A preliminary study of autism and cybercrime in the context of international law enforcement

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Abstract

Purpose – *The purpose of this paper is to explore the association of cybercrime, autistic spectrum conditions and international law enforcement, the past decade having seen a significant growth in reported cybercrimes involving autistic individuals.*
Design/methodology/approach – *Interest in the profile of autism and cybercrime and the pathways whereby such offences are committed is shared by key law-enforcement agencies worldwide. This was explored by literature review and survey.*
Findings – *The authors identified a presence of persons with Autism Spectrum Disorders but no empirical evidence to suggest a prevalence or an over representation of autistic individuals committing cybercrime offences. At present profiling, pathways, and recording is under developed.*
Research limitations/implications – *Paucity of literature on cybercrime and autism. Awareness of autism within law-enforcement agencies and the absence of key diagnostic and other data from the cross-section of agencies surveyed.*
Practical implications – *Improve detection, diversion, profiling, risk and pathways into cybercrime.*
Social implications – *Better prediction of risk of cybercrime and improved responses.*
Originality/value – *Original paper believed to be the first to look at cybercrime and ASD in the context of international law enforcement.*

Keywords *Autism, Criminal justice, Profiling, Law enforcement, Cybercrime, Asperger syndrome*

Paper type *General review*

Introduction

In 2001 the British computer hacker Gary McKinnon was accused of hacking into 97 US military and NASA computers. Denying malicious intent he claimed to be looking for evidence of UFO activity. He was arrested by the Hi-Tech Crime Unit in London and subsequently indicted in the USA on seven counts of computer crime. In 2002 the USA made a request for his extradition. McKinnon appealed and during the subsequent publicity the possibility of autism was raised and in the course of legal proceedings he was diagnosed with Asperger syndrome (AS). At the 11th hour his extradition was halted by the UK Government not on the grounds of AS but an assessment of his precarious mental health and high risk of suicide (Sharp, 2013).

McKinnon and other high profile cases involving autistic individuals, such as that of Ryan Cleary (Charlton, 2011) have attracted the interest of law-enforcement agencies worldwide. The presence of Autism Spectrum Disorders (ASD), more specifically those with AS in those arrested for various offences related to coding, hacking and malware has been reported but not systematically recorded. Other computer-related offences such as trolling and fraud have also been reported with autistic individuals as victims and offenders.

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There are recent reports of what has become known as the "autism defense" (Kushner, 2011) with lawyers claiming the presence of an autistic disorder to evade prosecution or attract a lesser sentence.

Descriptions of autism. Autistic spectrum conditions and ASD

Occurring in about 1 per cent of the UK population the term autism describes a spectrum of persistent neurobiological conditions present from early life affecting all areas of social functioning and communication. They affect many more males than females and are described in all societies, races, and cultures. All levels of IQ are affected. Diagnosis of ASD is made on the basis of observable behaviours, which include difficulties in empathising and social communication, language and a restricted and repetitive repertoire of behaviours and interests. These are often accompanied by marked disturbances in sensory processing and other neurological and psychological disorders.

Downstream these features can lead to a range of difficulties including an extreme need for predictability and order, problems in interpreting the thoughts and intentions of others and with the constantly shifting context of social encounters (Frith, 1991; Vermuelen, 2011). Perhaps consequentially a majority will experience disabling levels of anxiety (Tantam, 2000). In contrast to the difficulties the uneven profile of autism will often produce strengths, which may include exceptional skills in the arts, science and technology. Often having good academic potential as children a significant number are unemployed as adults. In some the condition is now viewed less as a disability than a "difference" and a growing number are engaged in the computer industry due to their excellent "systemising" abilities and eye for detail (Roelfsema *et al.*, 2012; Baron-Cohen *et al.*, 2000).

Cybercrime and autism

Experts generally agree that the majority of individuals with autistic conditions are law abiding with low rates of criminality (Ghaziuddin *et al.*, 1991; Wing, 1981; Murrie *et al.*, 2002, Woodbury-Smith *et al.*, 2006; Howlin, 2007). Studies of mentally disordered offenders (Tantam, 2003; Hare *et al.*, 1999; Scragg and Shah, 1994; Woodbury-Smith *et al.*, 2010; Woodbury-Smith and Dein, 2014; Browning and Caulfield (2011) found an over representation of autism in the criminal justice system but cybercrime is scarcely referenced, many studies having been conducted before computers became widely available.

