

## Evaluation of a stranger safety training programme for adults with Williams syndrome

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### Abstract

**Background** Individuals with Williams syndrome (WS) are reported to display increased sociability towards strangers, leading to increased social vulnerability. No research has examined real life interactions of adults with WS towards strangers and no interventions have been implemented to teach stranger safety skills to this population.

**Method** Twenty-one adults with WS participated in 3 days of behaviour skills training to learn how to respond to a stranger lure. Skill acquisition was assessed *in situ*; confederate strangers approached participants, presented a lure and recorded the participants' response.

**Results** Prior to intervention, 14% of participants walked away from a stranger. Participants were able to accurately use the skills in role play. After training, 62% of participants said 'no' and walked away and only 14% agreed to leave with the stranger during *in situ* assessments.

**Conclusions** Individuals with WS are at-risk but can learn how to appropriately respond to lures from strangers. Further research is needed to increase use of safety skills in various conditions.

**Keywords** behaviour skills training, sociability, stranger safety, Williams syndrome

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Williams syndrome (WS) is a rare genetic disorder caused by a microdeletion of genes on chromosome 7, resulting in borderline to moderate levels of intellectual disability (ID) (Hillier *et al.* 2003; Mervis & John 2010). Individuals with WS are often characterised as overly friendly, socially disinhibited and too trusting of other people (Davies *et al.* 1998; Jones *et al.* 2000; Bellugi *et al.* 2007). The increased sociability seen among individuals with WS leads to a strong desire to make friends and to please others (Davies *et al.* 1998), as well as to what parents describe as a pervasive and difficult to inhibit desire to approach and engage strangers (Jones *et al.* 2000; Doyle *et al.* 2004). Given their ID, coupled with the increased sociability, individuals with WS may be vulnerable to abuse and exploitation by strangers (Doyle *et al.* 2004; Jawaid *et al.* 2012; Fisher *et al.* 2013a). This vulnerability underlines the importance of examining the social approach behaviours of individuals with WS and to develop trainings to teach these individuals to protect themselves from strangers.

The social approach behaviours of individuals with WS have been measured in many different ways. First, parent-report questionnaire studies (such as the Salk Institute Sociability Questionnaire, SISQ; Doyle *et al.* 2004) have found that individuals with WS display significantly increased sociability compared with individuals with other developmental disabilities and typically developing individuals (Jones *et al.* 2000; Klein-Tasman &

Mervis 2003; Doyle *et al.* 2004; Zitzer-Comfort *et al.* 2007; Järvinen-Pasley *et al.* 2010). For example, compared with individuals with autism, Down syndrome and typically developing controls, those with WS were rated by parents to have excessive interest in others, to seek social interactions and to lack inhibition towards approaching others (Jones *et al.* 2000).

Second, experimental studies have examined whether individuals with WS are able to judge whether or not a person is friendly and approachable by rating photos of unfamiliar faces displaying various emotions. These studies confirm that individuals with WS tend to rate happy faces as more approachable than do typically developing controls (Bellugi *et al.* 1999; Frigerio *et al.* 2006; Martens *et al.* 2009). On the other hand, some researchers found that individuals with WS also rated negative faces as approachable (Bellugi *et al.* 1999; Martens *et al.* 2009); while others found that individuals with WS did not consider faces expressing anger, disgust, fear or sadness as approachable (Frigerio *et al.* 2006). Thus, there is conflicting evidence as to whether individuals with WS are able to discriminate between individuals whose appearance is or is not approachable.

Third, research examining the biological basis of hypersociability in WS points to the possibility that these individuals are hard-wired to be socially oriented. Specifically, imaging studies have found that compared with typically developing individuals, those with WS have a larger volume in the right amygdala, which is then associated with more positive approachability ratings of unfamiliar faces (Martens *et al.* 2009). The larger right amygdala volume, therefore, might partially account for the strong social drive seen among individuals with WS (Martens *et al.* 2009). Furthermore, individuals with WS fail to engage the frontostriatal systems; this failure to engage is related to poor response inhibitions (Mobbs *et al.* 2007). Thus, individuals with WS may be unable to inhibit inappropriate social behaviours because of dysfunctions in two critical neural systems: the amygdala and frontostriatal systems (Mobbs *et al.* 2007). Comparing the amygdala hypothesis to the frontal lobe hypothesis, it has recently been reported that individuals with WS who are most likely to consider strangers to be approachable are also more

likely to demonstrate the poorest response inhibition abilities (Little *et al.* 2013).

