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Moral cognition in schizophrenia

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Introduction. Disordered moral behaviour and understanding of moral rules were described early in the literature on schizophrenia; however, moral cognition has received scant attention in spite of a large literature focused on social cognitive impairments and violent behaviour in schizophrenia.

Methods. We conducted a narrative synthesis of the literature on violence, moral judgement and schizophrenia.

Results. Initial empirical research into moral cognition in schizophrenia did not fully account for the basic- and social-cognitive deficits now known to characterise schizophrenia. Importantly, research into moral cognition in autism and psychopathy, disorders in part characterised by social cognitive impairments indicates subtle patterns of difference to the moral cognition of control participants. Recent neuroeconomic studies of moral cognition in schizophrenia have indicated that individuals with schizophrenia display subtle dysfunction in their fairness-related behaviours, but not in their propensity to engage in altruistic punishment.

Conclusions. Further research has the potential to broaden our understanding of what is intact and what is impaired in moral cognition in schizophrenia and also to inform our theories of the structures subserving moral judgement in the general population. Furthermore, a more thorough understanding of moral cognitive impairments in schizophrenia may have implications for both legal process and psychosocial rehabilitation.

Keywords: schizophrenia; moral cognition; moral judgement interview

As early as the 19th century, it was noted that some individuals with a certain subtype of schizophrenia (then termed “hebephrenia”) showed difficulty in understanding moral rules or behaving in morally appropriate ways (Kahlbaum, 1890/2002). This early literature suggested that individuals with schizophrenia may have deficits in moral cognition, that is, the cognitive processes that underpin capacities for moral judgement and behaviour. By moral judgement, we mean the attribution of moral status (e.g., “good,” “bad,” “morally obligatory” and “morally impermissible”) to the behaviour of self and others. By moral behaviour, we mean those behaviours which influence others in morally relevant ways.

Kahlbaum argued that these so-called “moral symptoms” were part of a broader cluster of symptoms associated with a disorder he termed “heboidophrenie.” Current

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philosophical, psychological and psychiatric thinking suggests, however, that some of Kahlbaum's moral symptoms would be conceived today as social rather than moral transgressions and attributed to the agitation, impulsivity and/or disorganisation that feature in schizophrenia, rather than any underlying moral insensitivities. For example, Kahlbaum described a case of heboidophrenie: Richard M, who would walk naked in his nightgown during the day, "attend social gatherings without a collar, and miss family reunions [without reason]" (Kahlbaum, 1890/2002, p. 203), which Kahlbaum considered morally improper. Whereas none of these behaviours involve fundamentally moral infractions, other behaviours displayed by Richard M would qualify as harm- or threat-based moral transgressions, for example, he also set fire to boxes in his room in a boarding school, told an uncle, "If you don't shut up straight away I will kill you," and stated, on being admitted to a hospital, "I am amazed at my having accepted to come to a madhouse, for all I have in my mind now is crime and murder" (p. 203).

Violent tendencies of this type continue to be seen today in a small minority of individuals with schizophrenia. Despite the small numbers, however, the repercussions of these actions can be devastating, and the questions that are raised about the moral accountability of violent offenders with schizophrenia are complex and trigger considerable legal and social debate.

Given the heterogeneity of theoretical constructs and methods, we conducted a narrative synthesis of the literature on moral judgement and schizophrenia, beginning with an overview of issues related to the moral accountability of violent offenders with schizophrenia.

Schizophrenia and violence

Whereas only a small minority of people with schizophrenia are violent (.03% for homicide, .2% for violent offences; Wallace et al., 1998), these individuals are much more likely to be the victims of crime than the perpetrators (Brekke, Prindle, Bae, & Long, 2001). A number of studies have concluded that a greater proportion of individuals with schizophrenia are involved in violent or aggressive behaviour than individuals from the general population, particularly during untreated first episode psychosis (Bennett et al., 2011; Fazel, Gulati, Linsell, Geddes, & Grann, 2009; Large, Smith, & Nielssen, 2009; Nielssen & Large, 2010).

