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The major mental disorders and crime: Stop debating and start treating and preventing

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1. Introduction

While the public have long believed that persons who suffer from “mental illness” are “dangerous” (Phelan & Link, 1998), scientific studies only partially support this belief. The empirical evidence, which is reviewed here, demonstrates that among persons born since the mid 1940s who develop major mental disorders¹ in countries where mental health services have been continually deinstitutionalized since the late 1960s or early 1970s, the likelihood of committing any criminal offence² is higher than that for persons without these disorders, and the likelihood of committing a violent offence is even higher. The actual proportions of persons with these disorders who do commit crimes vary from one country to another. The proportions of all crimes and of violent crimes committed by persons with major mental disorders also vary from one country to another.

This criminality and violence, which characterizes some individuals with major mental disorders, increases stigmatization and rejection by the community of all individuals afflicted with these disorders. It has in the past, and it continues to erode public support for funding adequate and appropriate mental health services for the mentally ill. Increasingly, it leads to difficulties in establishing community housing for persons with these

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¹ Throughout this text, the terms major mental disorder and mental illness are used to refer to schizophrenia, major depression, bipolar disorder, delusional disorder, and other nontoxic psychoses.

² The term crime is used here to refer to court judgements indicating that the individual in question actually committed the offence, regardless of whether they were convicted, found not guilty by reason of insanity, found to be guilty but mentally ill, etc. It is necessary to refer to both criminality and violent behaviour because in some situations even severe violent behaviour does not lead to criminal charges.

disorders, in finding appropriate employment, and in integrating them into social and recreational services in the community. Further, this criminality and violence causes immeasurable suffering — to the victims of these crimes and to those close to them, as well as to the perpetrators. In addition to these human costs, there are obviously enormous financial costs that result from these illegal behaviours.

Given this conclusion, which is based on a critical assessment of the extant literature, it is now incumbent on scientists to stop debating whether or not there is an association between the major mental disorders and criminality and/or violence, and get on with the task of identifying humane strategies for preventing it.

This paper begins with a critical review of the scientific literature, which addresses the relation between the major mental disorders and crime and violence. Emphasis is put on the methodological features of each type of investigation which limit the validity and/or generalizability of the results. The paper then presents a conceptual framework for undertaking research designed to unravel the etiology of criminal and violent behaviour of persons who develop major mental disorders. This knowledge is necessary not only to know when and how to intervene to prevent the development of antisocial and aggressive behaviours in this population, but also to identify different subtypes of patients requiring different programmes of treatment.

2. Review of the literature on the association between the major mental disorders and criminality and/or violence

Several different experimental designs have been used to examine the relationship between major mental disorders and criminality and/or violence. Each design is characterized by specific strengths and weaknesses and is limited to answering certain questions. The generalizability of the findings from each investigation varies considerably. The different countries in which these investigations were conducted have different rates of crime, different rates of specific types of crime (e.g. offences related to drugs, offences related to firearms), different rates of crime resolution (i.e. the likelihood that an illegal behaviour will lead to conviction), and differences in accessibility to drugs, firearms, mental health treatment, and social services. While the countries in which these investigations have been conducted do differ in these and other ways, they are similar in some ways that are relevant to the criminality and/or violence of persons with major mental disorders. Most of the countries have similar mental health policies (deinstitutionalization) and treatment services (principally medication prescribed in outpatient clinics and short periods of hospitalization), similar social services (income and housing), and, importantly, very similar prevalence rates of the major mental disorders.

2.1. Studies of criminality among patients living in the community

These studies recruit samples of patients either at discharge from an inpatient unit or in an outpatient clinic and compare their criminality to that of their neighbours who are not

receiving mental health care. Such studies conducted in western industrialized countries since the mid 1960s have obtained remarkably similar results indicating that patients with major mental disorders are more likely than the general population to commit crimes and to behave violently. While the older studies were characterized by multiple methodological weaknesses including samples that were heterogeneous with respect to primary diagnosis, loss of subjects during the follow-up period, incomplete criminal records (for a review, see Hodgins, 1993), this is not true of the more recent investigations (see, for example, Belfrage, 1998; Lindqvist & Allebeck, 1990; Link, Andrews, & Cullen, 1992; Modestin, Hug, & Ammann, 1997; Mullen, Burgess, Wallace, Palmer, & Ruschena, 2000; Steadman et al., 1998; Tiihonen, Hakola, Eronen, Vartanen, & Ryyänen, 1996). Surprisingly, in an investigation with a similar design, the prevalence of aggressive behaviour was found to be even higher among schizophrenic patients in so-called “underdeveloped” countries (Colombia, India, Nigeria) than in the “developed” countries (Denmark, Ireland, Japan, UK, US, USSR) in which many of the studies of criminality among discharged patients have been conducted (Volavka et al., 1997).