The findings from parent report, self-report and neuroimaging may indicate that the tendency to view strangers as approachable and trustworthy is hard-wired. In fact, it has been speculated that individuals with WS cannot inhibit themselves from interacting with strangers and are unable to learn how to appropriately respond to strangers. As Jones *et al.* (2000, p. 31) reported ‘. . . in circumstances typically eliciting social reservation (e.g., encountering strangers), infants, toddlers, children, and adults with [WS] frequently come directly up to and begin engaging strangers. Parents report attempts to train their [WS] child (e.g., adolescent daughter) *not* to talk to strangers – to no avail’.

Unfortunately, little research has been conducted to directly measure how individuals with WS behave towards strangers in real life situations or to determine whether they can be taught to respond appropriately to stranger lures. The only study to directly examine social behaviours of individuals with WS towards strangers was conducted with 10 preschool children with WS compared with 10 mental age-matched and 10 chronologically age-matched peers without disabilities (Dodd *et al.* 2010). Dodd and colleagues found that young children with WS, compared with peers without disabilities, were more willing to engage with a stranger. This research, however, was conducted in a laboratory setting with the child’s parent in the room. It is unknown, therefore, whether these children would have behaved similarly in a more natural setting. In another study, the approachability ratings of adults with WS were related to their real-life social tendencies, as reported by parents on the SISQ (Järvinen-Pasley *et al.* 2010). Compared with parents of typically developing individuals, parents reported individuals with WS as significantly more sociable in terms of approachability towards unfamiliar people. However, while the participants with WS themselves rated photos of familiar faces as approachable, they did not similarly rate photos of unfamiliar faces as approachable. Thus, this study found a disconnect between the sociability reported by parents and the sociability reported by individuals with WS themselves (Järvinen-Pasley *et al.* 2010). While parents tend to rate individuals with WS as likely to

approach strangers, individuals with WS tend to report more inhibition towards approaching unknown individuals.

Finally, using a video vignette task, individuals with WS's awareness of 'stranger danger' was examined (Riby *et al.* 2013). After viewing two scenes of strangers approaching a young child, the participants were asked how the child should respond. Compared with typically developing controls, individuals with WS were less aware of the dangers of interacting with strangers and were more likely to indicate it was okay for the child actor to interact with a stranger. Riby and colleagues concluded that future research should examine the relationship between social approach behaviours and stranger danger awareness in individuals with WS.

The three studies examining social behaviours and responses to strangers have conflicting findings. Two studies found that children with WS were more likely to approach strangers and to indicate it is acceptable to interact with a stranger. Järvinen-Pasley *et al.* (2010), however, found that individuals with WS are less likely to indicate they would approach a stranger, as compared with parent ratings. Unfortunately, Dodd *et al.* (2010) were the only researchers to examine the actual approach behaviours of individuals with WS. Before we can conclude that individuals with WS are unable to resist interacting with strangers, direct observations of social behaviours in individuals with WS are needed (Järvinen-Pasley *et al.* 2010). Furthermore, if individuals with WS are more likely to approach and engage strangers, it is important to examine whether they can be taught stranger safety skills. The aim of the current study was to extend the previous research in two ways. First, this study directly examines how adults with WS respond to lures from strangers. Second, this study will determine whether training can increase the use of appropriate stranger safety skills by adults with WS.

This study had three research questions. (1) Prior to training, do adults with WS display the stranger safety skills of saying 'no' and walking away when approached by a stranger? (2) Can adults with WS learn the stranger safety skills during 3 days of group behaviour skills training? (3) Will adults with WS use the stranger safety skills in response to a stranger lure after training?

