
A Neuropsychiatric Developmental Model of Serial Homicidal Behavior

J. Arturo Silva, M.D.,* Gregory B. Leong,
M.D.,† and Michelle M. Ferrari, M.D.‡

Serial sexual homicide has been the object of intensive study from forensic psychiatric, criminological, developmental, and sociological perspectives. In contradistinction to these approaches, neuropsychiatric concepts and methods have received relatively little attention in this area. In this article we adopt a neuropsychiatric developmental perspective and undertake a review of the psychiatric literature on violence and autism spectrum disorders. Our analysis of this literature suggests the presence of an association between autism spectrum psychopathology and serial homicidal behavior. Recommendations for further research to help clarify the nature of this association are briefly discussed. Copyright © 2004 John Wiley & Sons, Ltd.

During the last three decades substantial progress has been made in the study of serial homicide. This work has helped identify, classify and track these killers (Ferreira, 2000; Giannangelo, 1996; Godwin, 2000; Hickey, 1997; Holmes & Holmes, 1998; James, 1991; Keppel & Walter, 1999; Ressler, Burgess, & Douglas, 1988; SanMartin, 2001; Stone, 1994). In spite of these advances, little is known about the neuropsychiatric origins of sexual serial killing behavior (Bukhanovskaya, 2001; Bukanovsky, 2003; Hickey, 1997; Miller, 2000; SanMartin, 2001; Stone, 1994), and a clearly articulated neuropsychiatrically informed hypothesis about these homicides has yet to emerge.

The dearth of neuropsychiatric information on sexual serial homicide may be partially explained by the inability to identify potentially relevant biological markers. However, during the last decade, the autism spectrum disorders (ASDs) have begun

*Correspondence to: J. Arturo Silva, M.D., P.O. Box 20928, San Jose, CA 95160, U.S.A.

E-mail: silvapsychcorp@earthlink.net

The views of this article are those of the authors and do not necessarily represent those of the University of Washington, Washington State Department of Social and Health Services, Kaiser Permanente Medical Group or Stanford University.

†Department of Psychiatry, University of Washington and Center for Forensic Services, Western State Hospital, Tacoma, WA, U.S.A.

‡Division of Child and Adolescent Psychiatry, Kaiser Permanente Medical Group, Santa Clara, CA, and Department of Psychiatry and Behavioral Sciences, Stanford University, Stanford, CA, U.S.A.

to emerge as a potential neuropsychiatric paradigm to explain the origins of some forms of violent behavior including sexual violence. Aggressive behaviors among children and adolescents with higher functioning autism are not rare (Tantam, 2003). The psychiatric literature also contains various case reports and small case series involving adults and adolescents with pervasive developmental disorders who engaged in criminal behaviors closely linked to their autistic psychopathology (Baron-Cohen, 1988; Cooper, Mohamed, & Collacott, 1993; Hall & Bernal, 1995; Kohn, Fahum, Ratzoni, & Apter 1998; Mawson, Grounds, & Tantam, 1985; Murrie, Warren, Kristiansson, & Dietz, 2002; Silva, Ferrari, & Leong, 2002a, 2002b; Silva, Leong, & Ferrari, 2003; Silva, Wu, & Leong, 2003).

Although the paucity of published cases of ASD associated with violence suggests that autism may not be a predisposing risk for violence, two studies suggest otherwise. Scragg and Shah (1994) studied a sample of forensic patients housed in a secure hospital and reported the prevalence rate of Asperger's disorder to be between 1.5 and 2.3 percent, a figure much higher than the 0.4 percent assumed for the general population. Siponmaa, Kristiansson, Jonson, Nyden, and Gillberg (2001) studied 126 individuals aged 15–22 years who had been originally evaluated in connection with serious, mostly violent, criminal offenses. The initial diagnostic evaluation identified only two individuals who qualified for a pervasive developmental disorder (PDD) diagnosis during childhood. However, further evaluation, including a systematic assessment for neuropsychiatric developmental disorders, found 15 percent with pervasive developmental disorders (12 percent with pervasive developmental disorder not otherwise specified, PDD-NOS, and 3 percent with Asperger's disorder), which represents at least a 15-fold increase compared with the incidence in the general population. Sixty-three percent of those diagnosed with a PDD had committed arson. The three percent frequency of Asperger's disorder in the study by Siponmaa *et al.* was similar to that reported by Scragg and Shah (1994). These two studies suggest that pervasive developmental psychopathology is a risk factor for criminal behavior and that forensic psychiatric evaluators may be missing most offenders who suffer from ASDs.

Recent preliminary investigations also suggest a close connection between violent behavior and autism spectrum psychopathology in a subset of serial killers (Silva *et al.*, 2002a, 2002b; Silva, Ferrari, & Leong, 2003), raising the possibility that some behavioral characteristics associated with autism may be implicated in the development of some serial killers. Furthermore, the high heritability of ASDs (Santangelo & Folstein, 1999) and robust neuropsychiatric nature of ASD (Povinelli & Preuss, 1995; Schultz, Romanski, & Tsatsanis, 2000) suggest the possibility that autistic psychopathology may represent a complex set of biological markers of value in the study of sexual serial homicide.