Reasons for involvement in criminality in ASD cited by Allen *et al.* (2008) include extreme egocentricity, pursuit of a special interest coupled with poor self-monitoring and impulse control. Impaired verbal and non-verbal understanding and social naiveté may also increase the risk of exploitation and exposure to cyber-bullying. This may be aggravated by comorbid psychiatric disorders (Gunasekaran and Chaplin, 2012).

Cybercrime is the fastest growing area of crime and law-enforcement agencies around the world are overwhelmed, not only by the sheer number of crimes being committed but by an agreed response to it, including a lack of adequate training material (Shipley *et al.*, 2014).

Cybercrime is "The illegal use of computers and the internet or crime committed by means of computers and the internet". In this study we attempted to restrict the definition to an illegal act where the only means of commission is via the use of a computer and the internet and includes the technical expertise required to commit cybercrime where network intrusions, hacking, the creation and deployment of malware are concerned. We excluded offences, which could be committed via a computer but where a computer is not essential but these are referred to by law-enforcement agencies.

A cybercriminal is an individual who commits cybercrime, making use of the computer either as a tool or as a target or as both.

Cybercriminals use computers in three broad ways:

- selecting the computer as their target, attacking other computers, to perform malicious activities, such as spreading viruses, data theft, identity theft, etc.;

- using computers as their weapon to carry out “conventional crime”, such as spam, fraud, illegal gambling, etc.; and
- using computers as their accessory to save stolen or illegal data.

Unlike other offenders cyber offenders seldom fit a recognised criminal profile, committing crime not for monetary gain but for recognition, adulation, attention or self-satisfaction. Often described in police reports as “loners” or “odd” they are reported to come less frequently from lower socio-economic groups.

These are often serious offences with severe consequences. The circumstances surrounding arrest are likely to be exceptionally traumatic for these individuals and the strength of evidence in computer-related cases means almost certain conviction for those accused with the possibility of severe punishment.

A term often seen in the forensic literature is Asperger syndrome (AS). Introduced by Wing (1981), it describes individuals with good language skills and of average or above IQ but with a restricted repertoire of behaviours, narrow all-consuming interests and a marked difficulty in relating socially to others. Some will have too few features meeting the criteria for diagnosis of ASD (Wolff and Barlow, 1979). There is a growing resentment among this population at what is seen as “pathologising” differences in human behaviour and any connection between autism and cybercrime is disputed (Fotinger and Ziegler, 2004).

Literature review of offender profiling and cybercrime

Offender profiling is a technique for identifying personality and behavioural characteristics based upon an analysis of the crime committed. In traditional criminal profiling, crime scene evidence, geography, victimology, characteristics and relationships all play a large role in identifying offender typography, methodology and motive. In cybercrime, it may be difficult to develop such a profile due to the nature of the crime and offender. The absence of usual criminal motivations and rationales is accentuated by the way that computers are able to thwart those police methods. Described by Bednarz (2004) as “a promising but immature science”, cybercrime profiling has yet to receive the same level of attention as other areas of criminality.

The more recent media portrayal of hackers as anti-social and deviant is not supported by empirical research. In their study of hacker’s conferences in the USA, Schell and Dodge (2002) examined the behaviours, motivations, psychological predisposition, creative potential and decision-making styles of over 200 mostly male delegates. They did not find anti-social personality types but based on a questionnaire and the AQ (Baron-Cohen, 1998 cited in Woodbury-Smith *et al*., 2006) they did find a strong association with autistic traits. A more recent study of college students by Seigfried-Spellar *et al.* (2015) examined the relationship between malicious computer use and autism traits but found only a tiny proportion (0.01 per cent) of those engaged in deviant computer use had a clinically significant AQ score.

Currently, profiling methods and understanding of pathways into such crime are rudimentary with little coherent information or literature. In the 1950s crude attempts to categorise hackers saw them labelled “black hats” (violate systems often for illegal purposes) “white hats” (skilled but use skills to collaborate with the establishment) and “grey hats” (ethical hackers hack because they perceive it is justified).

Further attempts to categorise hacker types led in 2006, to the creation of the “Hackers Profiling Project” (UN Interregional Crime and Justice Research Institute in partnership with the Italian Association for Information Security and the Institute for Security and Open Methodologies). This identified nine categories of hacker:

1. Wannabe (Lamer): they use hacking techniques without the knowing or learning how they function. They tend to download free “hacking toolkits”, and post a huge amount of messages on forums asking others to teach them how to hack.
2. Script Kiddie: they rely on UNIX/Linux shell scripts written by others – lack technical skills and sophistication and are the least capable and are called “point and clickers”. Interested only in the result and not in learning how computers and hacking techniques work.

