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Internet use and online safety in adults with Williams syndrome

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Abstract

Background Individuals with intellectual and developmental disabilities (IDD) increasingly have access to the Internet. Whilst Internet access increases opportunities for social connection for individuals with IDD, it also may increase risk of victimisation. Adults with Williams syndrome (WS), who display an extreme pro-social drive to engage with both familiar and unfamiliar people, might be especially vulnerable to online victimisation. This study first explores how often and why individuals with WS use the Internet and social networking sites. Next, the online vulnerability of individuals with WS is assessed through responses to hypothetical scenarios of potentially dangerous online interactions.
Method Twenty-eight young adults with WS (mean age = 27.7 years) and their parents completed questionnaires about their Internet and social networking use and parental oversight. Participants with WS then responded to hypothetical scenarios assessing their likelihood to take social and non-social risks online.
Results Most participants with WS frequently use the Internet and the majority visit social networking sites every day or almost every day, with little parental supervision or oversight. Individuals with WS interact with both known and unknown individuals through social networking sites. Participants are more likely to agree to engage in socially risky behaviours compared to risky behaviours that are not social in nature when online. For example, participants were more likely to agree to meet an 'online friend' in person than they were to give their bank account information for winning a 'contest'.
Conclusions Individuals with WS, who are a socially vulnerable group in the real world, display behaviours that could also lead to victimisation online as well. As the Internet continues to become more accessible, more research is needed to increase online safety of individuals with WS and other IDDs. Implications for intervention and future research are discussed.

Keywords Internet use, online safety, intellectual disability, social vulnerability, Williams syndrome

Internet use has been rising at a meteoric rate amongst the current generation. It is estimated that 83.3% of households in the US have a computer, and 74.4% have access to the Internet (compared to just 18% who had Internet access in 1997; File & Ryan, 2014). The Internet itself is now estimated to have almost three billion users worldwide (International Telecommunications Union, 2014). The Internet is now a necessity of everyday life, particularly as devices continue to become more portable, allowing for constant communication. This has substantial implications for the lives of today's 'Internet

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generation,' as the distinction between the real world and the virtual platform becomes increasingly blurred (Subrahmanyam & Greenfield, 2008).

The Internet has also become an important tool for individuals with intellectual and developmental disabilities (IDD). Adults with mild intellectual disability (ID) often have the skills needed to access the Internet independently (Katz, 2001; Davies *et al.*, 2015). This is especially true as programmes become more user-friendly and the Internet becomes more intertwined with daily life (Boyd & Ellison, 2007; Davies *et al.*, 2015). It is estimated that 97% of individuals with IDD have access to the Internet at home, and 41% have a computer in their own bedroom (Didden *et al.*, 2009). Although the majority of individuals report using the Internet primarily for downloading music or playing games, several also report using the Internet for making social connections, such as sending or receiving e-mail, posting information about themselves on the Web and chatting with friends (Didden *et al.*, 2009).

Whilst access to the Internet offers undeniable advantages to individuals with and without IDD—providing access to resources and the opportunity to feel a part of an online community (Ridings & Gefen, 2004)—there are risks to these connections. Recent high profile cases in the media have highlighted the dangers of the Internet for individuals without IDD, which too often include instances of cyberbullying, identity theft and online grooming (e.g. behaviours to gain access to the individual by exploiting their trust, whilst maintaining the secrecy of the relationship; Craven *et al.*, 2006; Mitchell *et al.*, 2011). Currently, little research has sought to understand the Internet use patterns and potential online victimisation of individuals with IDD.

Online vulnerability of individuals with intellectual and developmental disabilities

Whilst everyone faces the risks posed by the Internet, individuals with IDD may be especially vulnerable to online victimisation, particularly if they have reduced IQ, difficulties interpreting social communication and understanding social nuances, elevated levels of trust, and feelings of social isolation and loneliness in their daily lives (Lough *et al.*, 2015). Overall, compared to individuals without IDD, individuals with IDD are less likely to use social networking sites (82% versus 68%) or video chat rooms (32% versus 24%), but they are equally likely to talk with people whom they meet online (40% versus 41%) and more likely to display sexualised behaviour online (13% versus 20%; Wells & Mitchell, 2014). These latter two behaviours have been related to increased instances of sexual solicitation and harassment (Mitchell *et al.*, 2001). Thus, whilst the Internet allows individuals with IDD to engage in a world of friendships and relationships that are not necessarily available to them in real life (Chamberlain *et al.*, 2007; Mazurek, 2013), being a part of the online community may also lead to increased vulnerability.