In this article, we explore the potential link between autism spectrum psychopathology and serial homicide from the perspective of a neuropsychiatric developmental model (NDM) that takes into account five causative components of serial homicidal behavior, a neuropsychiatric developmental component, psychopathy, aggressive behavior, sexual psychopathology, and an environmental component with special emphasis on stress. Because we conceptualize autism as a neuropsychiatric probe of potential value in the investigation of sexual serial killing behavior (Silva *et al.*, 2002a, 2002b, 2003a, 2003b, 2003c) we term the proposed approach as neuropsychiatric rather than psychiatric in its perspective.

Autism Spectrum Psychopathology

Autism involves a triad of problems, namely (1) socialization deficits, (2) deficits in communication, and (3) impairments in imagination with repetitive and/or stereotyped behaviors. Autism spectrum disorders (ASDs) appear in DSM-IV-TR under the term pervasive developmental disorders (PDDs) (APA, 2000; Volkmar & Klin, 2000). In this article, we use the term ASDs to denote those PDDs that fall within the spectrum of autistic psychopathologies. Therefore, the term PDD is used equivalently and interchangeably with the term ASD.

Given the highly disabling nature of DSM-IV-TR autistic disorder, this disorder is not likely to account for many crimes that require a substantial degree of social organization and communicative abilities (Siponmaa et al., 2001). This consideration applies especially to serial killers because they must have sufficient cognitive, social, and communicative abilities to enable them to kill on repeated occasions without being identified and arrested. Therefore, we propose that Asperger's disorder (and related forms of autism such as pervasive developmental disorder not otherwise specified), a less disabling form of autism than autistic disorder, is more likely to be implicated in some cases of sexual serial killing behavior (see Table 1). Moreover, unlike autistic disorder, Asperger's disorder is associated at least with normal cognitive development (APA, 2000; Volkmar & Klin, 2000).

Table 1. DSM-IV-TR diagnostic criteria for Asperger's disorder*

-
- A. Qualitative Impairment in social Interaction, as manifested by at least two of the following:
- (1) marked impairment in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction
 - (2) failure to develop peer relationships appropriate to developmental level
 - (3) a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (e.g. by a lack of showing, bringing, or pointing out objects of interest to other people)
 - (4) lack of social or emotional reciprocity
- B. Restricted repetitive and stereotyped patterns of behavior, interests, and activities, as manifested by at least one of the following:
- (1) encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus
 - (2) apparently inflexible adherence to specific, nonfunctional routines or rituals
 - (3) stereotyped and repetitive motor mannerisms (e.g., hand or finger flapping or twisting, or complex whole-body movement)
 - (4) persistent preoccupation with parts of objects
- C. The disturbance causes clinically significant impairment in social, occupational, or other important areas of functioning
- D. There is no clinically significant general delay in language (e.g. single words used by age 2 years, communicative phrases used by age 3 years)
- E. There is no clinically significant delay in cognitive development or in the development of age-appropriate self-help skills, adaptive behavior (other than in social interaction), and curiosity about the environment in childhood
- F. Criteria are not met for another specific Pervasive Developmental Disorder or Schizophrenia
-

*Reprinted with permission from the *Diagnostic and Statistical Manual of Mental Disorders*, Text Revision, Copyright 2000, American Psychiatric Association.

The Relation between Autism Spectrum and Schizoid Personality Disorder Psychopathology

The most extensive research in schizoid personality disorder documents a substantial overlap between this personality disorder and Asperger's disorder (Wolff, 1995). DSM-IV and DSM-IV-TR acknowledge this close association in that the presence of a pervasive developmental disorder precludes a diagnosis of schizoid personality disorder (APA, 2000). Historically, the Asperger's disorder/schizoid personality disorder spectrum of psychopathology has often been studied from the perspective of personality psychopathology, mainly schizoid personality disorder. This trend is reflected in previous research findings that suggest an association between schizoid personality disorder psychopathology and sexual serial homicide (Stone, 1994) and sexual homicide (Myers, 2000).

Paraphilic Psychopathology

Individuals who suffer from ASDs tend to suffer from paraphilic psychopathologies of a fetishistic nature (Haracopos & Pedersen, 1992). Partialism, necrophilia, and of course fetishism all share strong fetishistic components. These paraphilias are characterized as involving a strong tendency to experience the object of erotic interest into physical hyper-representations of the body either by focusing on body parts (i.e. partialism) or physical symbolic extensions of the body proper (i.e., Fetishism), or exclusive focus on the physical make-up of the body (i.e., necrophilia). These paraphilias may also be conceptualized as deconstructive in nature with characteristics that may be either implicit and/or explicit because (1) deconstructions or separations of the eroticized person into physical (bodily) characteristics and psychological make-up occur and (2) they involve relating to an eroticized person either by radical manipulation and ordering of physical bodily characteristics and/or by systematically constraining the intentionality and autonomy of the eroticized person. The more adaptive paraphilic end of this spectrum is represented by voyeurism, characterized by sexual alienations that do not involve any direct physical contact with the eroticized object. At the other end of this spectrum is necrophilia, characterized by objective separation of the physical from the psychological make-up of the eroticized person. Furthermore, that separation, whether objective or imagined, is impregnated with a potential for further deconstructions of the human body, such as when a cadaver is dismembered for sexual purposes. The literature on sexual serial killers documents a high prevalence of deconstructive paraphilias (James, 1991; Hickey, 1997; Ressler *et al.*, 1988). We hypothesize that among autistic serial sexual killers this deconstructive paraphilic pattern is a partial, but intrinsic, outcome of the tendency of autistic persons to focus on physical objects and their component parts with a relative neglect for their mental qualities.