## Method

### Participants

Participants were recruited from a residential summer camp programme for adults with WS. Parents of participants were asked if they would like their child to participate in a stranger safety skills training while at camp. Interested parents signed a consent form and the individuals with WS signed an assent form. A total of 21 young adults with genetically confirmed WS (4 female, 17 male) participated; all but one camper elected to participate in the stranger safety skills training, demonstrating parents' interest in this type of intervention. Participants were an average of 25.71 (SD = 9.67) years of age (range 16–48). Participants were administered the Kaufman Brief Intelligence Test, second edition (KBIT-2; Kaufman & Kaufman 2004), that yields verbal, non-verbal and full-scale IQ scores. Average full-scale IQ was 70.90 (13.53); consistent with the WS cognitive profile, average verbal standard score was 78.62 (13.47) and average non-verbal standard score was 69.19 (16.22; Searcy *et al.* 2004). Participants were assigned to small training groups based on dormitory assignment (which were the participants' residences during camp). Group A consisted of four female participants; Group B consisted of six male participants; Group C consisted of six male participants; and Group D consisted of five male participants. Groups A and B were combined into Group 1 and Groups C and D were combined into Group 2 for analyses, as these groups participated in training at the same time. Groups 1 and 2 did not differ significantly by age or scores on the KBIT-2 (Kaufman & Kaufman 2004; Table 1).

**Table 1** Demographic characteristics of participants in Group 1 and Group 2. No differences found between groups

	Group 1	Group 2	t
n	10	11	
Mean age	27.30 (10.79)	24.27 (8.79)	0.71
KBIT verbal SS	77.10 (11.41)	80.00 (15.54)	-0.48
KBIT non-verbal SS	64.30 (14.86)	73.64 (16.78)	-1.34
Mean FSIQ	67.40 (11.11)	74.09 (15.55)	-1.14

KBIT, Kaufman Brief Intelligence Test; SS, standard score; FSIQ, full-scale IQ.

There were significantly more women in Group 1 compared with Group 2.

Confederate strangers ( $n = 14$ ) conducted *in situ* assessments at three time points throughout the study. Confederate strangers were unknown to the participants and were recruited from a graduate Special Education programme, as well as through word of mouth. Confederate strangers varied in age [mean = 31.43 (6.80), range 23–47 years] and gender (50% male). The majority (79%) of confederate strangers was Caucasian; there were also two Hispanic confederate strangers (one male and one female) and one male African American confederate stranger. Confederate strangers conducted assessments with multiple participants, but never conducted more than one assessment per participant.

### Setting

The training sessions were conducted in the common area of the university dormitories. Role

plays were conducted in the dormitories and on the common grounds surrounding the dormitories. *In situ* assessments were conducted in various community settings associated with camp, such as areas outside the dormitories, the music rehearsal room and building, the camp cafeteria, a local restaurant and a hair salon.

### Procedure

Participants were randomly assigned the type of lure (general, assistance or incentive), the gender of stranger (male/female), and the time of day (am/pm) for each *in situ* assessment (Table 2). Multiple examples of each type of lure were used throughout the study, including: general ('Would you like to go on a walk around campus with me?'); incentive ('I will buy you an ice cream if you come with me'); and assistance ('Can you help me carry this to my car?').

**Table 2** Type of lure, gender of stranger and time of day randomly assigned to participants for each *in situ* assessment

Group	Time 1			Time 2			Time 3		
	Lure type	Stranger gender	Time of day	Lure type	Stranger gender	Time of day	Lure type	Stranger gender	Time of day
A	Assistance	Female	pm	Incentive	Female	pm	Assistance	Male	am
A	Assistance	Male	am	Incentive	Female	pm	Incentive	Female	pm
A	General	Male	pm	Incentive	Female	pm	Assistance	Female	pm
A	Assistance	Male	am	Incentive	Male	pm	Incentive	Male	am
B	General	Male	am				Incentive	Female	pm
B	General	Male	pm				General	Male	pm
B	General	Female	am	Assistance	Female	pm	General	Female	pm
B	General	Female	am	General	Female	pm	Assistance	Male	pm
B	General	Male	pm	Incentive	Male	pm	Assistance	Female	am
B	General	Male	am				Incentive	Female	am
C	Incentive	Male	pm	Incentive	Female	am	Incentive	Male	am
C	Incentive	Female	pm	Assistance	Male	am	Assistance	Female	am
C	General	Female	am	Assistance	Female	pm	Incentive	Male	pm
C	Incentive	Female	pm	Incentive	Female	pm	General	Male	pm
C	Assistance	Female	pm	Assistance	Male	am	Incentive	Male	am
C	General	Female	pm	General	Male	am	Incentive	Male	am
D	Assistance	Female	am	Assistance	Male	am	Assistance	Male	am
D	General	Female	am	Incentive	Male	am	Incentive	Female	pm
D	Assistance	Female	pm	Assistance	Male	am	General	Female	pm
D	Incentive	Female	pm	General	Female	am	Assistance	Female	am
D	General	Male	am	Assistance	Male	am	Incentive	Male	pm