Just as risk for victimisation differs for individuals with different disabilities in the real world (Fisher *et al.*, 2013), Internet use and online vulnerability might also differ by type of disability. Specific characteristics of certain disabilities may be more or less related to risk of online victimisation (Wells & Mitchell, 2014; Lough *et al.*, 2015; Normand & Sallafranque-St-Louis, 2015). For example, individuals with Williams syndrome (WS) may be especially vulnerable to online victimisation. WS is a rare genetic neurodevelopmental disorder caused by the microdeletion of 25–28 genes on chromosome 7 (7q11.23; Hillier *et al.*, 2003), affecting approximately 1 in 20 000 people. Individuals with WS display mild to moderate levels of ID (Searcy *et al.*, 2004) as well as an extreme pro-social drive to engage with other people (Järvinen *et al.*, 2013), irrespective of whether or not they are familiar (Jones *et al.*, 2000). Individuals with WS are described as being overly friendly and trusting, with a lack of social inhibitions (Little *et al.*, 2013). Yet, despite this, individuals with WS typically struggle to form and maintain peer relationships, resulting in high levels of social isolation (Davies *et al.*, 1998). Taken together, this profile indicates that individuals with WS are often considered to be socially vulnerable (Jawaid *et al.*, 2012; Fisher *et al.*, 2013).

A key facet in the social vulnerability profile of individuals with WS is their social approach behaviour. Several studies (e.g. Bellugi *et al.*, 1999; Jones *et al.*, 2000; Martens *et al.*, 2009; Fisher *et al.*, 2014) have examined social approach behaviour by presenting photographs of faces displaying various emotions and asking participants to indicate how much they would like to approach

and interact with each person (e.g. Adolphs Approachability Task; Adolphs *et al.*, 1998). Research consistently reports that compared to chronologically age-matched peers, individuals with WS are more willing to approach the faces displaying positive (e.g. happy) facial expressions (Bellugi *et al.*, 1999; Jones *et al.*, 2000; Frigerio *et al.*, 2006; Porter *et al.*, 2007; Martens *et al.*, 2009; Fisher *et al.*, 2014). Such heightened willingness to approach someone simply based on their picture (without knowing anything about the person) has significant implications when considering the online vulnerability of individuals with WS, where often the only information available about a person is their online profile (e.g. a photograph).

No research has examined whether the real world social vulnerability and social approach behaviour of individuals with WS is also manifested online. To begin to understand the risk for online victimisation for individuals with WS the current study was designed to describe the online behaviour of adults with WS, and to examine the likelihood that individuals with WS might put themselves in high risk situations online. Three research questions were examined. First, what are the primary reasons young adults with WS use the Internet and how often do they go online? Second, do young adults with WS use social networking and how accessible are their social networking profiles? Third, how do adults with WS respond to scenarios which have been designed for the purposes of this study to assess their online vulnerability?

Method

Participants

Participants were recruited from a residential summer camp programme for adults with WS. The sample included 28 adults with WS (22 male, 6 female) and their parents (3 fathers, 25 mothers). The average age of the participants with WS was 27.7, ±8.4 years and average full-scale IQ was 69.11, ±15.28. The majority of participants (24) lived in their family home, whilst three others lived in the community with supports, and one lived in supported living. The parents who took part in the study had an average age of 56.9, ±7.4 years.

Procedure

After receiving approval from the University's Institutional Review Board, parents of individuals with WS were contacted about their interest in participating in research as a part of the camp. Interested parents were then mailed a consent form and an assent form for the participant with WS to sign. Once the signed forms were received by the research team (100% return rate) parents were sent the link to questionnaires to complete online. The rate of completion was 93.6%, as 31 consent forms were received from the research team and 29 parents completed the questionnaires. The 31 individuals with WS subsequently completed adapted forms of the parent measures whilst at the residential camp. The completion rate with this group was 96.8%; one individual was unable to complete the questionnaire because of limited comprehension of the survey questions. For the purposes of this study, only those individuals for whom we received both parent and participant responses were included in the analyses ($n = 28$).

Measures

Demographics. Parents completed a demographic questionnaire about their child and their family circumstances. In this questionnaire, parents were asked about age, living situation and employment status for both them and their child.

Kaufman Brief Intelligence Test, 2nd Edition (KBIT-2; Kaufman & Kaufman, 2004). The KBIT is a psychometric measure used to assess verbal, nonverbal and full-scale IQ. It can be used with individuals aged 4–90 years, and has been used in several previous studies with individuals with WS (for examples see Dykens *et al.*, 2001; Fisher *et al.*, 2014; Mervis *et al.*, 2012).

Internet Use Questionnaire. The Internet Use Questionnaire was adapted from the EU Kids Online Survey (Livingstone *et al.*, 2011). The parents were asked to complete a questionnaire about the online activity of their child, and the individual with WS was asked to complete the same questionnaire about their own behaviour. The individuals with WS were provided with visual aids created for this study (e.g. pictures of thumbs up/thumbs down, pictures of a

calendar with various number of days shaded, various social media icons) to support their comprehension of the questions and of the Likert scales. The questions covered topics such as how long they spend on the Internet, where they use the Internet, which websites they visit, who they talk to online and their social media activity.