Autistic experience can also be compared to a framework of normal psychological experience, which involves three basic dimensions: (1) a psychological dimension associated with strategies for mastery (or control) of the social and non-social environment, (2) a psychological dimension involving the ability to assess the

physical qualities of objects, whether living or nonliving, and (3) a psychological dimension encompassing abilities necessary for assessing and appreciating the mental life of the self and of others (Baron-Cohen, 2003). In autistic serial killers the first two dimensions may predominate, while the ability to appreciate the mental life of others appears compromised, leading to the dehumanization of others. This process is likely to be an expression of the characteristic pattern of intersubjectivity in autism in which “people with [Asperger’s syndrome] do not make the sharp distinction between people and things that is normally expected. Objects may have animistic power, and people may be measured like objects” (Tantam, 2000, p. 383). Therefore, the sexual deconstructive processes of autistic serial killers focus on the physical characteristics of their sexual objects while ignoring or obliterating their mental life, a process that appears to gravitate toward the non-animistic. Furthermore, autistic serial sexual homicide appears to be linked to another fundamental characteristic of autism, namely, the tendency to organize, master, and control the proximal environment via physical strategies (APA, 2000; Baron-Cohen, 2003).

Psychopathy

The psychopathic behaviors associated with sexual serial killing behavior are thought by many investigators in this area to be a key causative element in their homicides. Therefore, a core portion of this psychopathic component may work in synergy with the autistic infrastructure of autistic serial killers, thereby facilitating the development of these serial killers. However, since many serial killers may not suffer from autistic psychopathology, other factors (e.g. paraphilic psychopathology, dyscontrol of aggression, and/or significant psychosocial stressors) may be operating in tandem with psychopathic tendencies, leading to serial homicide.

Early Life Cycle Stressors

Many experts of sexual serial killing behavior have proposed that the origins of sexual serial killers are partially due to several types of abuse, unstable family environments, poor parenting, and other stressors associated with the childhood and adolescence of these killers (Giannangelo; 1996; Hickey, 1997; Ressler et al., 1988). Although these factors appear to have an important role in the development of these serial killers, it is possible that their importance may have been overstated. This view is supported by the lives of some serial killers who present with little evidence of having been abused during their early development (Masters, 1993a, 1993b; Mladinich, 2001). However, psychological neglect may predispose future serial killers with ASD to develop significantly closed psychological infrastructures where maladaptive fantasies and activities are allowed to thrive unimpeded by the relative absence of parental social input. It is also possible that psychological vulnerabilities secondary to the autistic psychopathologies of this group may have predisposed them to adopt patterns and pathways of maladaptive and inappropriate thoughts and behaviors that place them at high risk for killing.

Cognitive Psychological Apects of Proposed Model

ASDs have been extensively studied from two important paradigms. They are known as the theory of mind (Baron-Cohen, Leslie, & Frith, 1985; Baron-Cohen, 1995; Bowler, 1992) and central coherence (Frith, 1989). Both paradigms attempt to explain the autistic experience as a breakdown of the sense of unified psychological experience that characterizes the life of the normal person.

Compartmentalization of Living Experiences and Diminished Central Coherence

Coping strategies involving psychological compartmentalization are not uncommon in ASDs (Doughton, 2003; Sacks, 1995) and are known to be associated with closely related disorders such as in schizoid personality disorder. Deconstructive paraphilias can also be viewed as sexual behaviors related to a compartmentalization of living experiences. In the literature on serial killers the concept of compartmentalization refers to the marked tendency of many serial killers to divide their lives in ways that would be difficult to understand or incomprehensible to most people. This phenomenon is exemplified by married serial killers such as “Green River Killer” Gary Ridgeway, who managed to have a stable career, support his family, and interact with his wives, his son, and his original family on a regular basis without causing undue suspicion regarding his homicidal activities (Doughton, 2003). Psychological compartmentalization may also be at the root of some proposals that view serial killing as partial products of dissociative psychopathologies (Carlisle, 1998; Giannangelo, 1996).