3. Cracker: have good technical skills but differentiate themselves from the serious hacker.
4. Ethical Hacker: possesses excellent hacking skills decides to help the community by discovering bugs and mistakes used in IT infrastructures. Create own software scripts and prefer manual attacks.
5. QPS (Quiet, Paranoid, Skilled Hacker): targets IT systems simply for the love of the release of that particular HP/UX with similar ethics to the Ethical Hacker. If they sense detection disappears.
6. Cyber-Warrior/Mercenary: regards self as a "hero" and often found within extremist groups with political or religious ideologies. Skills vary substantially. May be commissioned to attack specific targets.
7. Industrial Spy Hacker: infiltrates a business and take information through the exploitation of information technology.
8. Government Agent Hacker: external attacker who runs highly sophisticated attacks towards nations.
9. Military Hacker: associated with "state sponsored" attacks.

As yet there has been no systematic attempt to see how well these categories describe cyber offenders with ASD.

Hacking was not always negatively regarded. Levy (1994) studied the so-called "White Hat" Hackers who attended the Massachusetts Institute of Technology in the 1950s identifying common values and behaviours that led to the enshrinement of a "Hackers Ethic":

- obsession with hands-on use of computer technology – all persons should have open access to all computers;
- desire that all information should be in the public domain – dislike of secrecy;
- mistrust of authority – espousal of decentralization, dislike of "proper channels";
- judging others by pre-eminent criterion of hacking prowess, rather than by other norms;
- belief in the creation of art and beauty using computer technology; and
- belief that using computers can change one's life for the better.

This led to a "Hacker's Code" characterised by a compulsive need for information and perfection. But what may have begun as an intellectual curiosity and obsession with technology easily veered into criminality. The computer offers users control and anonymity and an opportunity for solitary activity that could be pursued without regard for social boundaries or obstacles. Bachmann (2010) confirmed this apparent drive to solve complex problems and a propensity to engage in risky behaviour related to limited insights in self-awareness and monitoring. Such individuals have been associated with vendettas or political causes; others exploited by organised criminals due to their skills in designing malware or illegal systems such as botnets and viruses.

Awareness of autism by law-enforcement agencies

In the UK over 60 per cent of the prison population has at least one mental health problem or a learning disability (Bradley, 2009). Studies also suggest that individuals with AS are over represented within the criminal justice system yet there is insufficient training and awareness of the condition and a scarcity of reliable information. Moreover recommendations to improve training of staff on all mental health conditions are seldom implemented (Bradley, 2009; Browning and Caulfield, 2011).

Recognition of the more obvious signs of autism increased in the wake of the 1986 film "Rainman" but this does not extend to AS, where signs may be difficult to discern, even by skilled clinicians. Awareness among law-enforcement agencies is even more problematic with only England having specific legislation concerning autism. At a global level many law-enforcement agencies do not recognise any mental health conditions at all.

Survey of law enforcement

Given the expressed concerns about the possible connection between autism and cybercrime it was important to explore the awareness and perception of ASD in cybercrime units. International law-enforcement agencies were therefore surveyed to ascertain:

1. whether in their view there was an increased prevalence of cyber offenders with autism;
2. the current level of awareness of autism among such law-enforcement agencies; and
3. whether it was possible to identify characteristics or traits that would assist in the develop of a profile for cyber offending.

Methods

A brief online survey was undertaken of law-enforcement agencies globally preceded by a short information campaign. It was assumed that no additional or supplementary data would be available from records.

The design of the questionnaire reflected the experience of the authors of working in this field. One major issue in case identification concerned the lack of formal diagnosis of offenders coming in contact with cybercrime departments without which, we were reliant on the level of awareness of the agency.

Moreover, whilst Interpol is mandated for 190 countries, only approximately 70 have cybercrime legislation. Of those, approximately 50 have dedicated cybercrime units making access to units that deal consistently with cybercrime problematic.

As the study was of a preliminary nature the questionnaire was sent to a wide cross-section of countries globally.

The countries that finally participated were:

- the UK;
- the USA;
- Australia;
- New Zealand;
- Germany;
- the Netherlands; and
- Denmark.

All represented National Agencies in their respective countries.