E-safety scenarios. An e-safety scenarios task was designed to be completed by the individual with WS. This task was based on currently available online safety programmes for children, and was influenced by the Test of Interpersonal Competence and Personal Vulnerability (Wilson *et al.*, 1996). It included 12 scenarios, which assessed the likelihood of the participants talking to or arranging to meet strangers they met online, sharing personal information and photographs, hiding information from parents, and giving away money. Three options were presented for each scenario, and the selected answers were scored on a scale of 1–3, with higher scores representing higher risk options. Specifically, the option considered the lowest risk (e.g. said 'no' to the request) was scored (1). The option considered the highest risk (e.g. agreed to the request) was scored (3). The final option (scored 2) had the potential to lead toward a riskier situation but provided a delay in agreeing to the request. The options were presented in a random order for each scenario. An example of a scenario presented was as follows; 'You met a new friend online named Alex. You like all of the same things and have a lot in common, but you have never met before in real life. Alex wants to meet up soon so you can do something fun together. What would you do?'. The participants could select their answer from the following options; (scored 3) 'Make plans to meet Alex as soon as possible', (2) 'Tell Alex you're busy but would love to meet sometime soon' or (1) 'Say no, you don't think it's a good idea'. (See Appendix A for the e-safety scenarios task). A total score was calculated with higher scores indicating higher risk taking online. Scenarios were also rated as either social (e.g. meeting a person; $n = 8$) or non-social (e.g. giving out bank information; $n = 4$), and a mean score was calculated for each grouping. Cronbach's alpha reveal this scale had high reliability (alpha = .886).

Results

The data were analysed to determine Internet use, Social Networking use and E-Safety behaviours of adults with WS. We then compared responses to social and non-social scenarios using *t*-test analyses.

Overall internet and social networking use

Internet use. Based on parent report, 85.7% (24) of the adults with WS used the Internet every day or almost every day; 7.1% (2) used it once or twice a week; 3.6% (1) used it once or twice a month and 3.6% (1) did not use the Internet. Of those individuals who used the Internet, 48.1% (13) used it for more than two hours each day, and 25.9% (7) used it for more than four hours a day (on weekend days). When asked how they access the Internet, 96.3% (26) used a mobile phone, 74.1% (20) went online using a portable device such as a tablet, 55.6% (16) used a laptop in their bedroom, 40.7% (11) used a gaming console and 33.3% (9) used a PC in their bedroom.

Parental supervision. Participants reported that few parents provide supervision whilst the individual with WS uses the Internet. Only 11.1% (3) reported that their parents sit with them whilst they use the Internet. Participants also indicated that parents are not always aware of what they are doing when they are online; 29.6% (8) said that their parents knew nothing or just a little, 66.6% (18) said that their parents knew most or a lot of what they did online and 3.7% (1) said they were not sure how much their parents knew. When asked what they do most often when they are online, the most common reasons for using the Internet were to watch videos (e.g. YouTube) and to access social networking sites (see Table 1 for additional activities).

Social networking. Of the 85.2% of participants ($n = 23$) who reported using social media, 95.7% (22) reported that they could use it anytime, and 4.3% (1) could only use social media with permission or supervision from a parent. All of the participants reported that they most frequently visited Facebook for social networking. In further inquiring about their Facebook user profile, we found they had an average of 655 friends (range 15 – 1722) and 56.5% (13) had their profile set to 'public' (e.g. anyone can access), compared to 39.1% (9) who had a 'private' profile

Table 1 Participant reported online activities

		How often (%)		
	% use ($n = 27$)	Once or twice a month	Once or twice a week	Every day or almost every day
Video (e.g. Youtube)	100	3.7	11.1	85.2
Social networking	85.2	13.0	21.7	65.2
Email	59.3	6.3	50.0	43.8
Instant message	51.9	7.1	50.0	35.7
Chatroom	44.4	33.3	25.0	41.7

(4.3% did not know). When asked about who they talk to on Facebook, 95.7% (22) said they talked to people they knew in real life, and 78.3% said they also talked to people they did not know in real life. Table 2 details the specific information that participants share in their Facebook profile.

Internet safety

Responses are reported for the 27 participants who reported using the Internet. First, Table 3 shows what percentage of respondents provided each answer for each of the e-safety scenarios. On the surface, these findings seem promising, in that participants seem most likely to select the option presenting the lowest risk. A closer examination, however, comparing the responses given to the different categories of scenarios (e.g. social versus non-social) presents a more nuanced picture.

To further explore the e-safety responses, we examined the mean differences for social versus non-social scenarios (see Table 3 for rating for each item on a scale from 1 to 3). A paired samples *t*-test revealed that the participants were significantly more likely to engage in risky situations that were social (mean = 1.65, ± .54) rather than non-social (1.37, ± .50; $t(26) = 4.62$, $P < .001$) in nature. According to Cohen's (1988) suggestions, this was considered to be a moderate sized difference, with a *Cohen's d* value of 0.54. To examine this one step further, we divided the social behaviours into meeting people in real life versus talking with people on the Internet. Adults with WS were significantly more likely to agree to arrange to meet with an unknown person in real life (1.85, ± .72) compared to talk to an unknown person online (1.60, ± .50; $t(26) = 2.54$, $P \leq 017$, *Cohen's d* = .40) or engage in a non-social risky online activity (1.37, ± .50; $t(26) = 4.88$, $P < .001$, $d = .77$). Participants were also more likely to talk to an unknown person online compared to engage in a engage in a non-social risky online activity ($t(26) = 4.42$, $P < .011$, $d = .46$). There were no differences between gender and living situation and scores on the total e-safety scenarios task, nor on the social and non-social groupings. Scores also did not correlate with age or total IQ.