Conclusions about the association between the major mental disorders and criminality and/or violence drawn from studies of patients living in the community, need to be tempered by consideration of the methodological characteristics of these investigations. (1) By their design, such studies include samples that are biased by the admission and discharge practices of the hospitals and clinics from which the patients have been recruited. This may result in important differences across studies in the characteristics of the subjects. For example, one hospital may have a policy and/or practices that limit admissions of psychotic patients with a history of criminality, while another because of its location or mandate may admit this type of patients almost exclusively. Thus, depending on where subjects are recruited, the proportions likely to commit crimes vary. Some studies (see, for example, Volavka et al., 1997; Wessely, Castle, Douglas, & Taylor, 1994) have overcome this design problem by including both inpatients and outpatients from a geographically defined catchment area, thereby reducing sampling bias.³ (2) Most of these studies use diagnoses that have been made for clinical purposes and that may not always correspond to diagnoses made using more stringent research protocols and criteria. (3) There is often a significant loss of subjects by the end of the follow-up period, which seriously affects the calculation of recidivism rates. Subject loss may be directly related to criminality (subjects are incarcerated and not found for follow-up) or indirectly related (the most antisocial refuse to complete the follow-up). (4) The length of the follow-up periods vary from one study to another making comparisons difficult because generally the longer the follow-up the greater the proportion of subjects who offend. (5) Many of these studies do not measure the intensity, adequacy, and appropriateness of the treatment received by the patients while they are in the community and its relation to the observed criminality.

³ While these particular studies overcame the problem of sample bias, they are characterized by another problem, the lack of a comparison group composed of nondisordered subjects from the same area.

2.2. Studies of mental disorders among incarcerated offenders

A second type of study that has been used to address the association between the major mental disorders and criminality diagnoses a representative sample of offenders and compares the prevalence rates among the offenders to those obtained for age and sex matched subjects in the general population. While all of the investigations of this type conducted in North America have found higher prevalence rates for the major mental disorders among both male and female offenders than among nonoffenders (for a review, see Hodgins & Côté, 1995; Teplin, Abram, & McClelland, 1996), this is not true of similar studies conducted in the UK (Cooke, 1994; Gunn, Maden & Swinton, 1991).

In drawing conclusions about the association between the major mental disorders and criminality from diagnostic studies of offenders, the following methodological characteristics of the investigations need to be considered. (1) These samples are often biased and not representative of offender populations principally because the characteristics of those who agree to participate in the study differ from those who refuse to complete the diagnostic interview. (2) The accuracy and completeness of the information provided by the offenders depends, at least to some extent, on their belief that the information provided to the researchers will remain confidential (Hodgins & Côté, 1990). (3) The instrument used to make diagnoses affects the results that are obtained. Most of these studies have used the Diagnostic Interview Schedule (DIS), which has been shown to underestimate the prevalence of the major mental disorders (Hodgins, 1995). (4) The time interval between arrest and the diagnostic interview may affect the accuracy of the diagnoses. This is important because in the hours and days following arrest, subjects may be reacting emotionally to their predicament and may be under the influence of alcohol and/or drugs. (5) Certain subtypes of mentally disordered offenders may be more likely to be arrested than other subtypes and than offenders without such disorders. Similarly, policies and practices vary from country to country, but also from one time period to another, for example the likelihood that a person with a major mental disorder who commits a crime will be deferred to the health system or sentenced to incarceration.

2.3. Studies of mental disorders among samples of homicide offenders

Five studies have shown that the prevalence of the major mental disorders is even higher among homicide offenders than among other types of offenders (Côté & Hodgins, 1992; Erb, Hodgins, Freese, Müller-Isberner, & Jöckel, 2001; Eronen, Tiihonen, & Hakola, 1996; Gottlieb, Gabrielsen, Kramp, 1987; Lindqvist, 1986). The sampling biases have been reduced to a minimum in these studies, the cohorts are large and include all the homicide offenders in a given jurisdiction during relatively long periods of time (and not only those who were referred for a psychiatric assessment). The limits of these studies, however, are the timing of the diagnoses, which, in most cases, were made after the crime. In my view, this is not a serious limitation as there is no evidence whatsoever that any of the major mental disorders could be *caused* by committing a homicide. There is of course much

evidence suggesting that a traumatic event such as committing a homicide could *provoke* the onset of an acute episode in an individual who already has the disorder or is about to manifest the symptoms of the first episode.

