



Violent behavior in autism spectrum disorders: Who's at risk?☆

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ABSTRACT

Autism spectrum disorders (ASD) are a range of complex neurodevelopmental disorders characterized by social impairments, communication difficulties, and restricted, repetitive, and stereotyped patterns of behavior. Over the last decade, there has been increased media attention focused on the relationship between ASD and violent behavior due to a number of school shootings and high-profile criminal cases involving offenders with alleged ASD diagnoses. This coverage and these incidents have given rise to public concern and led to the perception that people with ASD are predisposed to violent behavior. In this manuscript, we provide a comprehensive review of the literature bearing on the relationship between ASD and violent behavior, and in doing so, characterize which people with ASD are most likely to be violent and under what circumstances. We conclude that, on the whole, while research findings are mixed, they lend support to the assertion that ASD does not cause violence, and indicate that when violent behavior occurs in people with ASD, it is the result of third variables including poor parental control, family environment, criminality, bullying, or psychiatric comorbidity (e.g., psychosis), that go undetected or untreated. The conclusions of this review have implications for families, clinicians, and policy makers, as a greater understanding of ASD-related violence risk is needed to combat misconceptions about people with ASD and the stigma associated with these conditions.

1. Introduction

Recent events, in particular the shootings at Sandy Hook Elementary School in 2012, Isla Vista-Santa Barbara in 2014, and most recently at Umpqua Community College in 2015, have raised concern about a potential link between autism spectrum disorders (ASD) and violence. While media outlets were quick to attribute these violent acts to the purported ASD of the perpetrator, the evidence supporting a causal relationship between ASD diagnoses and violent behavior is mixed. In this manuscript, we comprehensively review the scientific literature pertinent to the association between ASD and violent behavior in adolescents and adults with ASD. In turn, we consider and integrate the results of large and small-scale studies bearing on the relationship between ASD and violent behavior that use various samples (e.g., forensic, convenience, and random) and take into account social-emotional and cognitive deficits related to ASD, as well as environmental and contextual factors and comorbid psychopathology including psychopathy and psychosis. We conclude that while there are particular circumstances under which the risk for violent behavior is increased in people with ASD, ASD per se are not a significant risk factor for violent

behavior. Importantly, while the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) no longer separates autistic disorder (AD), Asperger syndrome (AS), and Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS) from each other, the majority of studies reviewed herein were carried out prior to the introduction of DSM-5. Therefore, throughout the review, when the acronym ASD is used it is used as a plural term that encompasses all of the pre-DSM-5 Autism Spectrum Disorder diagnoses and, where appropriate, we note the specific pre-DSM-5 Autism Spectrum Disorder diagnosis or diagnoses examined in a given study.

1.1. Autism spectrum disorders

Based on DSM-5 criteria, it is estimated that 1 in 68 US children have an ASD, and males are five times more likely to be diagnosed with an ASD than females (Christensen et al., 2012). These disorders are characterized by two prominent symptom clusters: (1) impairments in social communication and interaction and (2) repetitive patterns of behavior, activities, and interests (American Psychiatric Association, 2013). Within individuals with ASD, there is marked variability in the

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types of symptoms present, the severity of these symptoms, and their impact on functioning. In recognition of this heterogeneity, the DSM-5 introduced severity ratings for both the social communication and the restricted, repetitive behaviors symptoms domains. An excellent review of the history and symptoms associated with the ASD diagnostic entities prior to DSM-5 is available in [Bregman \(2005\)](#).

1.2. Violent behavior in ASD

Rates of violent behavior in people with ASD vary widely across studies from 1.5% to 67% ([Långström, Grann, Ruchkin, Sjostedt, & Fazel, 2009](#); [Scragg & Shah, 1994](#); [Søndena et al., 2014](#)). This variability results from the ASD diagnoses included in the study, the types of violence inquired about, and the nature of the sample used (e.g. forensic, community, etc.; see below). In terms of the types of violent crime committed by people with ASD, in line with conviction rates from the general population ([Hippler, Viding, Klicpera, & Happé, 2009](#)), the most common violent offenses are sexual assault ([Murrie, Warren, Kristiansson, & Dietz, 2002](#); [Woodbury-Smith, Clare, Holland, & Kearns, 2006](#)) and physical assault ([Bjorkly, 2009](#); [Schwartz-Watts, 2005](#); [Woodbury-Smith et al., 2006](#)), with physical assault being the most common act. In contrast to the general population, people with ASD are equally likely to physically assault a stranger or relative/caregiver ([Bjorkly, 2009](#)), and to physically assault more than one person during a given episode ([Bjorkly, 2009](#)). Moreover, these violent acts are less likely to be related to the use of drugs or alcohol ([de la Cuesta, 2010](#); [Murphy, 2006](#); [O'Brien, 2001](#); [Wahlund & Kristiansson, 2006](#)).