Table 2 Percent of participants ($n = 23$) who provide specific identifying information on their Facebook profile

Facebook profile information	% (*n*)
Picture that clearly shows face	95.7 (22)
Last name	91.3 (21)
Address	30.4 (7)
Phone number	56.5 (13)
School or job	73.9 (17)
Birthday	91.3 (21)

Discussion

Previous research has already identified individuals with WS as being a socially vulnerable group in the real world (for a review, see Jawaid *et al.*, 2012). Such real life social vulnerabilities could be exaggerated in the online world (Lough *et al.*, 2015). By asking individuals with WS about their online behaviour and responses to specific scenarios, the current study provides the first insight into their Internet use patterns and level of online vulnerability. These findings not only help us to understand how often and

Table 3 Responses to e-safety scenarios with percentage of respondents who selected each answer option for each scenario.

E-safety scenario	3(high risk) % (*n*)	2(medium) % (*n*)	1(low risk) % (*n*)	Social (S)/ non-social (NS)
Putting video camera on for unknown person	11.1 (3)	25.9 (7)	63 (17)	S
Sending photos of self to unknown person	33.3 (9)	14.8 (4)	51.9 (14)	S
Arranging to meet unknown person	37 (10)	18.5 (5)	44.4 (12)	S
Arranging to go to unknown person's house	29.6 (8)	3.7 (1)	66.7 (18)	S
Opening unknown photo file	3.7 (1)	48.1 (13)	48.1 (13)	S
Sharing password	7.4 (2)	7.4 (2)	85.2 (23)	NS
Paying to enter competitions	22.2 (6)	7.4 (2)	70.4 (19)	NS
Giving out bank account information	7.4 (2)	22.2 (6)	70.4 (19)	NS
Accepting friend request from unknown person	14.8 (4)	29.6 (8)	55.6 (15)	S
Clicking link to e-mail unknown person	3.7 (1)	33.3 (9)	63 (17)	S
Keeping online relationship a secret from parents	29.6 (8)	18.5 (5)	51.9 (14)	S
Hiding online behaviour from parents	14.8 (4)	7.4 (2)	77.8 (21)	NS

why individuals with WS are using the Internet, but they also help to inform the development of Internet safety interventions.

First, we found that adults with WS frequently use the Internet and the majority of our participants used social networking sites such as Facebook every day or almost every day. Such findings are in line with reported Internet use (97%; Didden *et al.*, 2009) and frequency (25.9%; Wells & Mitchell, 2014) in other samples of individuals with other IDD. Of interest, we found that parental supervision or oversight when individuals with WS used the Internet was low and several participants indicated that their parents did not know everything that they did online. The individuals with WS in this sample therefore seem to be relatively autonomous when using the Internet.

The second finding is that adults with WS share a large amount of identifiable information on their social networking profiles. Additionally, individuals with WS are Facebook 'friends' with several hundred people, both known and unknown to them in real life and participants indicated they often spoke to people online who they did not know in real life. These findings are significant as previous research indicates that talking with strangers (i.e. individuals met on the Internet) is a prominent risk factor for sexual solicitation online (Mitchell *et al.*, 2007, 2008). Previous research has also highlighted the concern that lack of sexual education for people with IDD, combined with their desire to meet people online, could increase the risk of sexual cyber-victimisation (Murphy & O'Callaghan, 2004). Thus, considering the amount of personal information that participants are sharing with virtual strangers, concerns for their safety are raised.

In our third finding, we note that adults with WS are more likely to agree to engage in socially risky behaviours compared to risky behaviours that are not social in nature. In fact, the more risky the behaviour, the more willing the individual was to engage in the behaviour. Thus when their online visibility is considered alongside their propensity to agree to meet up with strangers who they have only spoken to online, it would seem that this group is at very high risk when interacting with other people online (Lough *et al.*, 2015). It may be, however, that individuals with WS do not have the same opportunities as their peers to meet with someone they have spoken to online. Whilst this is a viable suggestion that could alleviate some concern for their vulnerability, recent work by Fisher *et al.* (2013) found parental independence in WS to in fact be a disability-specific correlate of their social vulnerability. This suggests that they are likely to have at least some opportunities to meet with 'online friends' in person. Further, the EU Kids Online survey (Livingstone *et al.*, 2011) noted that people with intellectual disabilities faced an elevated contact risk compared to their peers, suggesting they would be more likely to arrange to meet with strangers they have met online.