The extent to which schizophrenia per se contributes to violent and aggressive acts is unclear. This is because factors that predict violence in the general community including social disruption, history of abuse, low income and drug and alcohol abuse also predict violence in schizophrenia (Bennett et al., 2011; Bo, Abu-Akel, Kongerslev, Haahr, & Simonsen, 2011; Elbogen & Johnson, 2009; Fazel et al., 2009; Wallace et al., 1998). In particular, impairments in empathy associated with substance abuse may increase propensity to violence (Bragado-Jimenez & Taylor, 2012). Yet, other illness-related factors may also play a causal role as violent individuals with schizophrenia also show more hostility, impulsivity, schizophrenic positive symptoms, particularly command hallucinations and persecutory delusions, as well as less-severe negative symptoms and depression, reflectiveness and insight (Abu-Akel & Abushua'leh, 2004; Bo et al., 2011; Ekinci & Ekinci, 2013; Kumari et al., 2009; Nielssen & Large, 2010; Weiss et al., 2006).

Comorbidities also appear to confound the picture. For example, psychopathy has a 4–25% comorbidity in schizophrenia (Abushua'leh & Abu-Akel, 2006). This dovetails with the findings that psychopathy is associated with violent acts in schizophrenia

(Bo et al., 2011; McGregor, Castle, & Dolan, 2012; Spidel, Lecomte, Greaves, Sahlstrom, & Yuille, 2010; Tengström, Grann, Långström, & Kullgren, 2000) and that orbitofrontal cortex and amygdala dysfunction, which associates with psychopathy (Blair, 2004, 2007), also associates with violence in schizophrenia, along with reduced whole brain, increased putamen volume and microstructural abnormalities in the orbitofrontal cortex and amygdala (Naudts & Hodgins, 2005).

Psychopathy is a dimensional trait and may influence not only violent tendencies but also moral cognition and behaviour at both clinical and subclinical levels. For example, studies of moral cognition in incarcerated offenders high in psychopathy indicated that they treat conventional transgressions (e.g., speaking in class) similarly to moral transgressions (e.g., hurting another person), whereas controls treat the former as more permissible and less severe (Blair, 1995; Dolan & Fullam, 2010). Higher levels of psychopathy in non-clinical groups are also associated with tendency towards proactive aggression in non-clinical adolescents (Raine et al., 2006), a greater tendency to endorse violating individual rights for the greater good (i.e., make a “utilitarian” decision about actions in moral dilemmas; Langdon & Delmas, 2012), and a lower level of moral concern regarding issues of harm and fairness (Glenn, Iyer, Graham, Koleva, & Haidt, 2009).

Some researchers have proposed two primary routes to explain the heterogeneity in pathways to violence in schizophrenia. The first mimics pathways to violence in the general community and is primarily associated with proactive aggression via psychosocial disturbance, including drug and alcohol abuse, lifestyle factors and comorbid premorbid personality (including psychopathy). The second route is via association with the positive symptoms of schizophrenia, in particular persecutory delusions, which, in otherwise non-violent individuals, has been primarily linked to reactive aggression, including delusion-fuelled reactive aggression (Bo et al., 2011; Taylor, 2008).

One issue in particular remains unaddressed in regard to the second proposed route. The M’Naghten rules, which are the basis for not guilty pleas due to impairment caused by mental illness, include that an individual is not guilty if their offence is substantially driven by delusions or if disordered thinking has undermined the individual’s capacity to understand that their action was morally wrong (Large et al., 2009). However, not all people with schizophrenia, including those who commit crimes, display delusional symptoms and/or marked thought disorder. Furthermore, whereas delusional beliefs are often persecutory and cause significant fear (Langdon, McKay, & Coltheart, 2008; Zolotova & Brüne, 2006), delusion-related violence can be disproportionate to the perceived threat. These findings suggest that some individuals with schizophrenia who commit delusion-triggered crimes show a difficulty with understanding that their action was morally wrong – a difficulty that is not fully explained by the presence of delusions and/or other positive symptoms, including gross thought disorder.