In the next two sections, we consider the evidence that does and does not support the link between violent behavior and ASD. Following these, we provide a synthesis of the reviewed findings, review both the ASD and non-ASD related factors that may influence violent behavior in people with ASD, and finally, provide a general discussion integrating the reviewed findings across all sections.

2. Studies supporting an association between ASD and violence

2.1. Case reports

The foundation for the argument that AS is associated with violent behavior comes largely from case reports ([Asperger, 1944](#); [Baron-Cohen, 1988](#); [Mawson, Grounds, & Tantam, 1985](#); [Murrie et al., 2002](#)). For example, [Asperger \(1944\)](#) described four children he diagnosed with autistic psychopathy (a precursor diagnosis to Autism) who had a history of physical aggression, fascination with blood, graphic violent fantasies, or obsession with poisons; [Mawson et al. \(1985\)](#) described a 44-year-old male with AS who repeatedly engaged in violent behavior (e.g. stabbed a girl with a screwdriver, struck a neighbor, assaulted a child); and, [Baron-Cohen \(1988\)](#) described a 21-year-old man with AS who was repeatedly violent towards his 71-year-old girlfriend. The authors of these reports suggested that AS had a significant relationship with violent behavior, noting the social impairment characteristic of AS as a primary factor underlying the violence and asserting that violence is more common in ASD than had been previously recognized.

Building on this work, [Allely, Minnis, Thompson, Wilson, and Gillberg \(2014\)](#) and [Allely et al. \(2017\)](#) conducted ASD-focused reviews of the case studies of serial killers and mass murders, and perpetrators of mass shootings. These authors found that 28.03% of serial killers and mass murders, and 8% of mass shooting perpetrators had ASD features or diagnoses ([Allely et al., 2014](#)). In both papers, the authors noted that the rates of ASD they observed were far greater than the population prevalence rates, and further, given the limitations of the information they could access, that the estimates that they arrived were below the true level of diagnosable ASD in these populations. Yet, despite these findings, the authors concluded that a small subgroup of individuals with ASD is responsible for committing these rare acts of extreme violence.

2.2. Violent behavior in hospitalized samples

Two early studies that examined the association between ASD and violent offending in samples of hospitalized ASD patients suggested that individuals with ASD were prone to violent behavior. Specifically, [Tantam \(1988\)](#) found that 14 out of 54 individuals with ASD (23%) had committed a criminal offense, primarily violence against others and, in a sample of 422 patients, [Långström et al. \(2009\)](#) found 7% of patients with ASD had been convicted of a violent crime. In the latter study, when ASD diagnoses were looked at in isolation, the authors found that 20% of people with AS offended, while only 3.2% of people with AD offended. By way of comparison, research on violent offending rates for other forms of serious mental illnesses (e.g., schizophrenia, bipolar disorder, etc.) suggest an overall 1-year violent offending rate of 28% ([Hodgins, Alderton, Cree, Aboud, & Mak, 2007](#)). Thus, although the ASD-related rates presented above exceed the rates of violent offending in the general population, they are lower than the rates observed for other serious psychiatric disorders. This suggests that while hospitalized patients with ASD are at increased risk for violent behavior as compared to people from the general population, they are not at increased risk as compared to patients with serious mental health conditions.

2.3. Violent behavior in forensic samples

Several studies have looked at the prevalence of ASD in secure forensic settings and found an overrepresentation of patients with ASD. For example, [Hare, Gould, Mills, and Wing \(1999\)](#) examined the number of individuals with ASD across three secure hospitals in the UK and found a prevalence rate of 2.4% (two thirds had an AS diagnosis) which is ~2.5 times the population prevalence level of ASD [1% ([American Psychiatric Association, 2013](#))]. Of the individuals Hare identified, 32% had committed a violent index offense [i.e., an offense leading to committal to a specialized hospital (e.g. assault)]. The percentage of violent crime for the ASD group was comparable to that for the total population of the high security hospitals setting (35%; [Taylor et al., 1998](#)).