These findings are situated within an on-going debate about the overlap between real world and

online existence (Whittle *et al.*, 2013). It has been argued that the online and offline worlds have become so embedded in one another, that it has become impossible to disentangle one's offline and online existence. For individuals with IDD, this means that the factors that feed into their vulnerability in the real world are likely to also serve as risk factors in the online world. The findings from the current study certainly lend support to this argument. Individuals with WS are known to be highly trusting and disinhibited during social interactions (Pinkham *et al.*, 2008; Riby *et al.*, 2014), and show a diminished stranger danger awareness (Fisher, 2014; Riby *et al.*, 2014). When presented with the e-safety scenarios in the present study, almost half of the participants indicated that they would go and meet with someone who they had been speaking to online. It would therefore seem that the traits that feed into the social vulnerability of these individuals in real life, also help shape their vulnerability online (Lough *et al.*, 2015).

There are also fundamental differences, however, between the offline and online environments that could shape the qualitative nature of the vulnerability experienced. As an example, the Internet offers increased freedom as well as anonymity during online social interactions which would not be available in face-to-face interactions (Suler, 2004). Whilst this may be liberating and facilitate openness in conversations, it can be problematic for individuals who struggle to understand social boundaries. It also affords anonymity to the people that they are interacting with, which is likely to prove dangerous considering the high levels of trust that individuals with WS employ (Riby *et al.*, 2014).

Given the social nature of adults with WS, both on and offline, it seems imperative that a parent or guardian should monitor Internet use and social interactions initiated through social networking. Taking such a stance may be difficult, however, as adults with IDD often wish to (and should be allowed to) maintain their own independence and autonomy (Wehmeyer & Garner, 2003; Northway, 2015). An alternative approach, often taken by parents of youth without disabilities, would be to use filtering software (e.g. CyberPatrol, NetNanny) that can block access to dangerous sites or to insist their children do not visit social networking sites (Tynes, 2007). Yet results from the current study and from previous research indicate that the individuals with WS might not tell their parents what they do online or they might hide certain activities.

Perhaps a different approach, then, would be to teach Internet safety skills to adults with WS. Equipping individuals with WS with specific strategies to use when responding to risky situations may help to decrease vulnerability online. For example, individuals without IDD often develop their own strategies for staying safe online, such as increasing their privacy settings or minimising interactions from unknown individuals (Tynes, 2007). Our results indicate that adults with WS do not similarly employ these techniques, as more than half had a public Facebook profile and almost half indicated they would agree to meet an 'online friend' in person. Thus, whilst individuals without IDD might be able to employ Internet safety skill on their own, individuals with WS may need more explicit Internet safety skills instruction. Unfortunately, we are unaware of any such research on interventions for teaching Internet safety skills to individuals with WS, or any disability.

It light of our current findings, it seems pertinent to start with teaching adults with WS about what personal information is okay to share and which should be kept private (e.g. address, school), who is and is not appropriate to accept as a friend, and how to decide whether an 'online friend' is okay to become an 'offline friend'. Perhaps even more simply, teaching adults with WS about safety in general could enhance their safety online. For example, similar to the approach taken in a stranger safety training conducted with adults with WS (Fisher, 2014), adults with WS should be taught to always let a trusted individual know where they are. It is estimated that from 9% to over 40% of young Internet users have face-to-face meetings with a person first encountered online and in 30–61% of cases, their parents were unaware of these meetings (Baumgartner *et al.*, 2010; Livingstone *et al.*, 2011; Helweg-Larsen *et al.*, 2012). If this simple rule is followed, then at least someone will know of their whereabouts if they go to meet a stranger who they have met online.

Whilst the results of this study are an important first step in understanding the online social vulnerability of adults with WS, certain limitations should be addressed. First, the participants with WS were a part of an overnight camp that required them to display few behaviour problems and to be able to stay away

from home. As such, these participants might not be a representative sample of adults with WS. Additionally, because these participants were potentially more independent than the broader population of adults with WS, it is possible that they were subsequently afforded more independence online as well. Whilst we found no relation between age, IQ, gender, or living situation and responses to the E-safety scenarios, a larger sample of adults with WS with a broader range of functioning is needed to more fully understand the online social vulnerability of adults with WS. This study also did not have a control group to which our findings could be compared. The percent of Internet and social networking users, however, were similar to those reported in previous studies (Didden *et al*., 2009; Wells & Mitchell, 2014).

Despite these limitations, the research presents important findings for future research and intervention development. These results also re-affirm the anecdotal evidence we often hear from parents expressing their concern for their children's online safety, especially as their child gets older and becomes more independent. Whilst the Internet provides a wealth of opportunities and resources to enhance the everyday lives of adults with WS, it also poses threats which are arguably more dangerous than those they face in the real world. As the Internet continues to become more accessible, future research should further examine the online vulnerability of individuals with WS, and ID more broadly. Such research should continue to explore specific disability status information to determine whether features of certain disabilities have different implications to risk of online victimisation (Wells & Mitchell, 2014). Once a more complete knowledge base is built, then the effectiveness of both existing and novel e-safety educational strategies can be examined.

References

Adolphs R., Tranel D. & Damasio A. R. (1998) The human amygdala in social judgment. *Nature Reviews Genetics* **393**, 470–4.

