Research in Developmental Disabilities 87 (2019) 31–42

Contents lists available at ScienceDirect

Research in Developmental Disabilities

journal homepage: www.elsevier.com/locate/redevdis

Social adaptive skills and psychopathology in adults with intellectual disabilities of non-specific origin and those with Down syndrome

Koviljka Barisnikov[a,*,1], Claudio Straccia[a,b,1]

[a] Child Clinical Neuropsychology Unit, Department of Psychology, University of Geneva, Switzerland
[b] Department of Special Education, University of Fribourg, Switzerland

ARTICLE INFO

No of reviews completed 2

Keywords:
Social skills
Adults with intellectual disability
Down syndrome
Psychopathology

ABSTRACT

The present study aimed to assess the psychometric proprieties of a new social adaptive skills questionnaire and examine the impact of maladaptive behaviour on social functioning in adults with ID of non-specific aetiology and those with Down syndrome.

The results of an exploratory factor analysis led to the exclusion of 20 items out of 48 and yielded a four-factor structure. The Confirmatory Factor Analysis conducted on 28 remaining items confirmed a four-factor structure explaining 43% of the total variance. The results computed on the global sample (n = 567) showed a "very good" internal consistency for the global score (.89) for all four factors with a very good fit (.97). Thus, this new assessment tool presented a good conceptual validity for assessing social-adaptive skills in adults with ID. The results also showed that participants with DS (no = 92) exhibited a higher global score of social adaptive skills on three subscales (sociability, social relating and respect for social rules) compared to adults with ID of non-specific aetiology (no = 328), and presented a lower level of psychopathology problems. Although aetiology was significantly related to these group differences even after controlling for level of ID and chronological age, the general level of psychopathology fully mediated these relations.

In conclusion, the regression coefficient analyses showed that the general level of psychopathology fully mediated the relationship between aetiology and social adaptive skills. A combined assessment of these dimensions should provide information about their predictive value for social functioning in ID adults and target specific remediation goals.

1. Introduction

Difficulties in adaptive functioning in people with intellectual disability (ID) have been largely documented and remain a long-term concern for families and caregivers (Bielecki & Swender, 2004; Tassé et al., 2012). The largely accepted model of the American Association on Intellectual and developmental Disabilities (AAIDD, Schalock et al., 2010) includes three domains of adaptive skills: *practical adaptive skills,* which refer to the activities of everyday life, self-care, occupational skills; *conceptual adaptive skills,* which include linguistic abilities, reading skills, money concepts and self-direction; and *social adaptive skills,* which comprise interpersonal skills, leisure skills and self-esteem, for example (see Tassé et al., 2012). These skills have been learned, are performed in every-day

* Corresponding author.
E-mail address: Koviljka.Barisnikov@unige.ch (K. Barisnikov).
[1] Both authors contributed equally to this work.

https://doi.org/10.1016/j.ridd.2019.01.010
Received 11 March 2018; Received in revised form 11 January 2019; Accepted 25 January 2019
Available online 05 February 2019
0891-4222/

life and their effectiveness allows psychologists to determine the level of individual adaptive functioning (see Lecavalier & Butter, 2010; Matson, Smiroldo et al., 1998). In this paper we will focus on social *adaptive* skills in people with ID.

The terms social skills, social competences and social abilities are often used synonymously and could be broadly defined as socially oriented adaptive skills (Bielecki & Swender, 2004; Gresham & Elliott, 1987). *Social intelligence* is seen as the "cognitive underpinning" of these skills (Lecavalier & Butter, 2010). More precisely, the series of socio-cognitive abilities such as: the theory of mind, which refers to the ability to make inferences about another's mind, to reflect on one's own and or others' behaviour, to express empathy and friendliness; to recognise emotional expressions and to solve social problems by acting flexibly and appropriately, are shown to be specifically related to learning social skills, rather than general intellectual ability or IQ level (Adolphs, 2009; Tager-Flusberg & Sullivan, 2000). Developmental studies have pointed out that a lack of these skills has been associated with internalizing and externalizing behaviour problems and peer rejection (Bornstein, Hahn, & Haynes, 2010). More specifically, aggression, social anxiety and low popularity with peers have a negative impact on social adaptive functioning (Parker, Rubin, Erath, Wojslawwowicz, & Buskirk, 2006). A less pro-social behaviour related to deficits in socio-cognitive and emotional abilities was reported in a range of neurodevelopmental disorders associated with ID (Tager-Flusberg & Sullivan, 2000; Yeates et al., 2007). Furthermore, the high presence of psychopathological and behaviour problems in people with ID seems to negatively correlate with social adaptive skills (Matson, Anderson, & Bamburg, 2000).