### Assessment

Participants received up to three *in situ* assessments: Time 1, Time 2 and Time 3. For each *in situ* assessment, a research assistant met a confederate stranger at the specified location. She then provided the confederate stranger with a specific lure and a 'termination' phrase to be used for each participant assigned to that stranger. The research assistant then moved away from the confederate stranger, to a location where she could observe the interaction but was not noticeable to the participant. One at a time, the confederate stranger approached all participants assigned to him or her and presented a lure. If the participant agreed to go with the stranger, the stranger used the termination phrase to walk away alone (e.g. 'Oh, I just realised I am late for a meeting. I need to go now'). If the participant said 'no' or walked away, the confederate stranger walked away in the opposite direction. Following each *in situ* assessment, the confederate stranger and research assistant separately recorded the participant's response. The research assistant also recorded procedural fidelity of the confederate stranger's behaviours.

### Intervention

After collection of Time 1 data, participants received intervention according to their group assignment. Participants in Groups A and B received intervention for 3 consecutive days, while Groups C and D did not receive any stranger

safety training on these days. Following the 3 days of intervention for Groups A and B, all participants received the Time 2 *in situ* assessment. Following the second *in situ* assessment, participants in Groups C and D received 3 days of intervention and Groups A and B did not receive any additional stranger safety training. Following 3 days of intervention for Groups C and D, all participants received the Time 3 *in situ* assessment. Therefore, the Time 1 assessment served as a pre-test for all participants; The Time 2 assessment served as an immediate post-test for Group 1 but as a second pre-test for Group 2. The Time 3 assessment was a maintenance post-test for Group 1 and an immediate post-test for Group 2 (see Table 3).

All groups participated in 3 consecutive days of 30-min behaviour skills training (BST) sessions; an intervention sequence consisting of instructions, modelling, role play and feedback. BST has been successfully used to teach individuals with ID to avoid lures from strangers (Collins *et al.* 1992; Gast *et al.* 1993; Gunby *et al.* 2010; Fisher *et al.* 2013b), sexual abuse prevention (Lee & Tang 1998; Miltenberger *et al.* 1999; Egemo-Helm *et al.* 2007), as well as various other safety skills (see Mechling 2008 for a review). Furthermore, BST has been found to be the most effective method for teaching stranger safety skills to young children without disabilities (Miltenberger & Olsen 1996). Thus, given their ID, this method was considered the best way to teach these skills to individuals with WS.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
Group A	Time 1 BST	BST	BST Time 2			Time 3
Group B	Time 1 BST	BST	BST Time 2			Time 3
Group C	Time 1		Time 2 BST	BST	BST	Time 3
Group D	Time		Time 2 BST	BST	BST	Time 3

**Table 3** Schedule of behaviour skills training (BST) and Time 1, Time 2 and Time 3 *in situ* assessments for the four groups

Groups alternated each day between receiving BST sessions from one of two trainers. Two camp counselors per group were also present during training to assist with modelling behaviours and collecting data during role plays. During each session, the trainer used a short (less than 10 min) Power Point presentation to explain what a stranger is and the types of lures a stranger might use to entice someone to walk away with them. Multiple examples of the four types of lures (general, incentive, assistance and authority<sup>1</sup>) were presented. Participants were then taught the three safety behaviours to use in response to a stranger lure: (1) say 'no'; (2) immediately walk at least five steps away; and (3) tell a trusted adult about the stranger. During this instruction, participants were required to interact with the trainer, answering questions and developing examples. Instruction was kept short and engaging to account for the decreased attention span characteristics of individuals with WS.

