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Eyewitness recall and suggestibility in individuals with Down syndrome

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Keywords**:** Intellectual disabilities, Down syndrome, eyewitness memory, suggestibility, criminal justice system

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Running head: Witnesses with Down syndrome

Abstract

Background: Many criminal justice professionals perceive the eyewitness skills of individuals with intellectual disabilities (ID) to be weaker than those of typically developing (TD) individuals. Down syndrome (DS) is one of the most common genetic causes of ID, yet there is no research addressing eyewitness skills in this population. This study examined the eyewitness recall and suggestibility of young people with DS. **Method:** Young people with DS and mental age-matched TD children viewed a video of a non-violent petty crime and were subsequently asked to freely recall the event before being asked general and specific questions incorporating both misleading and non-leading prompts. **Results:** Compared to mental age-matched TD individuals, young people with DS: produced as much information; were just as accurate; and were no more suggestible. **Conclusions:** The eyewitness memory skills of young people with DS are comparable to those of mental age-matched TD children. The implications of these findings for the forensic context and eyewitness memory are discussed.

Keywords: Intellectual disabilities, Down syndrome, eyewitness memory, suggestibility, criminal justice system

Down syndrome (DS) is one of the most common genetic causes of intellectual disability (ID). Despite DS affecting approximately 1 in every 1,000 babies born each year (Down's Syndrome Association, 2013), there is no empirical research on the eyewitness skills of this group. This is problematic, as children and young people with disabilities are more vulnerable to maltreatment, abuse and sexual violence than their typically developing peers (Hershkowitz et al., 2007; Lin et al., 2009; Mencap, 1999; Sullivan & Knutson, 2000). Several characteristics of individuals with DS might affect their eyewitness abilities. These include: IQ levels in the moderate to severe ID range (25-55); problems with expressive language (Chapman 1997; Laws & Bishop, 2004; Ypsilanti et al., 2005); difficulties providing coherent narratives (Chapman, 1997; Laws & Bishop, 2004); and verbal short-term memory impairments (Brock & Jarrold, 2005; Carney et al., 2013; Jarrold et al., 2007).

Children with non-specific aetiology ID can provide forensically useful information (Agnew & Powell, 2004; Brown et al., 2012; Brown et al., 2015; Henry & Gudjonsson, 1999, 2003; Michel et al., 2000), and their free recall is often very accurate (Henry et al., 2011). However, somewhat lower accuracy is reported in those with moderate (IQ = 40-54) relative to those with mild ID (IQ = 55-70/75) (Brown et al., 2012, 2015). Comparatively, performance of those with ID on free recall, general questions and specific questions can reach chronological age (CA) level (Brown et al., 2012, 2015; Henry & Gudjonsson, 1999, 2003), although mental age (MA) equivalent performance levels are more usual (Gordon et al., 1994; Henry & Gudjonsson, 2003; Jens et al., 1990; Michel et al., 2000). There are occasional reports of poorer than MA level performance on free recall and specific questions (Agnew & Powell, 2004), and particular vulnerabilities noted for those with moderate ID (e.g., Brown et al., 2012, 2015).

Guidelines for forensic interviews highlight that leading (particularly misleading) questions should be avoided (Ministry of Justice, 2011), yet such questions are asked when

interviewing witnesses who have ID (Cederborg et al., 2009). This is problematic, given that children with mild and moderate ID are more suggestible than their CA matched peers (Brown et al., 2012, 2015; Henry & Gudjonsson, 2003). However, suggestibility in those with ID is often in line with MA (Agnew & Powell, 2004; Gordon et al., 1994; Henry & Gudjonsson, 1999, 2003; Jens et al., 1990; Michel et al., 2000), although Brown et al. (2012, 2015) found greater suggestibility in children with *moderate* ID. Given these key issues, it was important to assess whether young people with DS would reach MA level for both recall and suggestibility.

The current research provided an exploratory study of eyewitness skills of young people with DS. Participants viewed a short video of a petty crime and were subsequently interviewed using a set of pre-determined questions (some were 'correctly leading' or 'misleading'). There were three aims: (1) to explore the performance of individuals with DS on 'non-biased' question types; (2) to explore suggestibility in individuals with DS; and (3) to ascertain levels of accuracy in response to open-ended prompts. It was tentatively predicted that individuals with DS, relative to same MA level peers with typical development (TD group) would recall less information, show higher levels of suggestibility and be less accurate.