2.4. Investigations of unselected birth cohorts in which the criminality of persons who develop major mental disorders is compared to that of persons who do not develop mental disorders

There are now six investigations of unselected birth cohorts that have compared the criminality of those who develop major mental disorders and those who do not (Hodgins, 1992; Hodgins, Mednick, Brennan, Schulsinger, & Engberg, 1996; Ortmann, 1981; Stueve & Link, 1998; Tiihonen, Isohanni, Räsänen, Koironen, & Moring, 1997; Wallace et al., 1998). The results of these investigations are remarkably similar, despite the fact that they have been conducted in five different countries. All have revealed that greater proportions of persons who later develop or who have already developed a major mental disorder, as compared to those who do not develop severe mental disorders, commit crimes. Further, these investigations confirm what has been observed in the studies of the criminality of patients and in the studies of mental disorders among offenders, that the association between the major mental disorders is stronger for violent than for nonviolent crimes. Because of the size of the cohorts examined, for example, the Danish cohort that we have studied includes more than 358,000 persons, these investigations have demonstrated that the increased risk for criminality and violence found to be associated with the major mental disorders is greater for women than men. This latter investigation also showed that the risk of offending continued to increase among the mentally ill even after age 30. Further, these investigations have shown that the increased risk for criminality is associated with the development of a major mental disorder and not simply due to a confound with low socioeconomic status. Interestingly, two of these investigations have shown that the female mentally ill offenders were raised in families of middle and upper socioeconomic status (Brennan, Mednick, & Hodgins, 2000; Hodgins, 1992).

It has been shown that males with a history of antisocial behaviour have elevated rates of premature death as do persons who develop major mental disorders. A detailed analysis of the Danish cohort revealed no relationship between premature death, major mental disorder, and offending (Hodgins, 1998).

Two of these birth cohort investigations have examined the associations between specific disorders and offending. While both found increased risks for offending associated with schizophrenia, the subjects in the Finnish cohort have not passed through the age-risk periods for either the major mental disorders nor criminality (Tiihonen et al., 1997). Estimates of the risks of offending obtained from the Danish birth cohort are more reliable because of the large number of subjects and because of the subjects' age (43–46 years old) at final data collection. Among males, the risk of violent offending was found to be 4.6 times higher for subjects with schizophrenia, and 2.0 times higher for those with an affective psychosis as compared to subjects never admitted to a psychiatric ward. The comparable risk ratios for the females were 23.2 and 3.9 (Brennan et al., 2000).

Three important aspects of these investigations are often misunderstood or ignored. The first concerns the difference between the increased *risk* of offending that has been documented for persons who develop major mental disorders and the proportions of them who offend. The increases in the risk of any type of offending and of violent offending associated with the presence of a major mental disorder that have been observed in these six investigations are very similar, but the proportions of subjects, both disordered and non-disordered, who offend vary quite considerably. This is because the calculation of *risk* takes account of the crime rate in the general population. In other words, *risk* is calculated by comparing the proportions of offenders among those who develop a major mental disorder as compared to those who do not. The findings that the *risks* of offending among persons who develop major mental disorders are similar in different countries but that the proportions of them who offend are intriguing for they suggest that factors that influence criminality generally also influence criminality among those who develop major mental disorders.

The second aspect of the birth cohort studies that is often not taken into account in interpreting the results is the fact that all crimes are counted even those that occurred before the onset of the major mental disorder. Consequently, there are two groups of mentally ill offenders, those who begin offending before the symptoms of the disorder are manifest and those who offend after the symptoms of the disorder are present. The first group, which we have labelled the “early-starters,” presents a stable pattern of antisocial behaviour from a young age, while the second group, the “late-starters,” shows no evidence of antisocial behaviour before the symptoms of the major mental disorder are present (Hodgins, Côté, & Toupin, 1998).

The third aspect of these investigations that is often overlooked when interpreting the findings concerns the use of hospitalization to index the presence of a mental disorder. In all but the Israeli study, the presence of a disorder was identified through the psychiatric register of hospitalizations. While the major mental disorders were very likely to lead to hospitalization in the countries where these studies were conducted, personality disorders and alcohol- and drug-related disorders were not. Further, among persons with these latter disorders, the differences between those who are and are not hospitalized are unknown and could be related to the commission of crimes. Consequently, the psychiatric registers may adequately index the presence of a major mental disorder but not other disorders, and therefore may be useful only for studying the association between criminality and the major disorders.