A possible implication is that capacities for moral cognition and reasoning may be affected in these individuals. This suggestion dovetails with previous findings that moral cognition is associated in non-schizophrenia samples with antisocial behaviour even when controlling for other known predictors of antisocial behaviour (Barriga, Morrison, Liao, & Gibbs, 2001; Stams et al., 2006), and the hypothesis that fronto-temporal impairments undermine both moral judgement and moral behaviour (Raine & Yang, 2006).

Despite that moral cognition is a major domain of social-cognitive functioning (Adolphs, 2003), which is known to be pervasively impaired in schizophrenia, primarily in the domains of emotion recognition and theory of mind (ToM; see later) and that an individual’s capacity for moral judgement is of fundamental importance when determining

the legal culpability of individuals with schizophrenia who commit crimes, there is a dearth of research into moral cognition in schizophrenia. Thus it is unclear whether the syndrome in and of itself impairs understanding of morality in some individuals with schizophrenia in a legally relevant sense. The following sections summarise what is currently known of moral cognition and related fields in schizophrenia.

Previous work on moral cognition in schizophrenia

Empirical investigation of moral cognition in schizophrenia began in the 1960s but virtually ceased 25 years later, possibly due to a perception of early research findings as stigmatising. For example, in the first English-language empirical study of moral cognition in schizophrenia (Johnson, 1960), 45 adult males with schizophrenia were compared to controls on their responses to vignettes describing unjust situations such as a sick woman being imprisoned for the use of a heater during wartime electricity restrictions. Responses indicating that the punishment was justified were considered by the experimenters as “deviant.” Participant reasoning was also classified as falling into a particular value orientation such as humanitarian, authoritarian or utilitarian. Utilitarianism is a normative ethical theory in which the moral valence of behaviour is determined by consequences, in particular the amount of happiness or suffering caused by said behaviour. Johnson thus defined utilitarian moral judgements as those which endorsed violating individual rights for the greater good. Participants with schizophrenia gave a greater proportion of “deviant” responses than controls, although this tendency was less pronounced for people in the acute stage of illness. Furthermore, whereas control participants tended to exclusively refer to humanitarian concerns, participants with schizophrenia also tended to often refer to authoritarian or utilitarian concepts. Again, the responses of patients in the earlier acute stage of schizophrenia tended to be more similar to control participants, lending support to the idea that the experience of hospitalisation and disenfranchisement may have influenced responses in more chronic patients. From this pattern of findings, Johnson concluded that people with schizophrenia treat others in a way “hardly different from inanimate objects” (p. 283), and that they reject responsibility for the welfare of others.

In later work, Watson (1972) evaluated the responses of individuals with schizophrenia and controls on an inventory of self-rated hypothetical moral behaviour, for example, whether they would keep money dropped by someone else, or return it in order to be honest or for fear of getting caught. Participants with “process” schizophrenia (i.e., with chronic course and poor treatment response, Kantor, Wallner, & Winder, 1953) rated themselves as less likely to make antisocial choices than controls and participants with “reactive” schizophrenia (acute patients with good treatment response), but showed lower test–retest reliability on this measure. This latter finding was interpreted as indicating that individuals with process schizophrenia had less-stable internalised moral standards.

Further investigations into moral cognition in schizophrenia utilised Kohlberg’s Moral Judgement Interview (MJI; Colby et al., 1987), a semi-structured interview in which the respondent is asked a series of probes investigating their moral judgements in regard to (typically three) moral dilemmas. The most well-known example is the Heinz dilemma in which a man considers stealing an expensive drug to save his wife’s life. Participants are asked whether Heinz should steal the drug, followed by a series of probes investigating the relevance of duty, love, property rights and right to life for the scenario. The scoring

of the MJJ is based not on the interviewee's decision per se, but rather on the "moral maturity" of their justification, rated based on a spectrum in which justifications based on authority and punishment avoidance are at the low end, whereas concepts such as rights, the greater good and maintaining human dignity are on the high end. For example, a participant who states that Heinz should not steal the drug because he will be caught and punished will score lower than a participant who states that Heinz should not steal the drug because it is a violation of property rights. Lower moral maturity scores have been linked with behavioural traits such as sociopathy, greater propensity towards cheating and lower levels of altruism and guilt over transgressions (Campagna & Harter, 1975; Harris, Mussen, & Rutherford, 1976; Kohlberg, 1969).