The analyses of two other independent large-scale forensic samples ([Scragg & Shah, 1994](#); [Siponmaa, Kristiansson, Jonson, Nyden, & Gillberg, 2001](#)) also demonstrated that adults and adolescents with ASD are over-represented in forensic hospital settings. [Siponmaa et al. \(2001\)](#) examined the prevalence of ASD in young offenders in Sweden by reviewing case files and assessments of 126 offenders, 15–22 years old, who were referred for forensic psychiatric assessment after committing a serious offense. Results from the case files showed that 15% of the sample had a definite ASD and 12% had a probable ASD. Similarly, [Scragg and Shah \(1994\)](#) examined the records of 392 adult patients in a secure forensic maximum-security psychiatric hospital and found that the prevalence of ASD was four times higher in the hospital (2.3%) than in the general population (0.55%).

3. Studies that do not support an association between ASD and violence

3.1. Case reports

While the primary evidence used to suggest a link between ASD and violent behavior comes from case reports, when the full corpus of ASD case reports are considered, the strength of the link they suggest between ASD and violent behavior becomes less impressive. Pointedly, in [Ghaziuddin, Tsai, and Ghaziuddin's \(1991\)](#) review of 132 published patient case studies, only three ASD patients (2.3%) had a definite history of violence. Furthermore, [Hippler et al. \(2009\)](#) looked at offending behavior in former patients of Hans Asperger. Of the 177 patients from Asperger's cohort, eight individuals had a total of 33 convictions for a 1.3% offending rate, compared to 1.25% in the general

population suggesting that people with AS are not more likely to commit offenses than the general population and further, that it is a small subpopulation of people with ASD may be responsible for a significant portion of the violent behavior committed by people with ASD. Finally, in a recent review of violence in AS where 11 studies were examined (8 case studies and 3 prevalence studies¹), only 5 of those studies suggested a link between AS and violence, leading the author to conclude that there is no empirical evidence to support a claim that there is a link between AS and violence, or an increased risk of violence in persons with AS (Bjorkly, 2009).

3.2. Controlled studies

A number of large sample surveys examining rates of offenses (not constrained to violent offenses) have found that people with ASD are more likely to adhere to the law than matched controls (Howlin, 2004; Woodbury-Smith et al., 2006). For example, Mouridsen, Rich, Isager, and Nedergaard (2008) compared the prevalence of offending behavior in individuals with ASD to that of healthy controls in a large-scale longitudinal study in Denmark. The study included 313 children with ASD and 933 controls matched on sex, date of birth (the controls were born the same day or the day before or after the subjects with ASD), place of birth (region), and social group. The age at follow-up was between 25 and 59 years old and all participants were screened through the nationwide Danish Criminal Register, which has complete lifetime information on all criminal proceedings in Denmark. The results indicated that people with ASD had a 9% overall conviction rate and a 1.8% conviction rate for violent offenses, and matched controls had an 18% overall conviction rate and 2.3% conviction rate for violent offenses. The diagnosis specific conviction rates were as follows: childhood autism (0.9%), atypical autism (8%), and AS (18.4%). These results suggest that conviction rates of individuals with ASD are lower than those in the general population, ASD individuals are no more violent than matched controls, and that for those with ASD, convictions are most common among individuals with an AS diagnosis (Mouridsen et al., 2008).

To date, only one community-based study has examined the rate of offending in individuals with ASD (Woodbury-Smith et al., 2006). A total of 25 individuals with ASD and 20 typically developing controls were compared on self-reported offending behaviors. The results showed that while fewer people with ASD reported engaging in illegal behavior (48% ASD group vs. 80% control group) overall rates of any self-reported violent offending were similar between groups (30% ASD and 25% Control; Woodbury-Smith et al., 2006), suggesting that people with ASD are no more likely to commit a violent offense than people in the general population.