In interpreting the results of these birth cohort studies, a number of methodological considerations need to be taken into account. (1) The presence of a major mental disorder, except in the case of the Israeli study, (Stueve & Link, 1998) is identified when the subject is hospitalized. The proportions of persons with these disorders who are not hospitalized are unknown. As others and we have argued elsewhere (see, for example, Hodgins et al., 1996), it is reasonable to assume that in the countries where these studies have been conducted these proportions are low. Given the characteristics of the health and social service systems, it would be unlikely that a person with a major mental disorder would not be hospitalized, at least once, by age 40. However, we do not know how this bias introduced by using hospitalization to index the presence of a major mental disorder influences the results. Some studies suggest that persons with a major mental disorder who are antisocial are more likely to be hospitalized than those who are less troublesome

(Monahan & Steadman, 1983), while other studies suggest that mentally ill patients who are antisocial are less likely to be hospitalized (Taylor & Gunn, 1984). (2) All of these studies except the one conducted in Israel use clinical diagnoses made at the time of discharge from the hospital. However, there are studies comparing the diagnoses of major mental disorders in the psychiatric registers in Denmark (Munk-Jorgensen, Kastrup, & Mortensen, 1993), Sweden (Lindqvist & Allebeck, 1990), and Finland (Tiihonen et al., 1997) with diagnoses made for research purposes demonstrating very good correspondence. Further, the agreement between clinical and research diagnoses of the presence or absence of a major mental disorder is usually quite substantial (Hodgins, 1995). (3) While the Israeli study documented *true prevalence rates* of mental disorder rather than *treated prevalence rates* of mental disorder as in the five other birth cohort studies, this study relied on self-reports of violent behaviour and not official convictions as did the other studies. (4) Finally, unselected birth cohorts are biased in time and place. Consequently, the increased risk of criminality among persons with major mental disorders may be characteristic only of those born since the mid 1940s.

2.5. Conclusion

Taken together, the results of these investigations indicate that among persons born since the mid 1940s, those who develop major mental disorders in a country where a policy of deinstitutionalizing mental health care was implemented are more likely than nondisordered persons in these same generations and societies to be convicted of criminal offences and even more likely to be convicted of violent offences. These findings are alarming for they describe horrific human suffering. This should motivate scientists, clinicians, health administrators, and policy makers to find humane solutions. The seriousness of this situation is underlined by the fact that most of the studies — those following patients who were discharged to the community and the birth cohort studies — examined persons with major mental disorders who were receiving treatment. The only knowledge of the nontreated comes from the investigations of samples of offenders, many of whom acknowledged to the researchers that they had never received any treatment for their disorder even though they had been plagued with the symptoms for many years, even decades (Hodgins & Côté, 1990, 1995).

The evidence that persons with major mental disorders are more likely to be convicted of criminal offences than nondisordered persons simply because of discrimination against them by the police or judicial authorities is not convincing. One study, in one jurisdiction of one country at one time, did demonstrate such discrimination (Teplin, 1984). Another study conducted in England concurred with much clinical lore in showing that a subgroup of persons with major mental disorders stay at the scene of their crime and some even contact the police themselves (Robertson, 1988). All the other evidence suggests that the mentally ill may benefit from positive discrimination (see, for example, Steadman & Felson, 1984). Many studies suggest that the increased rate of conviction among persons with major mental disorders may result, at least in part, from the fact that they are more likely than nondisordered persons to behave aggressively. Such evidence comes from the Epidemiological

Catchment Area study, which included more than 20,000 subjects representative of the US population in the early 1980s. Diagnoses were made with the DIS and aggressive behaviour was self-reported (Swanson, Holzer, Ganju, & Jono, 1990). Subsequently, other studies of patient samples that have relied on reports from collaterals, notes in clinical files, as well as patient self-reports, have all documented high rates of aggressive behaviour among both males and females with major mental disorders (Lidz, Mulvey, & Gardner, 1993; Link et al., 1992; Steadman et al., 1998). Taken together, these results suggest that the increased risk for criminality and violence on the part of persons who develop major mental disorders is real and not a reflection of police or judicial discrimination.

