evaluate the patient’s situational context. Many acutely homicidal patients have the perception that their situation can have no alternative resolution other than violence.
5. Assess for risk factors and incorporate into a risk assessment. Demographics, including male sex and age, should begin the assessment. Impulsiveness should be a major trigger for concern and should dominate the formulation of the risk assessment. Method availability, including access to a firearm, should be another major determinant. The presence of dual diagnosis disorders by a review of each substance of abuse as well as any prior history of violence when intoxicated with each should be explored and noted. A particular concern is the loss of reality testing. A patient who is homicidal because of a delusional belief or a command hallucination is at high risk. Symptoms such as feeling controlled by an outside force or the patient’s believing that others wish him or her harm confer even higher risk of violence.
 - a. One option is to use a violence risk assessment (VRA) tool. A 2010 survey of 199 forensic clinicians has identified the nine most commonly used VRAs (Viljoen et al. 2010). More than 90% reported that they assessed risk in adolescent or adult offenders. More than 50% reported always or almost always

using VRAs; only 7% reported never using VRAs. These data suggest that VRA use is common. However, a recent evaluation of violence rates of 13,045 individuals identified as high risk by these VRAs in 57 samples from 47 independent studies found that the current evidence base does not support assigning probabilities of future violence risk through VRA (Singh et al. 2014). Though structured VRAs may be of importance when used alongside experienced clinical judgement, their current shortcomings warrants caution and careful use. See Table IV for additional details.

6. Consider suicide risk. Patients who present with homicidal ideation are also at a greater risk of killing themselves. The assessment of any individual who harbours thoughts of violence directed at others must include a suicide risk assessment.
7. Operationalize deterrents. A religious belief or fear of the legal consequences are possible factors reducing the probability of homicidal behaviour.

8. In in-patient or controlled settings, anticipate the situation awaiting the discharged patient: the evaluator should try to see the situation from the patient's perspective. Are drugs, alcohol, or weapons readily available to the discharged patient?
9. Avoid a "no-homicide" contract with the patient. Contracts in themselves do not decrease the risk of violence.
10. Get a second opinion. This will be an evidence in supporting a claim of having used sound professional judgement if litigation arises. The clinician can get a perspective on his or her own counter-transference attitude toward the patient.
11. Get a urine drug screen and do not send home/discharge an intoxicated patient. Patients who are under the influence of alcohol or other substances are at an increased risk of causing harm to themselves or others.
12. Document the dispositional decision and its rationale. Documentation is essential for forensic reasons.
13. Fulfil your legal duties. A duty to protect a patient's intended victims. It may include notifying the police and hospitalizing the patient.

Table IV. Violence risk assessment tools.

Title	Description
Level of Service Inventory – Revised (LSI-R) (Andrews & Bonta, 1995).	54-item actuarial instrument for ages 16 and up designed to predict outcome of parole, recidivism, success in half-way houses, and other dispositional determinations which may be compromised by violence.
Psychopathy Checklist – Revised (PCL-R) (Hare, 2003).	20-item actuarial instrument for ages 18 and up designed to assess the presence of psychopathy in individuals. High PCL-R scores are positively associated with measures of impulsivity and aggression.
Sex Offender Risk Appraisal Guide (SORAG) (Quinsey, Harris, Rice, & Cormier, 2006).	14-item actuarial instrument for ages 18 and up that is a modification of the VRAG to assess the risk of violent and sexual recidivism.
Static-99 (Harris, Phenix, Hanson, & Thornton, 2003).	10-item actuarial instrument for ages 18 and up designed to assess sexual recidivism. Used primarily in the correctional system.
Violence Risk Appraisal Guide (VRAG) (Quinsey et al., 2006).	12-item actuarial instrument for ages 18 and up designed to assess violence risk. The 12 th item is the PCL-R.
Historical, Clinical, Risk Management – 20 (HCR-20) (Webster, Douglas, Eaves, & Hart, 1997).	20-item structured professional judgement instrument for ages 18 and up designed assess violence risk. It includes 10 historical items, 5 clinical items, and 5 risk management items that are scored on a 0–2 scale. It additionally includes the PCL-R.
Sexual Violence Risk – 20 (SVR-20) (Boer, Hart, Kropp, & Webster, 1997).	20-item structured professional judgement instrument for ages 18 and up designed to assess violence risk in sex offenders. It includes 11 psychosocial adjustment items, 7 sexual offence items, and 2 future plan items that are scored on a 0–2 scale via the model N-?-Y.
Spousal Assault Risk Assessment (SARA) (Kropp, Hart, Webster, & Eaves, 1999).	20-item structured professional judgement instrument for ages 18 and up.
Structured Assessment of Violence Risk in Youth (SAVRY) (Borum, Bartel, & Forth, 2003).	31-item structured professional judgement instrument for ages 12 to 18 designed to assess violence risk. It includes 10 historical items, 8 social/contextual items, 7 individual/clinical items and 6 protective items.