Benson (1980) used the MJJ to investigate the moral judgements of 20 adolescents with schizophrenia and 20 age- and IQ-matched controls, finding that adolescents with schizophrenia scored lower, more frequently relying on "power, status and possessions," in comparison to the "concepts of equality, reciprocity and trust" (p. 676) relied upon by controls. The adolescents with schizophrenia were also rated by their teachers as displaying more delinquent behaviour than the controls. Herron, Stegen, Poland, and Schultz (1983) found that premorbid adjustment, block design scores (an index of non-verbal IQ) and vocabulary scores and years of education were the best predictors of moral maturity, assessed using the MJJ, in a sample of 40 adult males with schizophrenia. Within this sample, only two participants focused on social systems and conscience, which Kohlberg argued that most healthy adults do. Whereas the lack of a control group disallows direct comparison, this implies that these participants were less morally mature (according to Kohlberg's criteria) than would be expected.

These early investigations implied that the moral cognition of people with schizophrenia is impaired. However, these investigations primarily used Kohlberg's MJJ or similar testing methodologies, and Kohlberg has been criticised for a conception of moral development that overemphasises justice-based reasoning, whereas paying little attention to empathic care-based responses (Gilligan, 1977). The implication is that the patients may have had qualitatively different, but not necessarily morally impoverished, ways of responding to the MJJ scenarios. It is also plausible that the cognitive demands of these tasks impacted more on the individuals with schizophrenia, who are known to show pervasive cognitive deficits, than the controls, driving at least part of the differential patterns of responses shown.

Moral judgement and cognitive functioning in schizophrenia

One assumption of the MJJ is that moral judgements are the outputs of deliberative processes that are accurately reflected by stated justifications. However, more recent investigations have indicated that moral judgements and their justifications are dissociable and that moral justifications are at times post hoc (Haidt, 2001; Hauser, Cushman, Young, Kang-Xing Jin, & Mikhail, 2007). Thus, the apparent impairments shown by people with schizophrenia on the MJJ may in part reflect difficulty in their capacity to explicate or rationalise their judgements. This is particularly important, given the conceptual link between intellectual functioning and moral maturity as built into Kohlberg's model.

Kohlberg assumed that moral development was subsequent to intellectual development. Indeed, higher moral maturity scores on the MJJ are related to higher mental age (Campagna & Harter, 1975), verbal intelligence (Harris et al., 1976) and abstract and

analytic reasoning (Arbuthnot, 1973), including for people with schizophrenia (Herron et al., 1983). Interestingly, intelligence (IQ) may be more strongly predictive of moral maturity, as assessed using the MJJ, for people of below average IQ than for those above average (Kohlberg, 1969). It is relevant then that individuals with schizophrenia typically have IQ scores approximately one standard deviation below healthy controls (Goldberg & Green, 2002; Loughland, Lewin, Carr, Sheedy, & Harris, 2007).

In addition to a likely relationship between the lower IQ associated with schizophrenia and lower moral maturity scores on the MJJ, it is likely that other neurocognitive deficits in schizophrenia also influenced the aforementioned results. The MJJ is taxing of memory and attention, which are typically impaired in schizophrenia. As the aforementioned studies did not account for these deficits, the extent to which they contribute to lower moral maturity scores in schizophrenia is unclear. The related literature regarding the relationship between neurocognitive functioning and violence in schizophrenia has been inconsistent, with some studies finding that violent people with schizophrenia outperform non-violent people with schizophrenia on measures of, for example, verbal fluency and higher-order executive function, other studies finding the opposite pattern and some studies finding no relationship (Naudts & Hodgins, 2005).