3. What to do next?

There is now overwhelming evidence that significant numbers of persons who have developed major mental disorders in the past three decades are suffering immeasurably from the symptoms of their disorder, repeatedly experiencing full-blown psychotic episodes, committing suicide, taking drugs and alcohol, often being victimized by others, and committing crimes. Multiple responses to this situation are required. Scientists, policy makers, and practitioners have to collaborate in order to identify models of treatment and services that are effective in preventing all of the various, but associated, problems shown by persons who develop major mental disorders. One important aspect of the improvement of effective models of treatment is the development of procedures for identifying the situation(s) in which a patient can live with the lowest possible risk of criminal or violent behaviour. While these important tasks are increasingly being attended to (see, for example, Douglas & Webster, 1999; Hodgins & Müller-Isberner, 2000; Swartz et al., 1995, 1998), one challenge is still largely ignored, that of unravelling the etiology of the antisocial behaviour shown by some of those who develop mental illnesses. Knowledge of the etiology or etiologies of antisocial and aggressive behaviour of persons with major mental disorders would not only provide a basis for primary prevention, it would also identify subgroups of patients with different treatment needs. By better matching patient needs to specific combinations of treatment components, treatment effectiveness would be enhanced. Further, by identifying distinct homogeneous subgroups among mentally ill offenders, the accuracy of classifying environments in which each type could live safely would be increased. A framework for conducting research designed to identify the etiology of antisocial behaviour in this population, and some preliminary findings are presented in the subsequent sections of this paper.

4. A conceptual framework for studying the etiology of criminal and violent behaviour among persons who develop major mental disorders

In order to study the etiology of criminal and violent behaviour of persons who develop major mental disorders, it is necessary to adopt a developmental perspective.

Such a perspective examines the continual interaction of biological, psychological, and social factors during the course of the individual's life that determine his/her behaviours, emotions, and cognitions. Within this framework, development is studied in order to document, from conception onwards, how particular individual characteristics interact with both the immediate and the larger social environments to determine cognitions, emotions, and behaviour, and how, in turn, these individual characteristics are suppressed or strengthened.

Such a perspective acknowledges that very different etiologies or developmental trajectories can lead to what may appear to be similar outcomes in adulthood. As clinicians have recognized and the studies reviewed above document, mentally ill offenders are not a homogeneous group. They differ, for example, as to primary, secondary, and tertiary diagnoses, severity of cognitive, behavioural, and emotional impairment, history of antisocial behaviour, among other things, and, consequently, react in distinctive ways to their environments. It is reasonable to presume that among them, there are subgroups who differ not only as to the factors that have influenced the development of both the primary disorder and the antisocial behaviour, but also as to the factors that influence their antisocial behaviour in adulthood. Therefore, as we began our studies on the etiology of criminal and violent behaviour among persons who develop major mental disorders, the first step was to identify subgroups that presented distinctive patterns of characteristics that may be of etiological significance (Hodgins, 2000).

In the first birth cohort study that compared the criminality of those who developed major mental disorders to that of persons who were never hospitalized in psychiatry (Hodgins, 1992), examination of the ages at first crime indicated that there were two subgroups, one whose criminality preceded the onset of the illness and the other in which the criminality coincided or followed the onset of the illness. The existence of these two types of offenders with major mental disorders have subsequently been confirmed and their characteristics have been examined in longitudinal prospective investigations, in samples of patients, and in samples of convicted offenders (Hodgins et al., 1998; Nolan, Volavka, Mohr, & Czobor, 1999; Tengström, Hodgins, & Kullgren, 2001). We hypothesize that the etiology of offending in these two types, the early- and late-starters, is different. In other words, we hypothesize that they react to their environments differently because of certain characteristics that are stable over the life span. The identification of these subtypes is not only necessary for etiological studies, but also for treatment and prediction. For example, the early-starters who have a long history of antisocial behaviour and substance abuse before their first episode of the major mental disorder, require different kinds of incentives and supervision to ensure that they take medication, abstain from drugs and alcohol, and learn prosocial behaviours. The late-starters, by contrast, may be more compliant with pharmacotherapy, which may have a direct and positive impact on preventing further criminality and/or violent behaviour. There may be other subgroups of mentally ill offenders who have not yet been identified and whose developmental trajectories are distinct. To resume, the challenge is to understand what occurred during the life of the subjects included in the investigations reviewed above that lead to their developing both a major mental disorder and antisocial and/or aggressive behaviour.

4.1. Hereditary factors

From conception onwards, each individual perceives and reacts differently to his/her environment. Hereditary factors are involved in most human characteristics. Not surprisingly, they also contribute to the development of the major mental disorders (for a review, see Hodgins, 1996). These hereditary factors appear to alter the sensitivity to environmental insults and limit certain capacities, for example, skills for coping with stress (Kendler, Neale, Kessler, Heath, & Eaves, 1993) or verbal intelligence, which are both associated with aggressive and antisocial behaviour. There is also evidence showing that hereditary factors contribute to the development of criminality (Bock & Goode, 1996), antisocial personality disorder (Cadoret, Yates, Troughton, Woodworth, & Stewart, 1995; Lyons et al., 1995), alcoholism (Beirut et al., 1998; Lappalainen et al., 1998), drug addiction (Merikangas et al., 1998), aggressive behaviour (Coccaro, Silverman, Klar, Horvath, & Siever, 1994), and impulsivity (Gottesman & Goldsmith, 1994). An individual who inherited a vulnerability for a major mental disorder could also inherit a vulnerability for any of these other problems. These hereditary factors do not in and of themselves determine these disorders or behaviour patterns. Rather, they constitute vulnerabilities which are then strengthened or weakened by other factors during the course of development.