From a neuropsychiatric perspective, a primary cause for the compartmentalization in autistic serial killers involves the same type of compartmentalization and field independence as is intrinsic to the autistic process (Baron-Cohen, 2003). Psychologist Uta Frith proposed a neuropsychiatrically inspired explanation for the compartmentalization behaviors in autism. She believes that the multiplicity of diverse human experiences are integrated by a processing mechanism that makes it possible for normal everyday life to be experienced as a unified whole, and called it “central coherence”. She hypothesized that autistic children exhibit “weak central coherence,” which is characterized by a detail oriented, piecemeal approach to information processing (Frith, 1989), and that a lack of central coherence may be at the root of the compartmentalization pathologies fundamental to autism (Frith, 1989). From this perspective, autistic serial killers compartmentalize their life experiences via sexual partition strategies involving partialism and fetishism, but also by basic strategies of relating to others by separating their homicidal behavior from the other important aspects of their lives. However, the compartmentalization strategies of sexual serial killers are likely to involve psychopathologies other than the autistic process (Carlisle, 1998; Giannangelo, 1996; Hickey, 1997).

Theory of Mind Dysfunction

The study of social cognition has made substantial progress with the introduction of the “theory of mind” (ToM) paradigm, which postulates that human beings

and possibly other members of the ape family evolved nervous systems that facilitated the realistic assessment of mental states of other humans and of other species, thereby increasing their potential for survival (Baron-Cohen et al., 1985; Premack & Woodruff, 1978). ToM abilities appear in humans early during their life cycle, approximately at age four (Wellman, 1993). As with most cerebrally determined behavioral capacities, ToM abilities may fail to reach optimal development in some individuals. When ToM abilities are seriously compromised, the resulting deficits have been termed "mindblindness" (Baron-Cohen, 1995). Autism is the prototypic psychopathology associated with serious ToM deficits (Baron-Cohen, 1995; Baron-Cohen, Leslie, & Frith, 1985). ToM abnormalities can be systematically studied with the aid of psychometric instruments developed to assess ToM abilities (Baron-Cohen, 2003; Bowler, 1992). However, a substantial proportion of children who suffer from milder variants of autism including Asperger's disorder and PDD-NOS suffer from less compromise in ToM abilities and can perform adequately on many of these tasks (Bowler, 1992; Sicotte & Stemmerger, 1999). Furthermore, given that higher functioning autistic individuals can make substantial progress with regard to psychological adaptiveness including mentalization, as they mature into adulthood, ToM tests are even less likely to differentiate adults with higher functioning autistic disorders from normal adults (Roeyers, Buysse, Ponnet, & Pichal, 2001). Nonetheless, with regard to high functioning ASDs, mental health professionals who treat affected individuals, relatives of affected persons, and some affected individuals report ongoing difficulties with social reciprocity associated with difficulties in recognizing the feelings and thoughts of others. These abnormalities include deficits with appreciating the significance that the mental states of others hold to those people, a problem that is consistent with ToM deficits. More recently, newly developed ToM tests that are based on parameters involving social cognition or on more ecologically valid constructs are beginning to uncover ToM deficits in adults with high functioning autistic disorders (Baron-Cohen, 2003; Roeyers et al., 2001; Rutherford, Baron-Cohen, & Wheelwright, 2002). The ToM paradigm is especially relevant to autistic serial killers because it may provide a cognitive psychological and neuropsychiatrically based framework for their well known difficulties in relating to others. For example, an important consequence of having deficits in ToM may be associated with compromises in empathy. In autistic individuals the ability to appreciate the lives of others, to identify with them and to display an appropriate degree of compassion, can be seriously compromised. In this regard, people with ASDs and antisocial personality disorder appear to share a common abnormality, mainly lack of empathy. People with ASDs exhibit difficulties in empathy that appear to be linked to deficits in their abilities to estimate the mental life of other people. In contrast, individuals with antisocial personality disorder appear to have a more intact appreciation of the mental life of others, and yet they still have serious difficulties with empathy (Tantam, 2000). Therefore, the cognitive psychological and neurobiological bases underlying deficits in empathy in these two psychopathologies are likely to be different. Among autistic serial killers, an alternative explanation may be that both neural substrates associated with autistic psychopathology and core psychopathy contribute independently to deficits in empathy. However, currently, the nature of ToM deficits in autistic serial killers is largely unknown.

The Relation between Autistic Psychopathology and Fantasy Development

The pursuit of sameness is highly characteristic of autistic psychopathology. Among autistic persons, it is closely associated with a tendency to gravitate toward physical and psychological isolation, a process that results in the development of maladaptive psychological infrastructures in which the individual excessively relies on internally generated mental events rather than feedback from the social world.