3.3. Synthesis

The results of studies bearing on the relationship between ASD and violent behavior are mixed. That said, when the quality and inclusiveness of the evidence, and nature of samples are taken into consideration, the studies showing a link between ASD and violent behavior are fewer and, to our minds, less convincing than those demonstrating no link. More specifically, the studies demonstrating a link between ASD and violent behavior are based on a subsample of case reports and studies of patient samples drawn from specialized settings that likely contain ASD patients who are uniquely prone to violent behavior. In contrast, the studies suggesting there is no link between ASD and violent behavior rely on a more inclusive set of case studies and research studies with more methodologically sound designs. Future research needs to focus on large-scale community based

samples, instead of sampling only from specialized treatment settings (e.g. secure forensic settings and hospitals). Additionally, future research should encompass the entire ASD spectrum while also considering the effect of comorbid psychiatric diagnoses (e.g. psychosis, substance use disorders; see below), demographic factors (e.g. low SES), and psychosocial factors (e.g., physical or sexual abuse), which are known risk factors for violent behavior. In sum, studies employing more sophisticated designs in larger, more diverse and representative samples that concurrently assess for violence-related third variables (noted above) are needed.

4. ASD-related symptoms, characteristics, and deficits and violent behavior

As suggested above, there appears to be a subpopulation within patients with ASD who commit violent acts. Understanding which people with ASD are at-risk for violent behavior will aid efforts to contain such risk, and develop and provide preventative treatments. Research on ASD and violent behavior has identified a number of potential ASD symptoms, deficits in cognitive and emotional processing, environmental factors, personality traits, and psychological comorbidities that increase the risk for violence in people with ASD, and these are reviewed below.

4.1. Symptoms

Some authors have suggested that when people with ASD commit acts of violence, or other offending behaviors, it may be precipitated by the symptoms of ASD (Baron-Cohen, 1988; Bjorkly, 2009; Chen et al., 2003; Howlin, 1997; Mawson et al., 1985; Mouridsen et al., 2008; Murrie et al., 2002; Palermo, 2004). There are certain characteristics of the disorder which are more likely to be present in those with ASD when offending does occur. For example, atypical development of social interaction and communication may manifest as abnormal social approach, failure to initiate or respond to social interactions, a lack of facial expressions and nonverbal communication, and/or an absence of interest in peers (American Psychiatric Association, 2013; Haskins & Silva, 2006; Murrie et al., 2002; Palermo, 2004). Bjorkly (2009) reviewed 29 violent incidents of individuals with ASD and found that 10 (35%) of the violent acts were motivated by communicative and social misinterpretations of other persons' intentions (e.g. insensitivity to others expressed emotions and intentions, attributing negative intentions to non-provocative behavior and communication from other people) on the part of the person with the ASD. Additionally, specific symptoms of ASD such as difficulty perceiving non-verbal cues, social impairment, and restricted interests and ritualistic behaviors can lead to frustration, anxiety, lack of control, or confusion, which are associated with an increased risk of aggression and violent acts (Bjorkly, 2002; Howlin, 1998).

4.2. Characteristics and ASD-related deficits

Beyond the symptoms of ASD, people with these disorders are often characterized by a number of deficits including reduced frustration or distress tolerance, empathy, and theory of mind, and some studies have suggested that these deficits may be related to violent behavior in people with ASD (Bjorkly, 2009; Howlin, 2004; Schwartz-Watts, 2005). Moreover, impairment in coping with change and stressful situations may trigger impulsive, uncontrolled conduct (Hippler et al., 2009). As such, Murphy (2013) emphasized that individuals with ASD tend to have a vulnerability towards developing dysfunctional and restricted coping strategies that may serve as risk factors for interpersonal violence (e.g. rumination). Murrie et al. (2002) proposed that interpersonal naivety, sexual frustration, and deficient empathy (Bjorkly, 2009; Murphy, 2013) were significant factors in the offending behavior of those with AS, and described that the offender "seems genuinely

¹ A subset of the reviewed research (e.g., Baron-Cohen, 1988; Mawson et al., 1985; Murrie et al., 2002; Scragg & Shah, 1994) appears earlier in this manuscript.

unaware of the harm they caused their victims.” The latter may be due to reduced theory of mind, which can cause individuals with ASD to misinterpret or miss social or emotional cues, act impulsively with no idea about the thoughts or feelings of others, or not appreciate the implications of their own behavior towards others (Attwood, 2006, as cited in Søndena et al., 2014; Frith, 1991; Hippler et al., 2009). Based on the association of low empathy with violence, and the link between poor theory of mind and low empathy, a number of researchers have proposed that violence in the ASD can, at least in part, be related to deficits in inferring mental states in others (Abu-Akel & Abushua'leh, 2004; Bjorkly, 2009; Murphy, 1998; Ward, Keenan, & Hudson, 2000).