4.2. Perinatal factors

Most of the mentally ill persons examined in the investigations, which have identified an association between the major mental disorders and criminality, were born between 1944 and 1966. Those born in the late 1940s and early 1950s may have experienced certain specific pregnancy and birth complications more often than persons born prior or subsequent to this period. For example, certain behaviours of their mothers that were more common then than in preceding or subsequent generations, like smoking and drinking, have both been found to be associated with impulsivity, concentration problems, attention difficulties, conduct disorder, and violent crime (Ferguson, Woodward, & Horwood, 1998; Hunt, Streissguth, Kerr, & Olson, 1995; Lagerström, Bremme, Eneroth, & Magnusson, 1990; Milberger, Biederman, Faraone, Chen, & Jones, 1996; Räsänen, Helinä, Isohanni, Hodgins, & Tiihonen, 1999; Wakschlag, Lahey, Loeber, et al., 1997). These persons may have developed certain behaviours that increased their risk for illegal behaviour, not only because of their mothers' behaviour during their pregnancies but also because of obstetrical practices current at the time they were born. For example, men whose mothers were given phenobarbital while they were in utero, a practice at this time, have been found to have lower verbal intelligence than the norm. Further, the effect was found to be increased among men whose mothers had low socioeconomic status and who did not want to be pregnant (Reinisch, Sanders, Mortensen, & Rubin, 1995). Lower than average verbal intelligence has been associated with early onset antisocial behaviour (see, for example, Kratzer & Hodgins, 1999). Perinatal complications in males have been found to be associated with aggressive and impulsive behaviour and with violent criminality among those who begin offending at a young age. In the Swedish birth cohort described previously, we have found that among the males who developed a major

mental disorder, all but one of the males who had experienced complications in the neonatal period had a history of criminality (Hodgins, Kratzer & McNeil, submitted).

4.3. Early childhood factors

Little is known about early childhood factors that could contribute to the development of offending among those who develop major mental disorders. Studies of both children who develop schizophrenia in adulthood and children who develop major affective disorders have shown that subgroups among them present antisocial behaviour at a young age (Cannon, Mednick, & Parnas, 1990; Carlson & Weintraub, 1993; Harrington, Rutter, & Fombonne, 1996; Walker et al., 1996). In prospective, longitudinal investigations of two different cohorts, we have found that behaviour problems rated by teachers, parents, and child welfare authorities, and poor academic performance distinguished those men who offended in adolescence and then developed a major mental disorder (Hodgins & Janson, 2001; Lindelow, Hodgins, & af Klinteberg, 1999).

Other studies have shown that among the parents and other first-degree relatives of persons who develop major mental disorders, the prevalence of personality disorders and major mental disorders is very high (for a review, see Hodgins, 1994a, 1996). Such disorders are, in many cases, associated with less than optimal parenting skills, which often include modelling ineffective ways to solve problems and to cope with stress. If, because of hereditary factors and/or perinatal factors, a child showed tendencies to behave impulsively or aggressively, or to respond to stress in an emotional rather than an instrumental manner, as well as presenting the cognitive and emotional deficits associated with the developing major mental disorder, many parents would be unable to systematically structure a learning environment to counteract these tendencies. They may even inadvertently positively reinforce them, either by modelling similar behaviours or by not systematically sanctioning inappropriate behaviours. Further, such parents may be unable to access school and/or community resources that could provide structured, systematic programmes designed to reduce behaviours such as impulsivity and aggression. Even when parents who are themselves mentally ill try to obtain help for their children, it is rarely available (Vanharen, LaRoche, Heyman, Massabki, & Colle, 1993).

Similarly, when individuals who develop major mental disorders in adulthood reach adolescence and present behaviour and/or emotional problems, they themselves and/or their families have difficulty obtaining appropriate mental health services. Yet, research is showing that services directed to adolescents at risk for mental illness that provide help in resolving problems, one by one, as they develop, are proving to be effective and may even prevent the development of full-blown psychotic episodes (McGorry, 1998).