In autistic serial killers such a maladaptive psychological infrastructure may facilitate the emergence of mental phenomena involving an integrated set of symbols resulting in a unified theme or story that may be a prelude or substitute for action, that is, fantasy formation. Some investigators have proposed that long-standing sexual fantasies constitute a necessary component in the development of many sexual serial killers (Prentky *et al.*, 1989; Schlesinger, 2004; Miller, 2000; Myers, Burgess, & Nelson, 1998; Ressler *et al.*, 1988). However, the specific clinical factors underlying fantasy development that may lead to serial killing have not been sufficiently studied in a systematic manner. It is important to keep in mind that most sexual fantasies are unlikely to lead to sexual crimes. Not only do we not know what proportion of violent sexual fantasies lead to sexual serial murder, but a detailed understanding of the psychological architecture of sexual fantasy formation has yet to emerge. The current proposal suggests that autistic psychopathology may be an important factor in promoting dangerous sexual fantasies in autistic serial killers. The autistic psychopathologies that may be especially implicated in this process is the tendency of ASD individuals to gravitate toward social isolation (APA, 2000; Bowler & Worley, 1994), their predisposition to engage in repetitive processes including repetitive processes involving mental constructs, and their tendency to engage in rigid thinking and behaviors (APA, 2000; Bowler & Worley, 1994; McDougle, 1998). However, the likelihood that many serial killers who do not suffer from autism spectrum psychopathology also experience sexual fantasies associated with sexual violence suggests that other as yet unidentified factors are important in the genesis of these sexual fantasies.

Evolutionary Aspects

With regard to phylogenetic factors, ToM abilities are thought to constitute key strategies necessary for human survival, by allowing for a more efficient differentiation of potential friends from foes and in assessing the adaptiveness of potential sexual mates. Second, the vast majority of sexual serial killers are males (Hickey, 1997). Third, about 80 to 90 percent of people with ASDs are males (APA, 2000; Baron-Cohen, 2003). Fourth, given the strong male preponderance in both sexual serial killers, and ASDs, it follows that causal links may exist between ASDs and serial killing behavior in the development of autistic sexual serial killers. If these links exist, then the homicidal behaviors of autistic serial killers may also be intrinsically related to phylogenetically based strategies compromised by autism (Povinelli & Preuss, 1995), and that in all likelihood also interact with other factors associated with the genesis of sexual serial homicidal behavior. Therefore, the study of some

male sex-linked behaviors as occur in sexual serial killers with ASDs could provide clues regarding the etiology of sexual serial homicide and autism.

The preponderance of males in sexual serial killers may also reflect modular brain abnormalities that give rise to various psychological deficits. Some scientists have proposed that humans can negotiate adaptive exploration with their environments by relying on cerebral domains or modules and that these may have evolved differentially in males and females, resulting in significant differences in their strategies for dealing with psychosocial contexts (folk psychological adaptations) versus the physical environment (folk physics adaptations) (Baron-Cohen, 2003).

In support of the aforementioned hypothesis, several studies suggest that mechanistic, repetitive and obsessional-like interests involving inanimate objects are significantly more common among those afflicted with autism spectrum psychopathology than in non-autistic subjects (APA, 2000; Baron-Cohen, 2003). Baron-Cohen postulates that these abilities are precisely the type of ability that appears more likely to be encountered in males than in females. Conversely, compared with autistic persons, non-autistic subjects present with a greater preponderance of interests in abilities to appreciate objects endowed with mental characteristics. Moreover, these folk psychological abilities tend to be better developed in non-autistic females than non-autistic males (APA, 2000; Baron-Cohen, 2003). If this hypothesis is correct, then the homicidal activities of autistic sexual serial killers may be partly due to the adoption of interpersonal strategies that rely excessively on folk physics abilities when dealing with others, in effect viewing them more as physical objects than as living beings endowed with intentional abilities of their own (Baron-Cohen, 2003). A fundamental aspect of Asperger's disorder and similar psychopathologies is a pursuit of sameness, a process which is evident in their excessive repetitive behaviors and a need to control or master the environment. This process appears to be facilitated if a person focuses on objects devoid of intentionality (i.e. inanimate and nonliving objects). Not surprisingly, autistic people tend to gravitate toward activities that involve the mastery of folk physics rather than folk psychological concepts. Therefore, autistic serial killers may find it more comfortable to control not only their physical but also their social environment via the application of coercive mastery or power seeking behaviors in their interactions with their victims. Given that control of the sexual behaviors of others is a basic component of sexual sadism (Hazelwood, Dietz, & Warren, 2001), the proposed paradigm may help explain some of the coercive aspects of sexual sadism and coercive sexuality such as rape behavior.

Biological Basis of Autism Spectrum Disorders

A detailed picture of the biological basis of autism is beginning to emerge, and our state of knowledge in this area indicates that these disorders have strong genetic and neurobiological bases (Povonelli & Preuss, 1995; Santangelo & Folstein, 1999; Schultz et al., 2000). Several genetic studies indicate that the heritability or proportion of variance in phenotypic expression that can be accounted for by genetic rather than environmental factors is among the highest in major psychiatric

disorders (Santangelo & Folstein, 1999). Furthermore, many studies document biological abnormalities in ASDs including abnormal central nervous system histopathology and neuropsychological deficits (Liss *et al.*, 2001). Functional neuroanatomical studies also indicate that certain specific brain regions may be also affected (Schultz *et al.*, 2000; Grady & Keightley, 2002). Grady and Keightley (2002) describe that a complex emotional/social brain network has been severely compromised in autism.

Given the robust neuropsychiatric bases for autism, the current proposal has the potential to provide a necessary but frequently lacking component in studies of serial killers, namely a conceptual psychobiological framework with a potential for complementing and integrating the already existing psychosocial information base on these killers.