Baumgartner S. E., Valkenburg P. M. & Peter J. (2010) Unwanted online sexual solicitation and risky sexual only behavior across the lifespan. *Journal of Applied Developmental Psychology* **31**, 439–47. DOI: 10.1016/j.appdev.2010.07.005.

Bellugi U., Adolphs R., Cassady C. & Chiles M. (1999) Towards the neural basis for hyper-sociability in a genetic syndrome. *NeuroReport* **10**, 1653–7.

Boyd D. M. & Ellison N. B. (2007) Social network sites: definition, history and scholarship. *Journal of Computer-Mediated Communication* **13**, 210–30. DOI: 10.1111/j.1083-6101.2007.00393.x.

Chamberlain B., Kasari C. & Rotheram-Fuller E. (2007) Involvement or isolation? The social networks of children with autism in regular classrooms. *Journal of Autism and Developmental Disorders* **37**, 230–42. DOI: 10.1007/s10803-006-0164-4.

Cohen J. (1988) *Statistical Power Analysis for the Behavioral Sciences*, 2nd edn. Lawrence Earlbaum Associates, Hillsdale, NJ.

Craven S., Brown S. & Gilchrist E. (2006) Sexual grooming of children: review of literature and theoretical considerations. *Journal of Sexual Aggression* **12**, 287–99. DOI: 10.1080/13552600601069414.

Davies D. K., Stock S. E., King L. R., Brown B., Wehmeyer M. L. & Shogren K. A. (2015) An interface to support independent use of Facebook by people with intellectual disability. *Intellectual and Developmental Disabilities* **53**(1), 30–41.

Davies M., Udwin O. & Howlin P. (1998) Adults with Williams syndrome. Preliminary study of social, emotional and behavioural difficulties. *The British Journal of Psychiatry* **172**(3), 273–6. DOI: 10.1192/bjp.172.3.273.

Didden R., Scholte R. H. L., Korzilius H., De Moor J. M. H., Vermeulen A., O'Reilly M. *et al.* (2009) Cyberbullying among students with intellectual and developmental disability in special education settings. *Developmental Neurorehabilitation* **12**, 146–51. DOI: 10.1080/17518420902971356.

Dykens E. M., Rosner B. A. & Ly T. M. (2001) Drawings by individuals with Williams syndrome: are people different from shapes? *American Journal on Mental Retardation* **106**, 94–107.

File, T. & Ryan, C. (2014). Computer and Internet use in the United States: 2013. Retrieved on 17th July 2015 via http://www.census.gov/history/pdf/2013computeruse.pdf

Fisher M. H. (2014) Evaluation of a stranger safety training for young adults with Williams syndrome. *Journal of Intellectual Disability Research* **58**, 903–14. DOI: 10.1111/jir.12108.

Fisher M. H., Mello M. P. & Dykens E. M. (2014) Who reports it best? A comparison between parent-report, self-report, and the real life social behaviors of adults with Williams syndrome. *Research in Developmental Disabilities* **35**, 3276–84. DOI: 10.1016/j.ridd.2014.08.011.

Fisher M. H., Moskowitz A. & Hodapp R. M. (2013) Differences in social vulnerability among individuals with autism spectrum disorder, Williams syndrome, and Down syndrome. *Research in Autism Spectrum Disorders* **7**, 931–7. DOI: 10.1016/j.rasd.2013.04.009.

Frigerio E., Burt D. M., Gagliardi C., Cioffi G., Martelli S., Perrett D. I. *et al.* (2006) Is everybody always my friend? Perception of approachability in Williams syndrome. *Neuropsychologia* **44**(2), 254–9.

Helweg-Larsen K., Schutt N. & Larsen H. B. (2012) Predictors and protective factors for adolescent Internet victimisation: results from a 2008 nationwide Danish youth survey. *Acta Paediatrica* **101**, 533–9. DOI: 10.1111/j.1651-2227.2011.02587.x.

Hillier L. W., Fulton R. S., Fulton L. A., Graves T. A., Pepin K. H., Wagner-McPherson C. *et al.* (2003) The DNA sequence of chromosome 7. *Nature* **424**, 157–64. DOI: 10.1038/nature01782.

International Telecommunications Union. (2014). Measuring the information society report 2014. Retrieved on 17th July 2015 via: https://www.itu.int/en/ITU-D/Statistics/Documents/publications/mis2014/MIS2014_without_Annex_4.pdf

Järvinen A., Korenberg J. R. & Bellugi U. (2013) The social phenotype of Williams syndrome. *Current Opinion in Neurobiology* **23**, 1–9. DOI: 10.1016/j.conb.2012.12.006.

Jawaid A., Riby D. M., Owens J., White S. W., Tarar T. & Schulz P. E. (2012) 'Too withdrawn' or 'too friendly': considering social vulnerability in two neurodevelopmental disorders. *Journal of Intellectual Disability Research* **56**, 335–50. DOI: 10.1111/j.1365-2788.2011.01452.x.