Consider one specific example of how childhood factors may be related to offending among the mentally ill. Communication problems in families that include children who have inherited a vulnerability for schizophrenia have been shown to contribute to the development of schizophrenia (Tienari, 1991), and more specifically, to schizophrenia with predominant positive symptoms (Cannon et al., 1990). Other investigations have shown that among the first-degree relatives of schizophrenics with predominant positive symptoms, as compared to

the relatives of schizophrenics with other symptom profiles, the prevalence of antisocial behavior and criminality are elevated (Kay, 1990). Among individuals who show a certain type of positive symptoms — threat–control–override symptoms — the risk of aggressive behaviour is elevated (Link & Stueve, 1994). However, this has not been found in all studies (Appelbaum, Robbins, & Monahan, 2000).

Subjects born in the mid 1940s and early 1950s may be distinctive not only because of the factors that affected their development in the perinatal period, but also by virtue of environmental factors that affected them during early childhood. They may have been exposed, more than previous generations, to certain environmental pollutants, which damage the central nervous system in such a way as to limit self control. For example, a cumulation of lead in the bones of young boys has been found to be associated with aggressive behaviour and delinquency (Needleman, Riess, Tobin, Biesecker, & Greenhouse, 1996). Many of the subjects studied in the investigations which have documented an increased risk of criminality and violent behaviour among the mentally ill, were the first generation to grow up with automobiles. Until recent environmental controls were made mandatory, cars, trucks, and buses, which during the early years of their lives became common in urban centres, emitted fumes full of lead. Environmental pollutants may have increased the prevalence of antisocial behaviour in these cohorts generally. This proposition is consistent with findings from the ECA study in the US, which found an increase in antisocial behaviour during this century, and which may be the basis for the increase in crime rates in most countries during the same period (Robins, Tipp, & Przybeck, 1991). Consequently, it may be that as the prevalence of persistent antisocial behaviour increased generally, so did the proportion of mentally ill persons who were also antisocial.

4.4. Treatment

In our effort to develop a framework to investigate why some of the mentally ill persons described in the studies that were reviewed in the first section the paper committed crimes, it is necessary to consider the care that was provided to them once they became ill. The subjects included in these investigations were the first generation of persons afflicted by major mental disorders to have been treated in the era of deinstitutionalization. While the implementation of this policy was begun in the late 1960s in some countries and only in the late 1970s and early 1980s in others, in all of the western industrialized countries, it has involved significant reductions in the numbers of psychiatric hospital beds, and limited treatment in the community that imposed the burden for help-seeking on the patient (Hodgins & Lalonde, 1999; Mullen et al., 2000). The outpatient treatment centres, which were set up as inpatient beds were closed, were not only limited by a lack of resources, but also by the lack of empirical evidence of what constituted effective community treatment programmes. Almost no information was available indicating what type of patient required what type and level of care (Hodgins & Gaston, 1987a, 1987b) and describing the various treatment components required to address the multiple problems presented by offenders with major mental disorders (Wilson, Tien, & Eaves, 1995).

This was the context of mental health services and laws in which the persons examined in the studies reviewed above found themselves when they began to develop symptoms of major mental disorders. In addition, many of them became symptomatic during a period dominated by the “sixties generation” whose culture actively promoted drug taking and ensured relatively easy availability of drugs. Alcohol was also readily available. Many studies have now shown that the use of drugs and alcohol further increase the risk of offending among persons who develop major mental disorders (Eronen, Tiihonen, et al., 1996; Steadman et al., 1998). This relationship is probably more complex than is initially apparent. First, it is important to note that a significant number of offenders with major mental disorders are not intoxicated and/or do not have a history of substance abuse (Hodgins, 1994b). Second, among those who are using drugs and/or alcohol at the time they offend, there are at least two types. For the early-starters whose substance abuse is a problem dating back to adolescence, it is simply one aspect of their antisocial lifestyle (Hodgins & Janson, 2000), while for the late-starters drug and alcohol consumption is more likely related to symptoms of the major disorder. Consequently, alcohol and drugs play very different etiological roles for the two types of offenders with the same primary disorders.

Further, in many of the countries where the studies that show increased risk of criminality among the mentally ill have been conducted, men were (and are still) required to enter the military and were trained to use firearms. In some of these countries, firearms were and are easily accessible, even to the mentally ill. While firearms were even more easily accessible in the past, at this time the mentally ill were shut away in asylums.