4.3. Environmental and contextual factors

A subset of articles investigating the relationship between violent behavior and ASD (Ghaziuddin, 2005; Ghaziuddin, 2013) have focused on psychosocial adversity and environmental variables associated with offending, and have noted that, as in the general population, poor parental control, a chaotic home environment (e.g. characterized by permissive and authoritarian parenting styles, highly critical, disapproving, rejecting, or unstable), a family history of mental health problems (e.g. depression, psychotic disorders), parental divorce, physical or sexual abuse, and criminality are factors increase violence risk. Social rejection, victimization (including of bullying), holding a grudge, and seeking revenge may also play important contributory roles and precipitate offending in individuals with ASD (Allely et al., 2014; Allen et al., 2008; Søndena et al., 2014). Furthermore, Lerner, Haque, Northrup, Lawer, and Bursztajn (2012) proposed that deficits in emotion regulation and moral reasoning could lead to violent behavior, particularly for individuals who fall on the higher-functioning end of the spectrum. While various neurodevelopmental factors may be involved in the etiology of violent behavior, much research and speculation has focused on the role of ASD and head injury (Allely et al., 2014; Pallone & Hennessy, 1998; Sarapata, Herrmann, Johnson, & Aycok, 1998), thereby suggesting that a complex interaction between certain symptoms of ASD, family and environmental factors, and greater impairment in cognitive and emotional control may be predisposing or mediating factors that make individuals with ASD increasingly vulnerable to violent behavior.

4.4. Genetic factors

ASD are associated with an 80% heritability estimate and over 1000 genes have been identified as contributing to these disorders (Lichtenstein et al., 2010; Lundström et al., 2015). Recently, David et al. (2016) identified ASD-related 1031 genes, but concluded that only 262 were unique to ASD. This genetic overlap between ASD and other disorders suggests common molecular mechanisms and shared biological functions, and this has implications for understanding violent behavior in people with ASD.

Of note, ASD has been found to genetically overlap with attention deficit hyperactivity disorder (ADHD), conduct disorder (CD), and schizophrenia (Carroll & Owen, 2009; Craddock & Owen, 2010; Lichtenstein et al., 2010; Kerekes et al., 2014; Lundström et al., 2015; Ronald, Simonoff, Kuntsi, Asherson, & Plomin, 2008). Concerning ADHD and CD, in a large archival study that included almost 7000 people diagnosed with autism, Heeramun et al. (2017) found that once ADHD and CD were controlled for, the relative risk for violent behavior reduced from 1.39 to 0.85. Furthermore, in a longitudinal study that included approximately 3400 children with neurodevelopment disorders, Lundström et al. (2015) found that while ADHD and Tic Disorders were associated with increased rates of violent criminal behavior, ASD were not. Finally, while the current literature is rather sparse regarding the impact of psychotic disorders on violent behavior in people with ASD (e.g., Långström et al., 2009) given the high genetic overlap and longitudinal studies demonstrating increased risk for

psychosis in people with ASD, and the relationship between psychosis and violent behavior (Silverstein, Del Pozzo, Roche, Boyle, & Miskimen, 2015), it is reasonable to assume that when present, psychotic disorders influence violent behavior in people with ASD.

Taken together, these data suggest a number of conclusions. First, ASD are highly heritable polygenetic disorders with a relatively restricted unique genetic etiology. Second, given that the risk for violent behavior is significantly reduced when commonly comorbid conditions that are associated with violent behavior are controlled for, it appears that ASD's unique risk genes exert little-to-no influence on violent behavior. Finally, identifying violence-related risk genes from among the shared genetic liabilities has great potential for improving our understanding of violent behavior in psychiatric disorders transdiagnostically.