The assessment of social abilities relies on: *"the subjective judgement about how effectively an individual performs social skills"* (Lecavalier & Butter, 2010, p. 181) used to define social behavioural characteristics. The behaviour checklists and rating scales completed by caregivers of individuals with ID are mainly used to assess their adaptive skills (Lecavalier & Butter, 2010; Tassé et al., 2012; Tassé, Luckasson, & Schalock, 2016). Their numbers are developed according to the adaptive behaviour model (AAIDD) presented above that includes conceptual, practical and social skills; however, few are valid for adults with ID. The most widely used, the « *Vineland Adaptive Behavior Scales»* (VABS-3rd edition; Sparrow, Cicchetti, & Saulnier, 2016), the *Adaptive Behavior Scale-Residential and* Community (ABS-RC-2nd edition, Nihira, Leland, & Lambert, 1993) and the *Adaptive Behavior Assessment System* (ABAS-3rd edition, Harrison & Oakland, 2015) are normed for use throughout childhood and late adulthood. These scales assess social adaptive domains that include conceptual, practical and maladaptive behaviour domains. As such, these scales provide an overall picture of an individual's social functioning and behaviour, making it possible to define support needs rather than targeting specific social skills deficits for remediation (see Bielecki & Swender, 2004; Lecavalier & Butter, 2010; Tassé et al., 2012). Using the VABS, for example, studies reported different strengths and difficulties in regard to three adaptive domains and maladaptive behaviour in the ID population of different aetiology (Dykens, Hodapp, & Finucane, 2000).

Some scales were specifically designed *to assess social skills* but only a small number of them are valid for use in the ID adult population. The *MESSIER* (see Matson, Carlisle et al., 1998) was developed for children and adults with severe and profound ID. *The assessment of social competences* (ASC, Meyer et al., 1985) is a valid and reliable measure for the ID population aged 7–21 years. *The Social Performance Survey Schedule* (SPSS, Matson, William, Bellack, & Senator, 1983) is adapted for use in adults (age 21–59 years) with mild-to-moderate ID. Although these instruments were designed to specifically assess social skills, they largely include conceptual and practical skills as well as maladaptive behaviour similarly to those based on the AAIDD model described above.

In recent years, some scales have been developed to assess a specific domain of *social skills. The Salk Institute Sociability Questionnaire* (SISQ, see Jones et al., 2000) was designed to assess the expression of hypersociability observed in the Williams syndrome (WS) population. SISQ is an interesting tool that assesses several behaviours in relation to socio-cognitive and emotional abilities (e.g. approach; empathy; social interaction). However, a complete questionnaire has not been published and psychometric data are not known. Nevertheless, the comparative studies that have used SISQ have reported that WS participants had significantly higher global Sociability scores than participants with Down syndrome (DS) (Doyle, Bellugi, Korenberg, & Graham, 2004; Jones et al., 2000). Although the individuals with DS are known to be sociable, the individuals with WS showed a higher social approach (e.g. a tendency to approach strangers or familiar persons, or to be approached by others) and to express a particular emotional behaviour during interaction.

Nevertheless, the people with DS and WS generally present fewer psychopathological and behaviour problems compared to those with ID of non-specific origin (Dykens, 2007; Tassé, Macho et al., 2016). Several studies have pointed out a particular social behaviour phenotype that could be attributed to the aetiology of ID (Annaz, Karmiloff-Smith, Johnson, & Thomas, 2009; Dykens et al., 2000).