Difficulties Associated with Identifying Autistic Psychopathology in Sexual Serial Killers

Several reasons may help explain the previous failure to link ASDs to serial homicidal behavior. One reason is the longstanding and current tradition in psychiatry of focusing on childhood autism in both clinical and research work, thereby resulting in a vacuum of clinical and research information on adults with Asperger's disorder and PDD-NOS (Tantam, 2000, 2003). Another reason why we may know relatively little about higher functioning autistic adults, especially those with milder forms of ASDs, may be that a tendency toward isolation and limited insight into their psychopathology make them less likely to come to the attention of the mental health care system.

The present hypothesis proposes that autistic serial killers are likely to fall in the more adaptive end of the ASDs, and therefore their subtle presentations are less likely to be recognized (Ratey & Johnson, 1997). The limited fund of knowledge on sexual behavior and autism in general has also hampered the ability to consider sexual behaviors associated with autism in relation to other important areas of study such as exploration of potential links between sexual violence and autism spectrum psychopathology (Gillberg & Schaumann, 1981; Haracopos & Pedersen, 1992; Van Bourgondien, Reichle, & Palmer, 1997).

Finally, the classification of serial killers has traditionally focused on personality psychopathology paradigms as a way to explain serial homicide. This is true of schizoid personality disorder (Stone, 1994). However, as previously mentioned, research on schizoid personality disorder and Asperger's disorder is more consistent with one (autism spectrum psychopathology) rather than two types of psychopathology (*i.e.*, ASDs and schizoid personality disorder) in many cases (Wolff, 1995). Likewise, the antisocial behaviors of serial killers have been previously explored from the perspective of psychopathy or closely related constructs (Ferreira, 2000; Giannangelo, 1996). Therefore, psychological phenomena of central importance to understanding serial killers such as deficits in empathy have frequently been explained as originating from a psychopathic core, thereby missing the possibility that deficits in empathy may also be due to autistic psychopathology (Frith, 1989; Tantam, 2000; Wolff, 1995).

The Neuropsychiatric Developmental approach and its Potential Relevance for the Future Study of Serial Homicides

Currently, the value of the proposed approach lies at the heuristic level. Of necessity, the results of the present review are inferential and indirect in nature, and more direct approaches will be necessary to arrive at more definitive conclusions. Since autistic serial killers are most likely to be higher functioning autistic adults, improvements in the diagnostic and psychological characterization of adults with higher functioning ASD may facilitate their study. Moreover, potential relations between closely related nosologies, especially schizoid personality disorder and ASDs, is in need of study in serial killers. Also, the application and development of instruments that directly measure ToM abilities of serial killers in the context of social and physical settings where they tend to operate is needed. Increased study with social cognition paradigms may help to balance the existing tendency of investigators to focus on traditional measures of cognition, and to avoid missing neuropsychiatrically linked affective abnormalities associated with autistic serial killers. Finally, elucidating the functional neuroanatomy of autistic serial killers may also shed light on relevant brain–behavior relations associated with their homicides.

REFERENCES

- American Psychiatric Association (APA). (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.
- Baron-Cohen, S. (1988). An assessment of violence in a young man with Asperger's syndrome. *Journal of Child Psychology and Psychiatry*, 29, 351–360.
- Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: MIT Press.
- Baron-Cohen, S. (2003). *The essential difference: The truth about the male and female brain*. New York: Basic.
- Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a “theory of mind”? *Cognition*, 21, 37–46.
- Bowler, D. M. (1992). “Theory of mind” in Asperger's syndrome. *Journal of Child Psychology and Psychiatry*, 33, 877–893.
- Bowler, D. M., & Worley, K. (1994). Susceptibility to social influence in adults with Asperger's syndrome: A research note. *Journal of Child Psychology and Psychiatry*, 35, 689–697.
- Bukanovsky, A. (2003). Neuroimaging characteristics of the brain, skull, and cranio-vertebral area of violent serial sexual offenders (Abstract I19). *Proceedings of the American Academy of Forensic Sciences* (Vol. 9, p. 291). Colorado Springs, CO: American Academy of Forensic Sciences.
- Bukhanovskaya, O. A. (2001). Serial sexual sadists: Cerebral morphofunctional predisposition (Abstract I25). *Proceedings of American Academy of Forensic Sciences* (Vol. 7, p. 291). Colorado Springs, CO: American Academy of Forensic Sciences.
- Carlisle, A. C. (1998). The divided self: Toward an understanding of the dark side of the serial killer. In R. M. Holmes, & S. T. Holmes (Eds.), *Contemporary perspectives in serial murder* (pp. 85–100). Thousand Oaks, CA: Sage.
- Cooper, S. A., Mohamed, W. N., & Collacott, R. A. (1993). Possible Asperger's syndrome in a mentally handicapped transvestite offender. *Journal of Intellectual Disability Research*, 37, 189–194.
- Doughton, S. (November 10, 2003). *Why did Ridgeway do it? Experts say he's like other serial killers*. Retrieved November 19, 2003, from *Seattle Times* website: <http://216.239.51.104/search?q=cache:0Wcjxsb4ie8J:seattletimes.nsource.com/html/loc>
- Ferreira, C. S. (2000). Serial killers—victims of compulsion or masters of control? In D. H. Fishbein (Ed.), *The science, treatment, and prevention of antisocial behaviors: Applications to the criminal justice system* (pp. 15–1 to 15–18). Kingston, NJ: Civic Research Institute.
- Frith, U. (1989). *Autism: Explaining the enigma*. Malden, MA: Blackwell.
- Giannangelo, S. J. (1996). *The psychopathology of serial murder: A theory of violence*. Westport, CT: Praeger.
- Gillberg, C., & Schaumann, H. (1981). Infantile autism and puberty. *Journal of Autism and Developmental Disorders*, 11, 365–371.