5. How does comorbidity increase risk for violence in ASD?

5.1. Comorbid psychopathology

There are high rates of psychiatric comorbidity in children and adults with ASD (Bradley, Summers, Wood, & Bryson, 2004; Joshi et al., 2010; Joshi et al., 2013; Leyfer et al., 2006; Matson & Goldin, 2013; Simonoff et al., 2008). In children, Simonoff et al. (2008) found that 70% of those with ASD had at least one comorbid diagnosis and 41% had two or more comorbid diagnoses, and Joshi et al. (2010) found that 95% of their ASD sample had three or more co-morbid diagnoses and 74% had five or more comorbid conditions. In adults, Joshi et al. (2013) found that the average number of diagnoses for a person with ASD was three and Bradley et al. (2004) found that the rate of psychiatric comorbidity for adults with ASD was four times that of those without ASD. Therefore, it seems the rule rather than the exception that people with ASD will have some form of comorbid psychopathology.

Of the psychiatric comorbidities, as concerns violent behavior, schizophrenia and psychotic symptoms appear to be the most problematic. At the phenotypic level, evidence from ASD follow-forward, schizophrenia follow-backward, and comorbidity studies suggest a relationship exists between the two disorders. The ASD follow-forward studies revealed that 12%–50% of children and adolescents with an ASD develop a diagnosable psychotic condition (Sverd, 2003; Tantam, 1988; Wing, 1981; Szatmari, Bartolucci, & Bremner, 1989; Konstantareas & Hewitt, 2001; Mouridsen, Rich, & Isager, 2008), an ASD diagnosis increases the odds of psychotic experiences almost 3-fold, and both severity and number of ASD symptoms are associated with risk for psychotic symptoms (Jones, Thapar, Lewis, & Zammit, 2012; Sullivan, Rai, Golding, Zammit, & Steer, 2013). Schizophrenia follow-backward studies reveal that 30%–50% of adults and children diagnosed with a schizophrenia-spectrum condition fulfilled the criteria for a childhood ASD (Dvir & Frazier, 2011; Hallerbäck, Lugnegård, & Gillberg, 2012; Kolvin, Ounsted, Humphrey, & McNay, 1971; Kyriakopoulos et al., 2014) and this was particularly the case for those diagnosed with paranoid schizophrenia (Hallerbäck et al., 2012).

To be sure, the symptoms present in the prodromal phase and even later phases of schizophrenia overlap significantly with those of the ASD. Patients with ASD and prodromal schizophrenia exhibit social impairments and withdrawal, difficulties with interpersonal relationships, communication problems and restricted speech, impulsivity and aggressive behavior, odd or repetitive behavior, lack of emotion or emotional expression, disorganized thought and speech and cognitive impairments (e.g. theory of mind deficits) (Cheung et al., 2010; Fett, Viechtbauer, Penn, van Os, & Krabbendam, 2011; Mehl et al., 2010; Sugranyes, Kyriakopoulos, Corrigan, Taylor, & Frangou, 2011; Taskiran & Coffey, 2013). Yet, the similarities between these conditions are not restricted to phenomenology. Rather, they extend to the neurobiological and genetic levels. Neurobiologically, researchers have identified overlapping regions of grey matter deficits in ASD and schizophrenia (Cheung et al., 2010; Toal et al., 2009). Based on these findings, it was

proposed that ASD may be an alternative ‘entry-point’ into schizophrenia based on developmental brain abnormalities, and that individuals with ASD may only need additional abnormalities to develop the positive symptoms of psychosis (Toal et al., 2009). At the genetic level, family studies demonstrate an increased risk of ASD in the children of parents with schizophrenia (Cheung et al., 2010; Daniels et al., 2008; Ghaziuddin, 2005; Larsson et al., 2005; Rapoport, Chavez, Greenstein, Addington, & Gogtay, 2009) and evidence suggests that specific genetic alterations or deletions (e.g., chromosome 22q11; NRXN1) increase the likelihood of the development of both ASD and schizophrenia (Kim et al., 2008; Kirov et al., 2008; Marshall et al., 2008; Rapoport et al., 2009; Vortsmann et al., 2006; Weiss et al., 2008). Considered together, these data suggest that ASD may be a vulnerability factor for the development of psychosis and schizophrenia, and this has implications for violent behavior. With all of this said, it is important to note that psychosis needs to be considered in concert with other risk factors known to influence violent behavior in the general population and psychiatric samples, and that among people with psychotic disorders, there are many static and dynamic risk factors that influence the commission of violent behavior (e.g., psychopathy, substance abuse) (for review, see Silverstein et al., 2015).