Method

Participants

Sixty-nine young people were recruited from drama, dance and sports groups as well as after-school and holiday clubs. Standardised tests of verbal and non-verbal abilities [the British Picture Vocabulary Scale (BPVS-3; Dunn et al., 2009) and the Raven's Coloured Progressive Matrices (Raven's CPM; Raven, 2008) were administered to all participants, enabling the DS group to be matched to the TD group (see Table 1 for details). This was achieved by

determining the range of scores of the DS group and ensuring that the scores of all TD children fell within this range. Two TD participants obtained scores that fell outside this range and were excluded, leaving a final sample of 67: 25 young people with DS (9-26 years, 13 males); and 42 TD children (3-9 years, 12 males).

All participants had raw scores within the range 64-144 on the BPVS-3 and 4–35 on Raven CPM. Raw scores were employed for all analyses. There were no significant differences in verbal ability [$t(65) = 1.363$, $p = .178$] between the groups, but a significant difference in non-verbal ability [$t(65) = 4.103$, $p = < 0.001$] emerged. Both cognitive abilities were controlled statistically in subsequent analyses to ensure that verbal and non-verbal abilities were taken into account.

[insert Table 1 about here]

Materials

Participants were shown a short (three minute) video clip of a non-violent petty crime. An unexpected memory interview (adapted from Henry & Gudjonsson, 2007) followed, which comprised: (1) Open-ended free recall ('Tell me as much as you can remember about the video'); (2) Open-ended general questions ('Tell me about the people in the video?'); (3) Ten non-leading specific questions/invitations (e.g., 'What colour was the car?'); (4) Ten misleading specific questions/invitations ('e.g., 'What colour was the police car?' - there was no police car); (5) Ten correctly leading yes/no tag questions (e.g., 'The car didn't break down, did it? - correct response 'no'); (6) Ten misleading yes/no tag questions (e.g., 'There was no dog in the car, was there?' - correct response 'yes').

Interviews were audio recorded and transcribed. Following Rudy and Goodman (1991) every correct piece of information from free recall and general questions scored one

point (e.g., 'There were four (1) children (1) in a car (1)'). Errors during free recall and general questions, including incorrect details and confabulations, scored one point each (all errors were combined for analyses). Twenty-five percent of free and general recall transcripts were re-scored, and inter-rater reliability was high for correct ($r(16) = 0.997$, $p<.001$), incorrect ($r(16) = 0.948$, $p<.001$) and confabulated ($r(16) = 0.968$, $p<.001$) information.

Procedure

Approval for the study was granted by the relevant University's Research Ethics Committee. Parents provided informed, written consent, and the researcher obtained verbal assent from participants. Participants were tested individually for 30-45 minutes. After viewing the video, participants undertook the verbal (BPVS-3) and non-verbal ability tests (Raven's CPM). They then took part in the interview. For all tasks, instructions were given in short sentences using simple language. Many individuals in the DS group reported auditory or visual problems, so the pace and auditory level of questioning was adapted to participants' needs. In the case of unintelligible responses (more common in the DS group), the researcher asked participants to repeat responses.

Results

Mean (SD) scores for the young people with DS and TD children in relation to eyewitness question types are given in Table 2.

[insert Table 2 about here]

Hierarchical forced entry multiple regressions were carried out for each question type, combined errors, and percentage accuracy (total amount of accurate versus inaccurate information produced during free and general recall). Statistical checks (Cook's/Mahalanobis distances, average leverage, covariance ratio, standardised residuals, partial plots) did not reveal multicollinearity, outliers or cases that might be exerting excessive influence on the regressions (Field, 2013). BPVS-3 and Ravens raw scores were entered at Step 1. A dummy variable (group) was added at Step 2 to test whether, after controlling verbal and non-verbal abilities, group differences in performance on each question type were found (see Table 3). Only significant effects ($p < .05$) are reported.

[insert Table 3 about here]

All changes in R^2 on introduction of the dummy-coded group variable at Step 2 were non-significant: no DS versus TD group differences were found for any question type, percentage accuracy, or errors. There was a marginally significant group difference for yes/no misleading tag questions ($p < .07$). The beta-values for Step 2 of each regression showed BPVS-3 scores predicted eyewitness memory performance for two unbiased question types (free recall, specific non-leading questions) and one set of questions assessing suggestibility (misleading yes/no tag questions). Raven's scores predicted total errors but as this regression model was non-significant, interpreting beta-values is problematic and this result was not considered further (Field, 2013).