Jones W., Bellugi U., Lai Z., Chiles M., Reilly J., Lincoln A. *et al.* (2000) Hypersociability in Williams syndrome. *Journal of Cognitive Neuroscience* **12**(Suppl 1), 30–46. DOI: 10.1162/089892900561968.

Katz J. E. (2001) Adolescents and young adults with developmental disabilities interface the internet: six case reports of dangerous liaisons. *Mental Health Aspects of Developmental Disabilities* **4**(2), 77–84.

Kaufman, A. & Kaufman, N. (2004). *Kaufman Brief Intelligence Test* (2nd ed.). American Guidance Service: Circle Pines, MN.

Little K., Riby D., Janes E., Clark F., Fleck R. & Rodgers J. (2013) Heterogeneity of social approach behaviour in Williams syndrome: the role of response inhibition. *Research in Developmental Disabilities* **34**, 959–67. DOI: 10.1016/j.ridd.2012.11.020.

Livingstone, S., Haddon, L., Görzig, A., Olafsson, K. (2011). EU kids online September 2011. Retrieved on 31st October 2013 via: www2.lse.ac.uk/media@lse/research/EUKidsOnline/EU%20kids%2011%20(2009–11)/EUKidsOnlineIIIReports/Final%20report.pdf

Lough E., Flynn E. & Riby D. (2015) Mapping real-world to online vulnerability in young people with developmental disorders: illustrations from autism and Williams syndrome. *Review Journal of Autism and Developmental Disorders* **2**, 1–7. DOI: 10.1007/s40489-014-0029-2.

Martens M. A., Wilson S. J., Dudgeon P. & Reutens D. C. (2009) Approachability and the amygdala: insights from Williams syndrome? *Neuropsychologia* **47**(12), 2446–53.

Mazurek M. O. (2013) Social media use among adults with autism spectrum disorder. *Computers in Human Behavior* **29**, 1709–14. DOI: 10.1016/j.chb.2013.02.004.

Mervis C. B., Kistler D. J., John A. E. & Morris C. A. (2012) Longitudinal assessment of intellectual abilities of children with Williams syndrome: multilevel modeling of performance on the Kaufman Brief Intelligence Test-Second Edition. *American Journal on Intellectual and Developmental Disabilities* **117**, 134–55.

Mitchell K. J., Finkelhor D. & Wolak J. (2001) Risk factors for and impact of online sexual solicitation of youth. *Journal of the American Medical Association* **285**, 3011–4. DOI: 10.1001/jama.285.23.3011.

Mitchell K. J., Finkelhor D. & Wolak J. (2007) Youth Internet users at risk for the most serious online sexual solicitations. *American Journal of Preventive Medicine* **32**, 532–7. DOI: 10.1016/j.amepre.2007.02.001.

Mitchell K. J., Wolak J. & Finkelhor D. (2008) Are blogs putting youth at risk for online sexual solicitation or harassment? *Child Abuse & Neglect* **32**, 277–94.

Mitchell K. J., Jones L. M., Finkelhor D. & Wolak J. (2011) Internet facilitated commercial sexual exploitation of children: findings from a nationally representative sample of law enforcement agencies in the United States. *Sexual Abuse: A Journal of Research and Treatment* **23**, 43–71. DOI: 10.1177/1079063210374347.

Murphy G. H. & O'Callaghan A. C. (2004) Capacity of adults with intellectual disabilities to consent to sexual relationships. *Psychological Medicine* **34**, 1347–57.

Normand C. L. & Sallafranque-St-Louis F. (2015) Cybervictimisation of young people with an intellectual or developmental disability: risks specific to sexual solicitation. *Journal of Applied Research in Intellectual Disabilities*. DOI: 10.1111/jar.12163.

Northway R. (2015) What does independence mean? *Journal of Intellectual Disabilities* **19**, 203–4. DOI: 10.1177/1744629515593659.

Pinkham A. E., Hopfinger J. B., Pelphrey K. A., Piven J. & Penn D. L. (2008) Neural bases for impaired social cognition in schizophrenia and autism spectrum disorders. *Schizophrenia Research* **99**, 164–75. DOI: 10.1016/j.schres.2007.10.024.

Porter M. A., Coltheart M. & Langdon R. (2007) The neuropsychological basis of hypersociability in Williams and Down syndrome. *Neuropsychologia* **45**(12), 2839–49.

Riby D. M., Kirk H., Hanley M. & Riby L. M. (2014) Stranger danger awareness in Williams syndrome. *Journal of Intellectual Disability Research* **58**, 572–82. DOI: 10.1111/jir.12055.

Ridings C. M. & Gefen D. (2004) Virtual community attraction: why people hang out online. *Journal of Computer-Mediated Communication* **10**, 00. DOI: 10.1111/j.1083-6101.2004.tb00229.x.

Searcy Y. M., Lincoln A. J., Rose F. E., Klima E. S., Bavar N. & Korenberg J. R. (2004) The relationship between age and IQ in adults with Williams syndrome. *American Journal on Mental Retardation* **109**, 231–6.