- Godwin, G. N. (2000). *Hunting serial predators: A multivariate classification approach to profiling violent behavior*. Boca Raton, FL: CRC Press.
- Grady, C. L., & Keightley, M. L. (2002). Studies of altered social cognition in neuropsychiatric disorders using functional neuroimaging. *Canadian Journal of Psychiatry*, *47*, 327–336.
- Hall, I., & Bernal, J. (1995). Asperger's syndrome and violence. *British Journal of Psychiatry*, *166*, 262–268.
- Haracopos, D., & Pedersen, L. (1992). *Sexuality and autism, Danish report*. Retrieved January 17, 2003, from <http://www.autismkuk.com/index9sub.htm>
- Hazelwood, R., Dietz, P. E., & Warren, J. I. (2001). The criminal sexual sadist. In R. R. Hazelwood, & A. W. Burgess (Eds.), *Practical aspects of rape investigation: A multidisciplinary approach* (pp. 463–475). Boca Raton, FL: CRC Press.
- Hickey, E. W. (1997). *Serial murders and their victims*. Belmont, CA: Wadsworth.
- Holmes, R. M., & Holmes, S. T. (1998). *Serial murder*. Thousand Oaks, CA: Sage.
- James, E. (1991). *Catching serial killers: Learning from past serial murder investigations*. Lansing, MI: International Forensic Services.
- Keppel, R. D., & Walter, R. (1999). Profiling killers: A revised classification model for understanding sexual murder. *International Journal of Offender Therapy and Comparative Criminology*, *43*, 417–437.
- Kohn, Y., Fahum, T., Ratzoni, G., & Apter A. (1998). Aggression and sexual offense in Asperger's syndrome. *Israel Journal of Psychiatry and Related Sciences*, *35*, 293–299.
- Liss, M., Fein, D., Allen, D., Dunn, M., Feinstein, C., Morris, R., Waterhouse, L., & Rapin, I. (2001). Executive functioning in high-functioning children with autism. *Journal of Child Psychology and Psychiatry*, *42*, 261–270.
- Masters, B. (1993a). *The shrine of Jeffrey Dahmer*. London: Hodder and Stoughton.
- Masters, B. (1993b). *Killing for company: The story of a man addicted to murder*. New York: Dell.
- Mawson, D., Grounds, A., & Tantam, D. (1985). Violence and Asperger's syndrome: A case study. *British Journal of Psychiatry*, *147*, 566–569.
- McDougle, C. J. (1998). Repetitive thoughts and behavior in pervasive developmental disorders. In E. Schopler, G. B. Mesibov, & L. J. Kuncze (Eds.), *Asperger syndrome or high functioning autism?* (pp. 293–316). New York: Plenum.
- Miller, L. (2000). The predator's brain: Neuropsychodynamics of serial killers. In L. B. Schlessinger (Ed.), *Serial offenders: Current thought, recent findings* (pp. 135–166). Boca Raton, FL: CRC Press.
- Mladnich, R. (2001). *The Joel Rifkin story: From the mouth of the monster*. New York: Simon and Shuster.
- Murrie, D. C., Warren, J. I., Kristiansson, M., & Dietz, P. E. (2002). Asperger's syndrome in forensic settings. *International Journal of Forensic Mental Health*, *1*, 59–70.
- Myers, W. C. (2000). *Juvenile sexual homicide*. San Diego, CA: Academic.
- Myers, W. C., Burgess, A. W., & Nelson, J. A. (1998). Criminal and behavioral aspects of juvenile sexual homicide. *Journal of Forensic Sciences*, *43*, 340–347.
- Povinelli, D. J., & Preuss, T. M. (1995). Theory of mind: Evolutionary history of a cognitive specialization. *Trends in Neurosciences*, *18*, 418–424.
- Premack, D., & Woodruff, G. (1978). Does the chimpanzee have a theory of mind? *Behavioral and Brain Sciences*, *1*, 515–526.
- Prentky, R. L., Burgess, A. W., Rokous, F., Lee, A., Hartman, C., Ressler, R., & Douglas, J. (1989). The presumptive role of fantasy in serial killer sexual homicide. *American Journal of Psychiatry*, *146*, 887–891.
- Ratey, J. J., & Johnson, C. (1997). *Shadow syndromes*. New York: Pantheon.
- Ressler, R. K., Burgess, A. W., & Douglas, J. E. 1988. *Sexual homicide: Patterns and motives*. Lexington, MA: Lexington.
- Roeyers, H., Buysse, A., Ponnet, K., & Pichal, B. (2001). Advancing advanced mind-reading tests: Emphatic accuracy in adults with pervasive developmental disorder. *Journal of Child Psychology and Psychiatry*, *42*, 271–278.
- Rutherford, M. D., Baron-Cohen, S., & Wheelwright, S. (2002). Reading the mind in the voice: A study with normal adults with Asperger's syndrome and high functioning autism. *Journal of Autism and Developmental Disorders*, *32*, 189–194.
- Sacks, O. (1995). *An anthropologist on Mars: Seven paradoxical tales*. New York: Vintage.
- SanMartin, J. (2001). Concept and history of the serial killer. In A. Raine, & J. SanMartin (Eds.), *Violence and psychopathy* (pp. 91–104). New York: Kluwer-Plenum.
- Santangelo, S. L., & Folstein, S. E. (1999). Autism: A genetic perspective. In H. Tager-Flusberg (Ed.), *Neurodevelopmental disorders* (pp. 431–446). Cambridge, MA: MIT Press.
- Schlesinger, L. B. (2004). *Sexual murder: Catathymic and compulsive homicides*. Boca Raton, FL: CRC Press.
- Schultz, R. T., Romanski, L. M., & Tsatsanis, K. D. (2000). Neurofunctional models of autistic disorder and Asperger syndrome: Clues from neuroimaging. In A. Klin, F. R. Volkmar, & S. S. Sparrow (Eds.), *Asperger syndrome* (pp. 172–209). New York: Guilford.