Discussion

Contrary to predictions, individuals with DS recalled as much information as TD peers in response to unbiased questions, did not show higher levels of suggestibility in response to

misleading questions and made equivalent numbers of errors. There were also no group differences in terms of accuracy (DS=74%; TD=85%). Although these accuracy rates are lower than those reported in some previous studies (e.g., Henry & Gudjonsson, 1999, 2003, 2007), they are within the range for children with mild and moderate ID (Brown et al., 2012, 2015). The findings are in line with the developmental model of MA-consistent levels of recall and suggestibility (Zigler & Balla, 1982), implying that MA, in terms of verbal and non-verbal abilities, represents a best estimate of likely eyewitness performance across a range of question types in young people with DS. Previous studies on individuals with non-specific aetiology ID have reported similar MA-consistent performance (Gordon et al., 1994; Henry & Gudjonsson, 1999, 2003; Jens et al., 1990; Michel et al., 2000; although see Brown et al., 2012, 2015).

The current findings demonstrate the importance of taking into account MA and communication abilities for witnesses with DS during investigative interviews, and provide some initial evidence that unbiased recall is related to receptive vocabulary abilities. Although it must be acknowledged that the participants were questioned about a mild event, in a non-threatening environment, and after a short delay, the results demonstrate that the abilities of individuals with DS should not be underestimated – they *can* provide forensically useful information. A priority for future research will be to focus on assessing the performance of individuals with DS using realistic interview methods, to ensure their fair access to justice.

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Table 1: Details of participants, including chronological, verbal and non-verbal mental ages and mean raw scores on the BPVS-III and Raven's CPM (SD).

Measures	Individuals with Down Syndrome (n=25)	Typically Developing Children (n=42)
Chronological age	19 yrs 10 m (4.10 m)	6 yrs 1 m (1.1 m)
Verbal mental age	6 yrs 3 m (1.2 m)	6 yrs 8 m (1.5 m)
Non-verbal mental age[a]	6 yrs 0 m (1.3 m)	7 yrs 4 m (2.0 m)
BPVS-3[b]	90.68 (14.12)	96.05 (16.39)
Raven's CPM[b]	18.20 (5.77)	24.24 (5.86)

[a]6 participants in the DS group and 1 participant in the TD group were not included in the mean scores as their raw scores were too low to compute equivalent MA values

[b]raw scores

Table 2: Mean scores (SD) for each eyewitness memory question type for individuals with Down syndrome and typically developing children

Eyewitness memory measure/group	Individuals with Down Syndrome (n=25)	Typically Developing Children (n=42)
Free recall	9.12 (6.40)	10.33 (5.53)
General recall	5.28 (6.39)	6.40 (4.36)
Total errors[a]	4.40 (7.40)	3.12 (2.87)
Accuracy (percentage)[b]	74.05% (30.98)	84.73% (10.92)
Non-leading specific[c]	3.48 (1.90)	4.17 (1.51)
Misleading specific[c]	3.16 (2.53)	4.19 (2.50)
Correctly leading yes/no tag[c]	9.20 (1.29)	9.12 (1.31)
Misleading yes/no tag[c]	1.48 (1.66)	3.17 (2.81)

[a]total errors = Free and general recall incorrect + free and general recall confabulations

[b]accuracy = Correct information as a percentage of total information recalled

[c]maximum possible score = 10

Table 3: Summary of regressions predicting performance on each eyewitness memory measure. For each regression two predictor variables were entered at Step 1 (Raven's raw scores and BPVS-3 raw scores). A dummy coded variable was entered at Step 2 (group). The table provides information relating to Step 2 of each model: total variance accounted for by the model (overall R^2); change in R^2 at Step 2; and standardised beta values for each predictor variable.

	Overall R^2	ΔR^2 at Step 2	β *BPVS*	β *Ravens*	β *Group*
Correct information - free recall	**.17***	.00	**.45***	-.09	-.07
Correct information - general recall	**.14***	.00	.13	.28	.05
Total errors[a]	.11	.00	.24	**-.45***	-.04
% Accuracy	**.20***	.01	.19	.25	-.10
Correct open ended non-leading	**.28***	.01	**.52***	-.05	-.13
Correct open ended misleading[a]	.05	.01	-.05	.16	-.13
Correct yes/no correctly leading tag[a]	.07	.00	-.19	-.11	-.05
Correct yes/no misleading tag	**.29***	.04[#]	**.40***	.06	-.23

*p <.05 (in bold)

[#]p < .10

[a]overall model not significant