The trainer and two counselors then modelled the appropriate behaviours in four examples of correct responding and two counter-examples of incorrect responding. For each model, the trainer played the role of the 'camper', one counselor played the role of the 'stranger' and one counselor played the role of the 'trusted adult'. After each modelled example, a participant was asked to state which behaviours the trainer performed correctly. After each modelled counter-example, a participant was asked to state which behaviour the trainer performed incorrectly and what the trainer should have done. The trainer then reenacted that scenario performing the correct safety behaviours.

The participants then separated into smaller role play groups of two to three participants per one trainer/counselor. During role play, the trainer/counselor played the role of the 'stranger' and one participant played the role of the 'trusted adult'. The other participant practised responding to multiple examples of the four types of lures generated by the trainer/counselor. Participants alternated practising responding until each participant completed five role plays.

<sup>1</sup> The authority lure was described and participants rehearsed responding to examples of authority lures. We chose not to use authority lures during *in situ* assessments because of the nature of interactions with authority figures at camp.

For each role play, a brief scene was described and then the trainer approached the participant and presented a lure. Participants were coached to provide each other with behaviour-specific praise when they performed all three safety behaviours (e.g. 'Tell him what he did correctly that time'). If they did not perform one of the safety skills correctly, participants received verbal (e.g. 'what's next?') or physical (e.g. hand on back guiding participant away from the stranger) prompts from the trainer/counselor. After prompting, the role play was repeated until the participant independently performed the three safety skills.

## Outcome measures

### In situ

Safety ratings for each behaviour of the *in situ* assessments were recorded as follows: 0 = agreed to leave with the stranger; 1 = did not go with the stranger but failed to say 'no'; 2 = said 'no', did not walk away or report; 3 = said 'no', walked away, did not report; 4 = said 'no', walked away and reported. Participants were considered to have reached criterion if they achieved a score of 3 or higher.

### Role play

During training, skill acquisition was measured through performance on five role plays per session. During each role play, participants received 1 point for performing each of the three behaviours independently (say 'no', walk away, tell an adult). Participants could earn up to 15 points per session. The percentage of points earned throughout role play was then calculated for each participant.

## Training personnel

Prior to the start of the study, the BST trainers and eight camp counselors participated in a 30-min training, during which they were taught the procedures for BST, how to conduct role plays with the participants, and how to collect data during role play. Additionally, all additional camp personnel were aware of this project and were given instructions as to how to respond if a participant reported a stranger lure.

During a separate 30-min training, two research assistants and the confederate strangers were trained on how to conduct an *in situ* assessment and how to collect data on the participant's behaviours. Training consisted of an explanation of the study and procedures, behaviour modelling of the lure procedures, and rehearsal. Finally, during the same confederate training, the research assistants were trained to collect reliability and procedural fidelity data for the *in situ* assessments. While pairs of confederate strangers rehearsed the procedures, the research assistants observed each pair, provided corrective feedback or descriptive praise, and collected procedural fidelity data. Prior to conducting *in situ* assessments, all confederate strangers completed three consecutive role play scenarios with 100% accuracy. The research assistants and confederate strangers were not affiliated with the safety training or with the participants in any way and were only present during the *in situ* assessments. As such, participants did not recognise them or associate them with the stranger safety training during the *in situ* assessments.

#### Interobserver agreement and procedural fidelity

During all *in situ* assessments the confederate stranger served as the primary observer of the participant's verbal (provide refusal within 3 s) and motor responses (moved at least five steps away). All camp personnel served as primary observers for whether the participant reported the incident after the assessment (by completing the stranger lure reporting form). The research assistants acted as the interobserver agreement observer of the participant's verbal and motor responses during *in situ* assessments. The trainers/counselors were the primary observers of the participants' behaviours during role play.