5.2. Psychosis, ASD, and violence

Research suggests that violence is increased when people have psychotic symptoms or disorders (e.g., a psychiatric condition characterized by symptoms such as hallucinations and delusions, such as schizophrenia, schizoaffective disorder, or delusional disorder) – even though, most people with a psychotic disorder are not violent, and psychosis accounts for a very small proportion of overall violence in society (Goldberg, Serper, Beech, Dill, & Duffy, 2007; Silverstein et al., 2015). Given, the relatively low base rate for violence in ASD, the dramatic increase in risk for violence associated with psychosis, and the high comorbidity rate between ASD and schizophrenia and psychosis more broadly, one intriguing possibility is that undiagnosed or emerging psychosis is responsible for the tragic acts of violence committed by adolescents and adults with ASD. The data supporting such a conjecture, while not voluminous, are quite compelling. For example, Långström et al. (2009) examined all individuals hospitalized with ASD in Sweden from 1998 to 2000 and found 31 individuals (7%) were convicted of violent crimes. Among those, 25.8% also had schizophrenia or psychosis. By contrast, among ASD individuals with no violence-related convictions, only 9.2% had schizophrenia or psychosis, making the incidence rate of schizophrenia in the violent ASD patients almost three times as high (Långström et al., 2009; Wachtel & Shorter, 2013). Furthermore, in a small study of aggressive behavior and violence by Allen et al. (2008), various psychiatric comorbidities were found within the sample of offenders with ASD, with the most common being schizophrenia (25%). In sum, the studies reviewed in this section suggest that violent offending in ASD is related to the same psychiatric features and diagnoses that have consistently been found to be related to violent behavior in people without ASD diagnoses (Abushua'leh & Abu-Akel, 2006; Fazel, Gulati, Linsell, Geddes, & Grann, 2009; Fazel, Långström, Hjern, Grann, & Lichtenstein, 2009; Hodgins, 2008; Hodgins et al., 2007; Hodgins & Riaz, 2011; Newman & Ghaziuddin, 2008; Palermo, 2004; Swanson et al., 2008; Swanson, Holzer, Ganju, & Jano, 1990; Volavka & Citrome, 2011).

Compounding the problem is the duration of untreated psychosis (DUP) in young individuals with ASD. Given phenotypic similarities between schizophrenia spectrum conditions and ASDs, the signs of emerging psychosis are often difficult to detect (Cheung et al., 2010; Fett et al., 2011; Mehl et al., 2010; Sugranyes et al., 2011; Taskiran & Coffey, 2013). Yet, when it comes to violent behavior, their detection is critical. Pointedly, in people without ASD, risk for violence is particularly high prior to treatment for a first episode of psychosis (Foley et al., 2007; Latalova, 2014; Verma, Poon, Subramaniam, & Chong, 2005)

with approximately one-third of this population committing an act of at least minor violence (Nielssen, Malhi, McGorry, & Large, 2012). While we are unaware of research focused on violent behavior in people diagnosed with ASD who have untreated psychosis, it stands to reason that their risk for violent behavior would also be heightened. As such, careful monitoring for psychotic symptom development in people with ASD, will allow for the early detection of emerging psychosis and through appropriate treatment, potentially reduce the risk of violent behavior (Swanson et al., 2008; Torrey, 2011).

5.3. The reality of ASD and violence

Media reporting of violence committed by individuals with ASD has served to generate a concern about serious violent behavior in people with ASD (e.g. Allen et al., 2008; Baron-Cohen, 1988; Mawson et al., 1985) and an unjustified stigma of this group of individuals. In contrast to this, our review of the literature suggests that ASD itself is not an inherently violent disorder and that individuals with ASD alone are no more prone to violence than the people from the general population. Yet, some researchers propose that certain features of ASD (e.g. social impairment, restricted range of activities and interests or obsessions, reduced frustration or distress tolerance, impaired theory of mind) may be predisposing factors for violent behavior, as well as responsible for a vulnerability towards developing dysfunctional and restricted coping strategies that may serve as risk factors for violence. Additionally, environmental factors such as social rejection, bullying, and seeking revenge, and cognitive and emotion regulation deficits may also play an influential role and precipitate offending in individuals with ASD.