A related concern is the potential for thought disorder and negative symptoms, in particular derailment, poverty of speech and poverty of content of speech, to deflate MJJ ratings of moral maturity in patients. As ratings for the MJJ are largely based on the level of abstraction of a respondent's justifications, a respondent who simply states that one should follow the law but is unable to provide more detail will score more poorly than a respondent who provides further justification. In particular, respondents with severe negative thought disorder may have difficulty providing a sufficient amount of speech or content of speech to allow them to fully explicate their reasoning, and thus will score lower than they would have if they had not had this symptom. Also, participants who derail before providing a full justification will also score lower than if they had not derailed. Take, for example, the following response to the Heinz dilemma from an interview performed by one of the authors (J.M.):

So um, maybe he should steal the drug. It'd go through your thoughts, you'd get desperate and I don't think that druggist is a very, he's putting money above everything which isn't you know, it's not done [where I live], the chemists down there are very good.

Unfortunately, this respondent derailed before finishing her explanation of why the druggist's character is a morally relevant factor. The implication in her statement is that the druggist should be valuing the patient's life above money. Had she gone on to further argue that this is because human life is the most important value she would have scored higher for this statement.

In addition to the neurocognitive deficits common in schizophrenia, deficits in social cognition are also characteristic of the syndrome, including impaired ToM (the ability to make inferences about the mental states of others), even when general cognitive impairment is accounted for (Bora, Yucel, & Pantelis, 2009; Corcoran, Mercer, & Frith, 1995; Penn, Sanna, & Roberts, 2008; Sprong, Schothorst, Vos, Hox, & Van Engeland, 2007). Benson (1980) foreshadowed a possible relationship between impaired ToM and moral maturity in schizophrenia, arguing that difficulties in role-taking may impede moral development. Given that moral decisions, in general, and responses to the MJJ, in particular, require inferences of mental states to agents, impairments in this capacity will

likely influence moral maturity scores. This argument is supported by findings that brain regions associated with ToM, such as the medial prefrontal cortex and supramarginal gyrus are recruited by consideration of moral violations (Reniers et al., 2012).

There is one recent investigation into the relationship between social and moral cognition in schizophrenia. de Achával et al. (2013) compared individuals with schizophrenia, siblings of individuals with schizophrenia and healthy controls on their responses to moral dilemmas which involved killing one person in order to save a number of others and on non-social trade-off decisions. Contrary to hypothesis, the authors found that there were no differences between these groups in their propensity to endorse harming one for the benefit of many. However, differential patterns of brain activation were found, with individuals with schizophrenia and siblings showing reduced activation in the right hippocampus and greater activation in the superior and inferior frontal gyri. Additionally, in comparison to siblings, individuals with schizophrenia showed less activation in the right precuneus and more in the right superior temporal gyrus.

These patterns of activation were interpreted by the authors as indicating that brain regions associated with emotional processing were recruited less in people with schizophrenia than in controls when confronted with moral dilemmas. Why this did not influence their behavioural responses to these dilemmas is unclear, however, it is also unclear as to whether the patterns of activation were due to the moral or the social content of the dilemmas, as the control stimuli were non-social in nature.

The relationship between social and moral cognition has also been evaluated in individuals with autism spectrum disorders (ASDs), who also manifest ToM deficits and social dysfunction. These studies have produced mixed results. For example, irrespective of ToM impairments, when presented with simple transgressions, children with ASD make similar distinctions between moral and conventional transgressions (Blair, 1996) and moral judgements to typically developing children (Leslie, Mallon, & Dicorcia, 2006). However, individuals with ASD are more likely to explain the wrongness of moral transgressions via reference to rules rather than the welfare of victims and are also less likely to incorporate information about intention into their moral judgements of more complex moral transgressions, for example, by indicating that harmful accidents are worse than less harmful intentional acts (Grant, Boucher, Riggs, & Grayson, 2005; Moran et al., 2011; Shulman, Guberman, Shiling, & Bauminger, 2012; Zalla, Barlassina, Buon, & Leboyer, 2011).

These findings that indicate an association between poorer ToM and some impoverishment of complex moral reasoning in ASD stand at odds, however, with research into the relationship between social cognition and violence in schizophrenia. Violence, history of criminal behaviour and delinquency in schizophrenia appear to be linked to better ToM, albeit also with poorer affective empathy and emotion recognition (Abu-Akel & Abushua'leh, 2004; Majorek et al., 2009; Weiss et al., 2006). This may be due to comorbid psychopathy, which is linked with impaired affective empathy but spared ToM (Blair, 2005). Whereas these seemingly contrary findings are yet to be resolved, they serve to illustrate the point that unless social cognitive capacities and levels of psychopathy are accounted for, they will confound measures of moral cognition in schizophrenia.