Interobserver agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements for each of the target responses (did not go with the stranger, said 'no', moved away) and multiplying by 100 (Kennedy 2005). Two observers recorded the participant's behaviour during 100% of Time 1 assessments with 100% agreement, 89% of Time 2 assessments with 98% agreement and 67% of Time 3 assessments with 98% agreement. Pro-

cedural fidelity data were collected during 86% of Time 1 assessments, 83% of Time 2 assessments and 62% of Time 3 assessments. All measures of procedural fidelity reached 100%. Both trainers used a checklist to track procedural fidelity during the training (role plays). All trainings reached 100% procedural fidelity.

## Results

### Preliminary findings

Because all female participants ( $n = 4$ ) were in Group 1, we compared these participants to the male participants in Group 1. They did not differ from the men in terms of age [ $t(8) = 0.18$ , ns], IQ [ $t(8) = 0.72$ , ns], or scores at Time 1 [ $t(8) = 0.00$ , ns], Time 2 [ $t(5) = 1.00$ , ns] or Time 3 [ $t(8) = 0.37$ , ns] *in situ* assessments. Furthermore, among all participants there were no differences in performance by gender of the participant, gender of stranger, type of lure or time of day for any time point. Performance was also not significantly correlated with age or IQ.

**Research Question 1:** Prior to training, do adults with WS display the stranger safety skills of saying 'no' and walking away when approached by a stranger?

It was first important to determine whether individuals with WS displayed the stranger safety skill prior to receiving stranger safety BST. To answer this, we examined the participants' responses to the stranger lures before they received training. Each participant in Group 1 received one *in situ* assessment before training (Test 1). Overall, nine participants (90%) in Group 1 did not reach criterion prior to intervention (score of 3 or higher – said 'no' and walked away). Three individuals (30%) agreed to go with the stranger and six individuals (60%) said 'no' but did not move away from the stranger. The final participant reached criterion as he said 'no' and moved away from the stranger (see Table 4).

Participants in Group 2 received two *in situ* assessments before training (Test 1 and Test 2). Similar to Group 1, 9 out of 11 participants (82%) in Group 2 failed to reach criterion at least once prior to training. Overall, participants in Group 2 failed to reach criterion in 20 of 22 *in*

**Table 4** *In situ* assessment scores by group at Time 1, Time 2 and Time 3

	Time 1	Time 2	Time 3
Group 1 score (n = 10)			
0	3 (30%)	2 (28.6%)	1 (10%)
1			
2	6 (60%)	2 (28.6%)	4 (40%)
3	1 (10%)	2 (28.6%)	1 (10%)
4		1 (14.3%)	4 (40%)
Group 2 score (n = 11)			
0	5 (45.5%)	5 (45.5%)	
1	1 (9.1%)	1 (9.1%)	
2	4 (36.4%)	4 (36.4%)	4 (36.4%)
3	1 (9.1%)	1 (9.1%)	3 (27.3%)
4			4 (36.4%)

0 = agreed to leave with the stranger; 1 = did not go with the stranger but failed to say 'no'; 2 = said 'no', did not walk away or report; 3 = said 'no', walked away, did not report; 4 = said 'no', walked away and reported.

*situ* assessments; participants agreed to go with the stranger in 10 out of 22 *in situ* assessments and either did not respond or said 'no' but did not move away from the stranger in an additional 10. Two participants reached criterion in one of two assessments; both of these participants agreed to go with the stranger in their other *in situ* assessment (Table 4).

In summary, all but three participants failed to display the stranger safety skills prior to training (86%). Moreover, stranger safety skills were inconsistently displayed within individuals, with individuals sometimes displaying criterion level behaviours but other times agreeing to go with the stranger. These young adults with WS were, in fact, an at risk group that could benefit from receiving stranger safety BST.

Research Question 2: Can adults with WS learn the stranger safety skills during 3 days of group BST?

Participants in both groups quickly acquired the skills and were able to perform at criterion during role play. For Group 1, on the first day of training, participants' scores ranged from 67% to 100% with an average of 92% of steps completed independently. On day two of training, participant's scores ranged from 93% to 100%, with an average of 98%

of steps completed independently. On day three, scores ranged from 93% to 100%, with an average of 99%. Similarly, on the first day of training participants' scores in Group 2 ranged from 93% to 100% with an average of 99% of steps completed independently. On day two of training, scores ranged from 80% to 100%, average 95%. And on day three, scores ranged from 93% to 100%, average 99%. These results indicate that participants were able to acquire the skills during training and to independently display the skills during role play.