Law-enforcement agencies in South Korea and Japan were asked to participate but declined on the grounds that such issues do not exist in those countries and such cases have never been seen. This interesting contrast with evidence from the literature which suggests mental health conditions are very well known in these countries is a topic for further study (Table I).

Discussion

It is unsurprising that computers appeal to autistic individuals. They play to their known preferences, strengths and interest in problem solving. The consistent structure of coding language, standardised terminology in forums and logical syntax-guided structure of the computer and the internet is concrete and there are boundless opportunities for solitary pursuit of preferred or special interest. Additionally, the internet provides a means of communication for people who find conventional forms of interaction difficult and facilitate social encounters around shared interests. For those so inclined it can offer a new online persona and identity of their choosing. Media reporting and a growing public awareness help to explain the current level of interest in cybercrime and autism and the potential vulnerability to cybercrime both as offenders

Table I Survey questions

Answer choices	*Responses*
Q1. Please identify the type of cybercrime unit/department you work within? (Answered: 8; skipped: 0)	
National cybercrime unit	6
Regional cybercrime unit	0
Specialist unit	0
Fraud and cybercrime unit	2
Other (please specify)	0
Total respondents	8
Q2. How does your cyber department define cybercrime? (Answered: 8; skipped: 0)	
Hacking, coding, malware and ddos only	5
Payment card fraud, hacking, coding, malware and ddos	4
Child exploitation and/or pornography	1
All offences committed on the internet	1
Total respondents	8
Q3. In a typical year, how many cyber investigations does your department/unit undertake? (Answered: 8; skipped: 0)	
Up to 20	2
Up to 50	1
Up to 100	2
More than 100	3
Total respondents	8
Q4. In a typical year, how many investigations result in actual arrests? (Answered: 8; skipped: 0)	
Up to 10	3
Up to 20	2
Up to 50	1
Up to 100	2
Total respondents	8
Q5. Does your country recognise and embrace mental health issues? (Answered: 8; skipped: 0)	
Yes, mental health issues recognised	2
Yes, mental health issues recognised and openly discussed	6
No, mental health issues are not recognised	0
No, mental health issues are not recognised or openly discussed	0
Other (please specify)	0
Total respondents	8
Q6. Have you ever received any training in understanding and dealing with people with mental health issues? (Answered: 8; skipped: 0)	
Yes	4
No	3
Other	1
Total respondents	8
Q6.A. If you answered yes to question 6, what type of training have you received? (Answered: 6; skipped: 2)	
Input from the West Midlands Autism team whilst at the PCeU (NCCU precursor)	
Advanced training to hear suspects with mental health issues	
Online readings with a short multiple choice assessment at the end	
Recruit training	
General police MH awareness training	
Q7. When a cyber suspect is arrested by your department, do you routinely ask them about their medical or mental history? (Answer: 8; skipped: 0)	
Yes	4
No	3
Other (please specify)	2
Total respondents	8
Q8. When a person is arrested for a cybercrime do they undergo any form of medical assessment whilst in custody? (Answered: 7; skipped: 1)[a]	
Yes	0
No	4
Other (please specify)	3
Total respondents	7
Q9. Have you heard of the term "Autism" or "Autism Spectrum Disorder (ASD)" (Answered: 8; skipped: 0)	
Yes I have heard of Autism	3

(continued)