Whereas early studies of moral cognition in schizophrenia largely ceased in the 1980s, likely because findings at the time were perceived as stigmatising and long before we had developed the more sophisticated understanding of cognitive and social-cognitive deficits in schizophrenia that we have today, more recent research has begun

to reconsider the moral behaviour of people with schizophrenia from the perspective of neuroeconomics.

Neuroeconomic studies in schizophrenia

Moral and economic decisions are similar in that they involve socially contextualised decisions which tap into concepts of fairness and justice and may involve conflicts between means and ends (Kvaran & Sanfey, 2010). Neuroeconomic games have typically focused on fairness. For example, in the “Ultimatum Game” (Güth, Schmittberger, & Schwarze, 1982), players negotiate over a fixed amount of money. The “proposer” nominates a division of this sum, and the “responder” chooses whether or not to accept the offer. If the responder accepts the offer, both players receive the nominated amount. If the responder rejects the offer, neither player receives any money. Thus, rejection of an offer is typically taken to indicate that the responder has perceived the offer as unfair. A similar game is the Third-Party Dictator Game (Kahneman, Knetsch, & Thaler, 1986) in which the responder is not allowed to reject offers, but a third party may intervene. Typically, the third party may donate some of their own money, whereupon double the donated amount will be transferred from the proposer to the responder. Thus, the third party has materially impoverished themselves in order to punish the proposer. Importantly, neuroeconomic games allow for the investigation of actual rather than self-reported behaviour. However, it is important to note that fairness and harm may be partly dissociable moral domains (Haidt & Joseph, 2007), so caution should be taken when generalising from neuroeconomic findings to harm-related moral cognition.

When playing the Ultimatum Game, people with schizophrenia act in a less strategic manner than controls, proposing more “hyperfair” offers, and failing to reduce their offers in the round following a successful proposal (Agay, Kron, Carmel, Mendlovic, & Levkovitz, 2008). Furthermore, people with schizophrenia or subclinical high schizotypal traits accept a greater number of unfair offers, particularly more extreme unfair offers, and yet accept fewer fair offers (Csukly, Polgár, Tombor, Réthelyi, & Kéri, 2011; van’t Wout & Sanfey, 2011; Wischniewski & Brüne, 2011). One investigation of the behaviour of people with schizophrenia in a trust-based economic game has indicated that they tend to be less trusting at baseline and also do not respond to the trustworthy behaviours of others by being more trusting of them in further interactions (Fett et al., 2012). However, fairness perception appears to be largely intact in people with schizophrenia engage. For example, people with schizophrenia engage in altruistic punishment to the same degree as healthy controls when playing the Third-Party Dictator Game (Wischniewski & Brüne, 2011), and unpublished findings by our colleagues indicate that when playing the Ultimatum and Third-Party Dictator games, most individuals with chronic schizophrenia respond similarly to controls, irrespective of clinical or cognitive characteristics (Claassen, Kraft, & Brüne, *in preparation*). In sum, findings from this research field are mixed with regard to advancing understanding of capacities for moral judgement in schizophrenia and may relate to the equally mixed findings regarding reward-based versus punishment-based learning in schizophrenia (see e.g., Fervaha, Agid, Foussias, & Remington, 2013; Gold, Waltz, Prentice, Morris, & Heerey, 2008). Whereas these findings may indicate differences in the moral cognitive capacities of people with schizophrenia, at the present stage, it is not possible to disentangle this hypothesised domain-specific effect from the effects of deficits in social or strategic cognition more broadly. We will conclude by discussing all of the findings to date and future avenues for research.