Firearm restriction

In addition to the individualized treatment plans to reduce modifiable risk factors for violence, societal-level interventions are worth review in this statement by virtue of their importance. Of particular importance is firearm restriction among the mentally ill. Whereas firearms account for 40% of homicides worldwide, their use as implements in murder is as high as 66% in the Americas (United Nations Office of Drugs and Crime 2013).

There is significant geographic variation in the role of firearms in homicide. Eastern Europe and Southern Africa have high rates of homicide but a low contribution by firearms (United Nations Office of Drugs and Crime 2013). In comparison, Southern Europe and Northern Africa have low rates of homicide but high contributions from firearms (United Nations Office of Drugs and Crime 2013). These data suggest that restriction programs may be more effective in certain geographic locales and this fact must be integrated into any governmental or local programs to reduce homicide.

The United States, with its high murder rate and high contribution from firearms, has many levels of legislation intended to reduce firearm access to at-risk populations. Though a review (Norris et al. 2006) of legislative efforts has been published, recent current events and an evolving cultural attitude have effected significant change in recent years. There is significant variation across jurisdictions, enabling the ability to review the effectiveness of certain procedures. Firearm restriction interventions range from those targeting individuals who have been involuntarily committed on the most targeted end, to those targeting anyone who has sought treatment for mental disorders (Norris et al. 2006).

There are of course limitations to firearm restriction among the mentally ill. In addition to the consequences of restricting the privileges or the rights of the mentally ill (a distinction dependent on the social and cultural context in which this evaluation is made), it is possible that means substitution will take place; for example, when access to firearms are not available, the mentally ill may resort to the use of knives, bludgeons, or other implements of murder. The counterpoint to these arguments is that the lethality and relative ease of use of firearms facilitates killings when greater thresholds for murder through other implements may deter murders. Even when in an intoxicated and partially dysfunctional state, when individuals are less likely to be able to effectively self-regulate and inhibit behaviours with profound consequences, the wielding and triggering of a gun is relatively easy.

Additional societal interventions are of use. For example, alcohol restriction via small changes in bar

closing hours may reduce risk of violence (Rossow and Norström 2012), as may limiting alcohol sales in public places (Sanchez et al. 2011) and other dry law interventions (Biderman et al. 2010). Firearm restriction among the mentally ill appears to remain the most important intervention, however.

Limitations of psychiatric approaches to homicide

Many professionals are involved when a homicide happens (Wilson and Daly 1998; Geberth 2006; Vycudilik and Gmeiner 2009; Papadodima et al. 2010). The police and legal professionals have greater expertise in homicide, while psychiatrists, particularly forensic psychiatrists, are usually in a second line. Many psychiatrists have limited experience and expertise in homicide. The assessment of males who commit homicides is a complex task that requires considering complex concepts such as freedom and responsibility that are the duty of the legal profession rather than psychiatric experts (Fukushima 1994; Gross and Huber 1994; Rudnick and Levy 1994; Appelbaum and Gutheil 2006; Gendel 2006; Gunn and Taylor 2014). The role of psychiatrist in the prevention, assessment and treatment of males with potential to have, or who already have, committed homicide varies according to the type of mental illnesses. As described above, there are all kinds of possible combinations, three ideal types are described to comment on the role of psychiatrist for treating and preventing: homicide secondary to psychotic behaviour, associated to antisocial personality disorder, and in the context of substance use disorders.

When the homicide happens in the context of psychotic behaviour secondary to severe mental illness, such as schizophrenia or bipolar disorder, psychiatrists need to be involved in the treatment of the psychotic behaviour in a coordinated way with legal professionals. Although current biological treatments for severe mental illness are effective and ideally should be prescribed to all patients, it is difficult to know how psychiatrists can prevent homicide behaviours since psychiatrists have very limited ability to predict which psychotic patients will act in their psychotic behaviour or which ones will not.