Research Question 3: Will adults with WS use the stranger safety skills in response to a stranger lure after training?

While no participants dropped out of the study, we were unable to conduct Test 2 *in situ* assessments for three participants in Group 1 because of an inability to get the participants alone long enough for the stranger to approach. Examining scores in Group 1, the majority of participants demonstrated improved safety skills. Immediately following BST, three out of seven participants in Group 1 (43%; compared with 10% before training) displayed the safety skills at or above criterion (score of 3 or higher) at Time 2. Additionally, two participants said 'no' to the stranger, but failed to walk away. Finally, two participants agreed to go with the stranger immediately following training (Table 4).

Participants in Group 2 received the Time 3 assessment 1 day after completion of BST. Seven out of 11 participants (64%; compared with 18% before training) displayed the safety skills at or above criterion. Three other participants increased from a score of 0 (agreed to go with stranger) at their Time 2 assessment to a score of 2 (said 'no' but did not walk away) at their Time 3 assessment. One participant decreased from walking away to simply saying 'no' to the stranger (Table 4).

Finally, participants in Group 1 received a Time 3 assessment 3 days after completion of stranger safety BST. Five out of 10 participants (50%) displayed the safety skills at or above criterion. Four other participants said 'no' to the stranger but failed to walk away. Finally, one participant agreed to leave with the stranger on the Time 3 assessment. Interestingly, this participant had displayed the

safety skill at criterion in the previous two assessments.

Overall then, following intervention, use of the safety skills increased but was still variable. Thirteen out of 21 participants (62%) used the safety skills at least once after intervention. Of those who did not meet criterion, however, five (71%) increased from baseline performance; they moved from agreeing to leave with the stranger to saying 'no'. Finally, following intervention, only three participants (14%) agreed to leave with the stranger.

## Discussion

This study is the first to examine real life behaviours of how adults with WS interact with strangers and the first intervention designed to teach individuals with WS how to appropriately respond to lures from strangers. While there is evidence to indicate that sociability may be hard-wired in individuals with WS (Bellugi *et al.* 1999; Jones *et al.* 2000; Mobbs *et al.* 2007; Martens *et al.* 2009; Järvinen-Pasley *et al.* 2010), this study demonstrates that adults with WS are highly likely to agree to go with a stranger but that inappropriate social behaviours are not immutable.

This study has three main findings. First, individuals with WS were found to be an at-risk group in need of stranger safety training. While this concern is widespread through parent reports (Doyle *et al.* 2004; Jones *et al.* 2000; Klein-Tasman & Mervis 2003; Zitzer-Comfort *et al.* 2007), self-report (Riby *et al.* 2013) and clinical anecdotes, this is the first study to quantify this stranger vulnerability using direct behavioural assessments in real-world settings. Before intervention, only three participants said 'no' and walked away from the stranger. Furthermore, over one-third of the participants agreed to go with the stranger.

Second, participants with WS rapidly acquired the safety skills, as demonstrated during role play. In fact, participants were able to perform 96% of steps in role play independently on the first day of training. During BST, participants actively participated – talking about strangers and rehearsing ways to respond to a stranger. They were able to tell the trainer whether she performed the skills inappropriately during modelling and could tell the trainer

what she should have done instead. At the start of training, many participants expressed the difficulty they felt they would have with saying 'no' to a stranger because they did not want to appear rude or they did not want to hurt the stranger's feelings. In response to these concerns, the trainers and participants brainstormed ways they could say 'no' without being rude. For example, participants practised saying 'I'm sorry, but I can't do that'. Developing polite but firm ways to say 'no' helped to ease the participant's concerns about using the safety skills. This is an important lesson to embed into future stranger safety training interventions for individuals with WS.