- Scragg, P., & Shah, A. (1994). Prevalence of Asperger's syndrome in a secure hospital. *British Journal of Psychiatry*, 165, 679–682.
- Sicotte, C., & Stemberger, R. M. T. (1999). Do children with pervasive developmental disorder NOS have a theory of mind? *Journal of Autism and Developmental Disorders*, 29, 225–233.
- Silva, J. A., Ferrari, M. M., & Leong, G. B. (2002a). The neuropsychiatric developmental analysis of serial killer behavior. *American Academy of Psychiatry and the Law Annual Meeting Program* (p. 60). Bloomfield, CT: American Academy of Psychiatry and the Law.
- Silva, J. A., Ferrari, M. M., & Leong, G. B. (2000b). The case of Jeffrey Dahmer: Sexual serial homicide from a neuropsychiatric developmental perspective. *Journal of Forensic Sciences*, 47, 1347–1359.
- Silva, J. A., Ferrari, M. M., & Leong, G. B. (2003a). Asperger's disorder and the origins of the Unabomber. *American Journal of Forensic Psychiatry*, 24, 5–43.
- Silva, J. A., Leong, G. B., & Ferrari, M. M. (2003b). Paraphilic psychopathology in a case of autism spectrum disorder. *American Journal of Forensic Psychiatry*, 24, 5–20.
- Silva, J. A., Wu, J. C., & Leong, G. B. (2003c). Neuropsychiatric developmental analysis of sexual murder. *American Academy of Psychiatry and the Law Annual Meeting Program* (p. 13). Bloomfield, CT: American Academy of Psychiatry and the Law.
- Siponmaa, L., Kristiansson, M., Jonson, C., Nyden, A., & Gillberg, C. (2001). Juvenile and young mentally disordered offenders: The role of child neuropsychiatric disorders. *Journal of the American Academy of Psychiatry and the Law*, 29, 420–426.
- Stone, M. (1994). Early traumatic factors in the lives of serial murderers. *American Journal of Forensic Psychiatry*, 15, 5–26.
- Tantam, D. (2000). Adolescence and adulthood of individuals with Asperger syndrome. In A. Klin, F. R. Volkmar, & S. S. Sparrow (Eds.), *Asperger syndrome* (pp. 367–399). New York: Guilford.
- Tantam, D. (2003). The challenge of adolescents and adults with Asperger's syndrome. *Child and Adolescent Psychiatric Clinics of North America*, 12, 143–163.
- Van Bourgondien, M. E., Reichle, N. C., & Palmer, A. (1997). Sexual behavior in adults with autism. *Journal of Autism and Developmental Disorders*, 27, 113–125.
- Volkmar, F. R., & Klin, A. (2000). Diagnostic issues in Asperger syndrome. In A. Klin, F. R. Volkmar, & S. S. Sparrow (Eds.), *Asperger syndrome* (pp. 25–71). New York: Guilford.
- Wellman, H. M. (1993). Early understanding of mind: The normal case. In S. Baron-Cohen, H. Tager-Flusberg, & D. J. Cohen (Eds.), *Understanding other minds: Perspectives from autism* (pp. 11–39). New York: Oxford University Press.
- Wolff, S. (1995). *Loners: The life path of unusual children*. New York: Routledge.

Copyright of Behavioral Sciences & the Law is the property of John Wiley & Sons, Ltd. 2004 and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.