Table I

Answer choices	*Responses*
Yes I have heard of Autism and understand what it actually means	5
No I have not heard of this term	0
Total respondents	8
Q10. Have you heard of the term "Asperger's syndrome"? (Answered: 7; skipped: 1)	
Yes, I have heard of "Asperger's syndrome" and understand what it actually means	7
No, I have not heard of this term	0
Total respondents	7
Q11. In the UK for example there is a Statutory Act, called The Autism Act 2009, which requires statutory agencies to have an awareness of Autistic Spectrum Disorders in adults. Does your country have a similar piece of legislation? (Answered: 8; skipped: 0)[b]	
Yes	1
No	6
Do not know	1
Other (please specify)	0
Total respondents	8
Q12. Have you received any training in understanding Autism or dealing with offenders with an Autism Spectrum Disorder or Asperger syndrome, at any time in your career? (Answered: 8; skipped: 0)	
Yes – 1 day training	1
Yes – more than 1 days of training	0
No	7
Other (please specify)	0
Total respondents	8
Q12.A. If you have received Autism or mental health training, when and how did you receive this training? (Answer: 3; skipped: 5) (showing 3 responses)	
Only a small part of that training mentioned ASD	
This was offered by our police academy and also included a short internship at institutes for people with mental health problems	
No details	
Q13. How many suspects has your department arrested who either were already diagnosed with an Autism Spectrum Disorder prior to arrest or received a diagnoses after arrest? (Answered: 8; skipped: 0)	
Yes – already diagnosed	3
Not known	2
Other (please specify)	3
Total respondents	8
Q14. If you identify that your department has investigated a cyber-offender with an Autistic Spectrum Disorder, which offences were they suspected of committing? (Answered: 6; skipped: 2)	
Hacking a business, organisation or person	4
Creating code that enabled a crime to be committed	2
Creating/deploying/managing a bot or botnet	2
Social engineering	0
Creation/deployment/managing malware	2
Harassment or trolling	0
Child exploitation and/or child pornography	1
Obtaining/using compromised payment card information	1
Cyber counter terrorism offences	0
Bulletproof hosting services	0
Other (please specify)	2
Total respondents	6
Q15. If you were aware that cyber offenders may have an Autistic Spectrum Disorder, when did you first become aware of this and why? (Answered: 6; skipped: 2) (showing 6 responses)	
Generally potential identified before arrest but confirmed through parents, subjects description of personality and behaviour. Confirmed by medical practitioners	
Indicated by communication over the wiretap – symptoms were noticed during hearings not a clear diagnose	
Post-arrest when some of the above attributes became apparent during interactions with the offender	
Advised by suspect's mother upon first contact with him	
The few that has been identified has been in the ages 14-17, and the possibility of a disorder was discovered at the initial contact or arrest, or talking with the parents	
Only on one occasion – alerted by offenders' mother that he had Aspergers syndrome	

Notes: [a]Of those who answered "Other" it was stated that unless there was any suspicion of such an issue they would not routinely asked; [b]the yes response was the UK

and victims. The need to develop a more appropriate response from the criminal justice sector is widely acknowledged but the literature review produced no systematic studies of cybercrime and autism. The survey of law-enforcement agencies suggested an increasing number of autistic individuals involved in cybercrime and although there is a growing, awareness of mental health issues generally, where autism is specifically concerned this is incomplete. There is little systematic examination or recording of key data at the time of arrest and the system for determining whether to assess for a mental health condition or other disability is frequently left to chance or is dependent on local factors. A need for more nuanced training and more consistent responses and record keeping was identified as was a need to identify the profile and pathway into crime of cyber offenders. It is known that autistic individuals are involved in cybercrime but the data upon which any estimate of prevalence can be made are simply not available and at this point it cannot be assumed that they are over represented in such offending.

Concerning the so-called autism defence, the concept of Mens Rea can only be decided on a case-by-case basis. A diagnosis of autism offers no protection from prosecution although it is apparent that in some jurisdictions the Courts take this into consideration when sentencing.

It is hoped that the results generated from this study will be used to inform future research into the development of profiles of cyber offenders and their pathways into such crime and the development of more suitable recording systems and responses.

Conclusion

This study appears to be the first of its kind investigating the involvement of autistic individuals in cybercrime in the context of international law enforcement. Globally, law-enforcement agencies report a growing number of investigations concerning autistic individuals. Case studies confirm that individuals with autism are involved in cybercrime as both offenders and victims. There is a need for further systematic study of the characteristics, personality types, psychological states and other factors with a view to better detection, prevention and diversion and future management of such individuals. Whilst a presence of ASD was identified there is no empirical link between the prevalence rates of autism and cybercrime and therefore such an association remains speculative. A study of this offender population to better understand it will confirm or deny the presence of any particular subgroup and the risks they present.

We would endorse proposals to improve the quality and take up of training and awareness for law-enforcement agencies and for more research in this area. We conclude that there is a need for evidence-based concept in profiling to be developed relating to the offender psyche and circumstances, which will also improve the quality of data. This will be in the interests of both the autism community and criminal justice.

Limitations

This was a preliminary study, which although global looked at a cross-section of a consenting sample of law-enforcement agencies. We do, however, believe these to be reasonably representative of agencies where there is recognition of mental health issues. Further limitations concern the scarcity of literature in this area, the uneven awareness among law-enforcement agencies and the poorly developed systems of record keeping including the absence of diagnostic data. We believe these limitations shine a light on those areas that need further exploration.

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