Finally, use of the safety skills increased after intervention, but was not demonstrated consistently across participants. Interestingly, participants in Group 1 were less consistent with using the skills *in situ* than were individuals in Group 2. Specifically, after individuals in Group 1 received training, there were still 3 instances in which an individual agreed to go with a stranger. On the other hand, no participant in Group 2 agreed to go with a stranger after training. This finding is similar to other safety training research conducted with children, which found a lack of correspondence between self-report behaviours and real life behaviours (Olsen-Woods *et al.* 1998). While all participants in the current study acquired and displayed the safety skills during role play, there was a lack of correspondence between their behaviours during role play and their behaviours in real life situations.

The differences in acquisition were not related to age, gender or IQ of the participant, nor were they related to gender of stranger, type of lure or time of day of the lure delivery. Furthermore, those participants who did not display the safety skill after training did not differ in age or IQ from those who did display the safety skills. The heterogeneity in skill acquisition is similar to previously reported heterogeneity of social approach behaviours among individuals with WS (Järvinen-Pasley *et al.* 2010; Little *et al.* 2013). As with most developmental disabilities, individuals with WS display variability in social approach behaviours, with some being extremely social and others being described as withdrawn. The participants in this study responded similar to what has been found in previous self-report measures – some were more willing

to approach a stranger than were others (Järvinen *et al.* 2013). In future research, the ability to acquire the stranger safety skills should be compared with performance on sociability and approachability tasks. It would be interesting to see if those individuals with WS who judge faces as more approachable have a more difficult time acquiring and using the stranger safety skills. This ability to recognise emotion and discriminate may be an important factor in the ability to learn the stranger safety skills. Similarly, it is unknown if the facial expressions of confederate strangers would influence the use of appropriate responding. For example, would a participant be more likely to say 'no' to a stranger if he or she looked angry compared with a stranger who looked happy? This would be important as there is conflicting evidence regarding whether individuals with WS who have better abilities to recognise emotion report greater discrimination towards strangers (Meyer-Lindenberg *et al.* 2005; Haas *et al.* 2009; Little *et al.* 2013).

Beyond demographic characteristics that could account for the heterogeneity in response, this difference in acquisition could have a few explanations. First, participants in Group 1 received intervention on the first 3 days of a residential camp. It is possible that participants in both groups were still adapting to the camp dynamics when the Time 2 *in situ* assessment was conducted. As such, they might have been confused about who was associated with camp and who was truly a stranger. Second, many participants in Group 1 received the Time 2 assessment at a local restaurant. The participants might have been less likely to remember to use the safety skills because of the excitement associated with the event.

While not a criterion for correct performance, reporting behaviours were measured and collected. Interestingly, participants often reported the stranger to a trusted adult, irrespective of whether or not they actually said 'no' and/or walked away from the stranger. This is inconsistent with previous BST stranger safety research that has found 'reporting' to be the most difficult skill to teach adults with disabilities (Collins *et al.* 1992; Fisher *et al.* 2013a). The tendency to report the event could, itself, be related to the participants' need for social interaction. The participants received

social praise if they reported the stranger to a trusted adult. In fact, many participants reported the stranger to multiple trusted adults throughout the rest of the day. It is possible that participants were seeking social praise and knew they would receive praise for reporting.

While the results of this study are an important first step in examining the real life sociability of adults with WS, certain limitations should be addressed. Previous research points to the importance of *in situ* training (Miltenberger & Olsen 1996). Because of the nature and short duration of the camp, we were not able to conduct *in situ* training. Attempts were made to promote generalisation by conducting role plays on the grounds surrounding the dormitories. In future research, *in situ* training should be incorporated into the training package. A second limitation is related to the inability to collect long-term maintenance data. Because participants were from all over the country, we were unable to conduct maintenance assessments to determine whether participants continued to use the skills. Finally, because skills were taught and assessed in a camp setting, when participants were away from their parents, it is unknown how they might respond to strangers in their home community or in more natural settings. Despite these limitations, the findings of this study are an important first step in demonstrating that adults with WS do not always agree to go with strangers and that they can be taught to respond appropriately to strangers. Future studies should examine the behaviours and performance of younger children with WS and those individuals with WS who are lower functioning.

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