Subrahmanyam K. & Greenfield P. (2008) Online communication and adolescent relationships. *Future of Children* **18**, 119–46. DOI: 10.1353/foc.0.0006.

Suler J. (2004) The online disinhibition effect. *Cyberpsychology & Behavior* **7**, 321–6. DOI: 10.1089/1094931041291295.

Tynes B. M. (2007) Internet safety gone wild? Sacrificing the educational and psychosocial benefits of online social environments. *Journal of Adolescent Research* **22**, 575–84. DOI: 10.1177/0743558407303979.

Wehmeyer M. L. & Garner N. W. (2003) The impact of personal characteristics of people with intellectual and developmental disability on self-determination and autonomous functioning. *Journal of Applied Research in Intellectual Disabilities* **16**, 255–65. DOI: 10.1046/j.1468-3148.2003.00161.x.

Wells M. & Mitchell K. J. (2014) Patterns of internet use and risk of online victimisation for youth with and without disabilities. *The Journal of Special Education* **48**, 204–13. DOI: 10.1177/0022466913479141.

Whittle H., Hamilton-Giachritsis C., Beech A. & Collings G. (2013) A review of young people's vulnerabilities to online grooming. *Aggression and Violent Behavior* **18**, 135–46. DOI: 10.1016/j.avb.2012.11.008.

Wilson C., Seaman L. & Nettelbeck T. (1996) Vulnerability to criminal exploitation: influence of interpersonal competence differences among people with mental retardation. *Journal of Intellectual Disability Research* **40**, 8–16. DOI: 10.1111/j.1365-2788.1996.tb00597.x.

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Appendix A: E-safety scenarios task

I want to talk to you about certain things that might happen online. I want you to choose the option that is closest to what you think you would do. There is no right or wrong answer and you will not get in trouble for any of the answers. We will not talk to your parents about your answers. We just want to know more about what you are doing online.

1 You have been talking to a friend online but you have never met them in real life, they ask you to put your video camera on, what do you do?
   a Tell them you don't want to
   b Say not now, but you will do it next time you talk
   c Say yes sounds like a great idea
2 You have met a really cool person online and you have been getting along really well. They say they want to date you and ask you to send a picture of yourself. What do you do?
   a Say no, you don't want to send a picture of yourself
   b Promise you will send them one tomorrow
   c Send them a nice picture of you
3 You met a new friend online named Alex. You like all of the same things and have a lot in common, but you have never met before in real life. Alex wants to meet up soon so you can do something fun together. What should you do?
   a Make plans to meet Alex as soon as possible
   b Tell Alex you're busy but would love to meet sometime soon
   c Say no, you don't think it's a good idea
4 You are playing an online game, and you are chatting to other people that are also playing the game. One person asks if you want to come over and play the game together at their house. You have only ever talked to them online. What do you do?
   a Ask them if they want to come over to yours instead
   b Tell them no thanks
   c Say yes you would love to
5 Someone tries to send you a picture online. You have never met this person before or talked to them online before. They say it is a picture of a friend that you know. What do you do?
   a Ignore them
   b Say sure, send the photo over
   c Start talking to them to find out more
6 Someone you have met online asks you for your e-mail password because they need a new password and want some good ideas. What do you do?
   a Give them your e-mail password, it's good to share things
   b Suggest some of the other passwords you use instead
   c Say no, it's private information
7 You've found a really cool competition online. They say if you enter now you could win a lot of money. It only costs $5, and they ask for your name, address and phone number. What do you do?
   a Pay the $5 but don't give them all of your details
   b Pay the $5 and give them all your details
   c Ignore it
8 Someone you don't know has e-mailed you to say you have won a competition. You don't remember entering any competition, but it says you have won $10,000! They ask you for your bank account

number so they can put the money in your account. What do you do?
   a Ignore it, you didn't enter a competition
   b Write them back and ask what the competition was before giving them your bank account information
   c Give them your bank account information so you can get the $10,000
9 You have received a few friend requests on Facebook from people you don't know. What do you do?
   a Click accept, you could become friends
   b Click decline, you don't know who they are
   c Leave the friend requests and decide later
10 When you're online, a message pops up saying ?Hi I'm Danny from England. I'm looking to make friends in America. Click here to send me an e-mail'. What do you do?
   a Send Danny an e-mail and forward the message to your friends so he can make lots of new friends
   b Ignore the message
   c Send Danny an e-mail, you could be his friend
11 You have been talking to someone online, but you have never met them in real life. They are flirting with you, but ask you to keep your relationship a secret because it will make it more exciting. Do you keep it a secret?
   a No, you don't think you should keep this kind of thing a secret
   b Yes you will keep it a secret
   c Say you will keep it a secret for a while but then you want to tell people
12 You have been on a social networking site that you know your parents don't like you using. They ask you if you have been on it recently. What do you say?
   a Say no you haven't been on it, they would be mad if they knew you had been on that site
   b Say yes you have been on it and talk to them about it
   c Avoid answering the question