Discussion

One possible reason for the dearth of research into moral cognition in schizophrenia may be the concern that research into moral cognition in schizophrenia may lead to further stigmatisation of individuals with the illness. We hold the converse opinion that investigation of what is impaired and what is intact in the moral cognitive capacities of people with schizophrenia, and the aetiology of any impairment, will be helpful in understanding the nature of and, therefore, destigmatising any qualitatively differential moral judgements that might be found in this population.

The literature reviewed earlier indicates that early studies of moral impairment in schizophrenia blurred violations of social convention, impulsive behaviour and moral infractions. Whereas incidence of violent behaviour is increased in schizophrenia, both illness specific and non-specific factors appear to play a role. The causal role of potential impairments in moral cognition for violent behaviour has not been empirically studied, although comorbidity with psychopathy is a likely factor in violent behaviour and differential patterns of moral judgement.

Initial empirical investigations indicating that individuals with schizophrenia demonstrate impairments in moral cognition largely focused on explicit moral reasoning and justification. However, a recently influential empirical model of moral cognition questions importance of deliberative reason in moral cognition, raising the possibility that moral justifications may not map well onto moral judgements. Furthermore, these investigations largely did not account for the cognitive and social cognitive impairments in schizophrenia or for the effect of symptoms such as thought disorder. The potential role of social cognition in moral cognition has been investigated in research with individuals with autism, who show similar response patterns to controls participants on basic moral cognition tasks, but differ in the extent to which they take intention into account in more complex tasks, and also in the justifications they provide for their judgements. Finally, recent studies using neuroeconomic paradigms indicate that individuals with schizophrenia display subtle dysfunction in their fairness-related behaviours, typically to their own detriment, but not in altruistic punishment.

The earlier discussion indicates that impairments in moral cognition in schizophrenia will likely be subtle in nature and variable, depending on impairments in basic cognition and social cognition. We make the following specific predictions about moral cognition in schizophrenia:

- (1) People with schizophrenia without comorbid psychopathy will not differ from healthy controls in their basic moral judgements, such as in the moral-conventional task (Blair, 1995).
- (2) People with schizophrenia will be more utilitarian in their approach to moral dilemmas that pit individual vs. group welfare. This will be due to people with schizophrenia making fewer mental state inferences about the individual victim than control participants.
- (3) Higher levels of dimensional psychopathy will be associated with increases in utilitarian responding to dilemmas.
- (4) People with schizophrenia will preferentially focus on outcomes rather than intentions when making moral judgements, for example, by assigning blame for harmful accidents. This will be mediated by ToM deficits.

There are a number of other potential avenues for future research into the relationships between specific symptoms of schizophrenia and moral cognitions. For example, one

interesting line of investigation could be into moral flexibility and moralisation of social conventions. Deluded people with schizophrenia tend to show a greater tendency to jump to conclusions (Langdon, Ward, & Coltheart, 2010). Irrespective of whether this tendency is causal in delusion formation, it could be linked to less flexibility in moral judgements when presented with new information, or less of a tendency to treat violations of social convention as permissible if approved by the relevant authority. Extant theories in the wider moral cognition literature could also be investigated from a cognitive neuropsychiatric approach, which tests psychiatric cases with particular impairments to inform theories of normal cognition. For example, arguments that cognitive control is linked with capacity for utilitarian moral judgements in dilemma tasks (Greene, Sommerville, Nystrom, Darley, & Cohen, 2001) could be examined by testing participants with schizophrenia who are known to show impairments in cognitive control.

Research into moral cognition in schizophrenia may also have legal implications. For example, an individual with schizophrenia may carry out an act of violence under the influence of command hallucinations but have no impairment in moral cognition and understand that the act was wrong. This person would not meet the undermined capacity criterion of the M'Naghten rules. Thus, their legal defence may need to rely on mitigating circumstances due to coercion rather than compromised moral cognition.

Finally, moral cognitions comprise a fundamental aspect of social interaction. If some people with schizophrenia do have impaired moral cognition, it is possible that this could play a role in their social functioning difficulties. If this holds true, an understanding of the aetiology of impaired moral cognition in some individuals with schizophrenia may assist in the development of remediation of basic or social cognitive capacities that underpin moral cognition, with a resultant influence on social functioning and aggressive tendencies.

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