When homicides happen in the context of what psychiatrists call antisocial personality disorder, psychiatrists need to acknowledge that they have limited expertise in the treatment of these individuals who rarely seek psychiatric help. Individuals with substance use disorders in the absence of other psychiatric disorders also rarely seek help, though they certainly do more so than in antisocial personality disorder (ASPD). The psychiatrist's ability to address

homicides in the context of substance use disorders is thus intermediate between that of psychoses, where psychiatrists have much to offer, and that of antisocial personality disorder, when psychiatrists have limited resources to offer. In addition to the major personal decision from the patient for sobriety and a commitment to those rehabilitative interventions that help that individual patient to stay sober, the individual with a substance use disorder must be able to enter into a trusting relationship with the provider and be prepared for change.

Conclusion and recommendations

In conclusion, research on gender differences in homicide (and suicide) going beyond quantitative data remains very rare. Our limitations in research also apply for gender differences in the effects of hormones and serotonin deficits on aggression, violence and impulsiveness. Brain-based neurobiology should be the basis for prevention, and additional work is needed to better understand the pertinent biological factors of homicidal behaviour in mental illness.

Biological factors may include the role of structural and functional alterations in the prefrontal cortex as an inhibitory centre with its various connections within the adult brain (Bonelli and Cummings 2007; Potegal 2012). It is additionally important to consider the role of hormones and serotonin (Berman and Coccaro 1998; Mazur 2006; Wallner and Machatschke 2009; Soyka 2011). These factors may one day serve as biomarkers of homicide to be incorporated into risk assessment.

Greater research in gender-related violence focused on biological factors is needed. Psychotherapeutic and pharmacotherapeutic strategies which target these to-be-determined biological factors cannot yet be widely accepted without a better understanding of the underlying brain-based deficits. A drive towards this is in alignment with the goals of the Research Domain Criteria (RDoC) project of the National Institute of Mental Health (Insel et al. 2010; Insel 2014) and may bring significant benefit to the understanding of homicide prevention in mental illness.

As an example, a novel developmental psychotherapy termed Regulation Focused Psychotherapy (RFP-C; Hoffman and Rice in press) has been designed to target the externalizing behaviours of childhood by focusing on the implicit emotion regulation system (Rice and Hoffman 2014b). As these disruptive and aggressive behaviours are risk factors for later adolescent and adult psychiatric disorders, aggression, and violence, this therapeutic approach

provides a prevention program for future homicide. Its foundation upon the implicit subdivision (Gyurak et al. 2011; Gyurak and Etkin 2014) of the emotion regulation system (Gross 2013) provides a brain-based structure that is influenced by testosterone and other gendered biological factors which permits translation of biological research to direct preventative programs. Further research in developing our understanding of prefrontally mediated inhibition of limbic, hypothalamic, and autonomic nervous system hyper-arousal as they relate to aggression will advance the field.

For now, a prevention program contains the elements described in this communication. We may offer the following point-by-point assessments and recommendation at this time:

1. A targeted risk reduction program must focus on schizophrenia, bipolar and personality disorders, and in particular when these disorders co-occur with alcohol and substance use disorders. Factors which increase impulsivity in these disorders, particularly substances which may reduce inhibitory prefrontal processing and control, should be targeted. A targeted risk assessment as provided in this communication should assess for major violence and homicide risk factors in these populations, with intervention programs tailored to risk reduction. See Table III.
2. Societal-level risk reduction, particularly in the restriction of access to firearms, may play a great role. Addressing psychosocial factors like poor living situation or poor social support may also provide significant benefit.
3. It is important to educate (professionals) and raise awareness on drugs use, as this may influence detection. The focus should be particularly on the male group.
4. It is additionally important for psychiatrists to collaborate with professionals in other fields. It is difficult for psychiatrists alone to solve this issue and collaborations with other fields are essential. A primary role of the psychiatrist should be to dispel the influence of stigma in these collaborations and maintain an adherence to clinical practices that are based on the available evidence.
5. A relevant direction in prevention would be to strengthen help-seeking behaviour in males and their adherence to therapy. As acute and long-term pharmacological (and non-pharmacological) treatment of patients with unipolar depression and bipolar dis-

order reduces markedly the self-inflicted aggression even in this high-risk population (Rihmer and Gonda 2013), the appropriate and complex care of psychiatric patients could reduce the risk of homicidal behaviour.

Thus the main focus in preventive strategies would be on identifying high risk groups, on adequate treatment and compliance with long-term treatment while considering male specific problems and needs.

This communication is written from the perspective favouring the importance of a gender-specific approach to homicide risk reduction that is based in brain-based neurobiology. As neuroendocrinology continues to develop, future opportunities to prevent homicides will undoubtedly present. Our work group of the Men's Mental Health Task Force of the World Federation of Societies of Biological Psychiatry has been founded with this aim in sight, and will continue to produce literature on the role of gender-specific interventions in ameliorating harm.

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