Of equal importance, the literature suggests that the comorbidity of a psychotic disorder or the presence of psychotic symptoms and ADHD dramatically increase the risk for violent behavior in people with ASD. While it is critical to understand the differences between autism and these disorders, it is also vital to understand how these diagnoses can overlap and create a combination that increases the risk for violence. For example, in some cases, early symptoms of schizophrenia like social withdrawal, communication problems, odd, repetitive behaviors, and an apparent lack of emotion or emotional expression, may be mistaken for signs of an ASD (Jones et al., 2012). As a result, in many of these cases, psychotic symptoms may go undiagnosed and untreated because they are assumed to be a part of ASD. Therefore, when an individual with ASD exhibits, or is thought to be at risk for, violent behavior, it is important to evaluate for other psychiatric symptoms because these can independently influence the risk of offending in this group, as they do in the general population (Newman & Ghaziuddin, 2008).

5.4. Antisocial traits and psychopathy

Owing to phenotypic similarities between the antisocial or psychopathic traits and ASD (e.g., empathy deficits, lack of remorse, an inability to recognize the mental states of others), some researchers have speculated that there may be an overlap between ASD and psychopathy, and that this intersection is responsible for the criminal offenses of people with ASD (Fitzgerald, 2001; Fitzgerald, 2003; Fitzgerald, 2013; Freckelton, 2013). Yet, when the overlapping symptoms are carefully considered it becomes clear that their nature in each condition is quite different. For example, both disorders involve a lack of empathy. However, in autism, it is a lack of “cognitive empathy” (i.e., difficulty understanding other’s emotions, mental states, and nonverbal signs), while in psychopathy, it is a lack of “emotional empathy” or “affective empathy” [i.e., lack of concern about hurting others and inability to be affected by the emotional states of others (Blair, 2005)]. Further, when considered as individual difference factors within individuals with ASD, Rogers, Viding, Blair, Frith, and Happe (2006) found that psychopathic traits were not related to the severity of ASD symptoms or core autistic cognitive deficits (e.g., mentalizing or executive function; Wachtel & Shorter, 2013). Finally, as

noted above, Heeramun et al. (2017) found that, when present, ADHD and conduct disorder significantly increase the risk of violent behavior in children with ASD. Integrating these results, it appears that the two conditions are not fundamentally related, however, when comorbidity is thought to exist, one should be decidedly exacting in their assessment.

6. Conclusions

Studies to date of violence and ASD have been limited in terms of both methodology and the nature of the samples investigated. Future researchers should focus on carrying out research in large-scale population/community-based samples and employ research designs that take into account violence-related third variable confounds such as home environment, cognitive deficits, and comorbid psychopathology. Furthermore, when discussing violence in people with ASD, researchers should make explicit comparisons with other psychiatric diagnoses and the general population, and between offenders and non-offenders with ASD. Data on these issues will allow for better understanding of the unique violence risk that people with ASD pose as compared to others with psychiatric conditions, and for the identification of risk factors for violence for people on the ASD spectrum. The results from the majority of studies suggesting a link between ASD and violence are not generalizable to all individuals with ASD in the community because of the highly specialized settings from which data on almost all of these samples were collected. The reader should bear in mind the unique characteristics of the sample of patients with ASD who are hospitalized on an inpatient unit, as most patients with ASD can be maintained in the community or an alternative system of care over their lifetime without ever requiring inpatient psychiatric treatment. Additionally, it is important to note that there may be an overrepresentation of individuals with ASD in specialized forensic settings, which not only elevates the prevalence rate of violence and offending in ASD, but it also makes it difficult to draw conclusions regarding those with ASD in the community. Finally, based on all available research and evidence, we conclude that the association between ASD and violence is not due to the diagnosis or symptoms of ASD per se, but rather to co-occurring psychopathology, especially psychotic symptoms or disorders. In particular, the presence of untreated psychosis is a significant risk factor for violence in people with ASD, as it is in the general population. A greater understanding of ASD-related violence risk is needed to combat misconceptions about people with ASD and the stigma associated with these conditions.

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