The impact of these changes in society on persons who developed major mental disorders was quickly apparent. For example, consider the now classic US follow-up studies of the Baxstrom and Dixon patients who were reassessed under court order (Steadman & Coccoza, 1974; Thornberry & Jacoby, 1979). Even after many years of hospitalization, large proportions (50% and 35%) of these patients met criteria for civil commitment and were not released, and of those released, just more than one-in-five committed a new offence during their first four years in the community. In 1979, Rabkin (1979) noted that the follow-up studies of samples of patients discharged to the community before 1965 showed no increase in risk of criminality while those conducted after this date found higher prevalence rates of offending among the discharged patients than among their nondisordered neighbours. In Britain, a similar increase in violent offending among the mentally ill has also been documented (Taylor, Mullen, & Wessely, 1993), and, there, as in other countries, the proportions of patients with criminal records has continued to increase over the past three decades (Coid, Lewis, & Reveley, 1993; Côté & Hodgins, 1996). Another study illustrates the rapidity of this change. Grunberg, Klinger, and Grumet (1978) examined homicide offenders in Albany County, NY, comparing two time periods: 1963–1969, when institutional care was available, and 1970–1975 after the new community mental health centre opened. Even in this short period of time, they observed an increase in the proportion of homicides committed by mentally disordered (principally schizophrenic) subjects.

The notion that inadequate and inappropriate treatment has led to an increase of criminality and violent behaviour among persons who develop major mental disorders is further supported by the recent empirical studies demonstrating that illegal behaviours on the

part of even patients assessed as presenting very high risks can be prevented. Several studies conducted in the US (Heilbrun & Peters, 2000; Wiederanders, 1992; Wiederanders, Bromle, & Choate, 1997; Wiederanders & Choate, 1994), in Canada (Hodgins, Lapalme, & Toupin, 1999; Wilson et al., 1995), and in Germany (Müller-Isberner, 1996) have demonstrated that specialized forensic community treatment programmes prevent crime among the mentally ill. One study of a nonspecialized community programme has also shown a positive crime prevention effect (Wessely et al., 1994) (For further discussion, see Hodgins, 2001; Hodgins & Müller-Isberner, 2000). Taken together, the results of all of these investigations strongly suggest that the type and intensity of treatment affects the prevalence of criminality among persons with major mental disorders.

4.5. Legal obligation to comply with treatment

At the same time that the policy of deinstitutionalization was being implemented in the mental health field, in most countries laws were being amended to restrict the use of civil commitment and, in some jurisdictions to give patients rights to refuse treatment. Yet, the studies referred to above that have evaluated specialized forensic after-care strongly suggest that for some patients the legal obligation to comply with treatment is required in order to obtain positive results. A direct test of this hypothesis was made in Finland where prior to 1978, but not after this date, it was possible to obtain a court order to require patients who had committed a crime to use after-care services. Two studies conducted prior to 1978, one with a follow-up period of 9.3 years and the other 4.1 years, documented no recidivism (Hakola, 1979; Tuovinen, 1973), while two studies conducted after the law was changed found considerable violent recidivism (Eronen, Hakola, & Tiihonen, 1996; Vartiainen & Hakola, 1992). These investigations, in addition to those cited above, again strongly suggest that the legal options available to clinicians to enforce compliance with treatment are a factor that influences the criminality of at least certain subgroups of persons with major mental disorders.

4.6. Social services

The closing of the large asylums and the inadequacy and inappropriateness of the care provided to persons who developed major mental disorders lead to a situation in which many of them were (and are) forced to live with their families of origin. As the work by Estroff, Swanson, Lachicotte, Swartz, and Bolduc (1998) have demonstrated, persons with major mental disorders are often targets of abuse and hostility by family members on whom they are dependent and who are frequently the victims of their aggressive behaviour. This is not surprising given what has long been known about the inability, particularly of many persons afflicted with schizophrenia, to tolerate emotionally charged relationships with family members (Miklowitz, 1994). Most adults raised in western cultures would probably find it difficult to live with their parents. Yet, those who suffer from mental illnesses and who have limited problem solving skills and strategies for coping with stress are forced to do so. Many of them manage poorly in the family environment and resort to aggression to resolve

conflicts. Others live in environments that may also contribute to antisocial and aggressive behaviours. For example, in an evaluation of supervised apartments for persons with major mental disorders, we found that violence of some form was almost a daily occurrence and that patients' symptoms increased the longer they lived in the apartments (Hodgins, Cyr, Gaston, & Viens, 1988). The results of these and many other investigations demonstrate that the living environment of persons with major mental disorders may contribute to antisocial and aggressive behaviour.

5. Conclusion

Given this knowledge, the challenges are clear. The first is to identify humane and effective treatment programmes that relieve suffering and prevent violence. This requires the identification of subgroups of patients with distinctive characteristics and treatment needs and the development of specific combinations of treatments and services adapted to each. The second challenge is to identify the trajectories over the life span that lead to both mental illness and criminality in order to document opportunities for prevention.

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