Surprisingly, very few studies assess social abilities and behaviour in adults with ID. Matson, Dempsey, and LoVullo, (2009) investigated social skills in ID adults (16–88 years) and found that adults with the co-occurrence of autism spectrum disorder (ASD) had more social difficulties than these without ASD. The association between poor social abilities and depression in adults with mild ID (Benson, Reiss, Smith, & Laman, 1985), as well as with behaviour problems such as aggression and self-injurious behaviour in adults with severe or profound ID (Duncan, Matson, Bamburg, Cherry, & Buckley, 1999) was reported. However, it remains unclear if deficits in social skills result from problem behaviour or if the maladaptive behaviour results from social adaptive functioning impairment in ID individuals (Bielecki & Swender, 2004; Di Nuovo & Buono, 2011).

As seen above, several personal risk factors such as low social skills, less pro-social behaviour and the presence of psychopathology and behaviour problems could compromise social functioning in ID individuals. DS, the most common chromosomal cause of ID, provides a unique opportunity to study the impact of these factors on social functioning throughout adulthood. Studies in adults with DS have reported fewer psychopathology problems in comparison to their counterparts with mixed or nonspecific ID aetiology (Mantry et al., 2008). However, an increase in internalized disorders with age marked by depression, social withdrawal and dementia (Dykens, 2007; Esbensen, Mailick, & Krauss, 2008; Straccia, Tassé, Ghisletta, & Barisnikov, 2013; Tassé, Macho et al., 2016) was observed. They can also present difficulties in specific adaptive domains such as communication and academic skills (Dykens,

Hodapp, & Evans, 2006). Despite these difficulties and behaviour problems, the adults with DS remain sociable and much of the research has suggested that they are less affected by adaptive impairment, compared to those of non-specific aetiology (Straccia, Baggio, & Barisnikov, 2014; Tassé, Macho et al., 2016).

According to Dykens et al. (2000) studying the relation between the sociable and charming personality and lower rate of psychopathology in DS individuals could help to better understand their adaptive functioning. Fewer studies have assessed these relations in DS adults. Lecavalier and Tassé (2005) compared the personality profiles of adolescents and adults with DS to that of their peers with non-specific aetiology of ID, while controlling for the impact of psychopathology. Overall results showed few differences regarding the personality profile, except that the individuals with DS were rated as having more friends. Nevertheless, this difference disappeared when psychopathology was taken into consideration suggesting its possible mediation effect on social behaviour. Straccia et al. (2014) investigated the impact of behaviour problems and psychopathology on social functioning in DS adults in comparison with their ID peers of non-specific aetiology. They used the experimental version of the "Social Behaviour Questionnaire" (Barisnikov & Straccia, 2012) assessing several specific domains of social functioning in ID adults. The presence of psychopathology was assessed with the Developmental Behaviour Checklist – adult version (Mohr, Tonge, & Einfeld, 2005) and the Reiss Screen for Maladaptive Behavior (RSMB; Reiss, 1988). The DS group showed significantly higher levels of social competence, respect for social rules and social-emotional behaviour. They were also more socially accepted by their peers and their communities, as they have more friends and were more frequently invited by others. The DS adults also showed fewer symptoms of both internalised (e.g., depression) and externalised (e.g., disruptive behaviour) disorders, compared to their counterparts with non-specific origin of ID. However, the older DS participants presented more severe internalised problems such as depression and social withdrawal, but surprisingly their social behaviour score remained higher than that of their ID peers of non-specific aetiology. In contrast, Soresi and Nota (2000) reported that an increase in internalised problems in DS adults causes them difficulties in developing a social network and maintaining friendships as they age.

Nevertheless, we need more studies in adults with ID to better understand the associations between social functioning and behaviour problems. As seen above, social abilities refer to the ranges of skills (e.g. socio-relation; socio-emotional) that are strongly related to social adaptive functioning, which can be affected to varying degrees in people with ID and could lead to social isolation, lack of every-day coping and increased maladaptive behaviour (Bielecki & Swender, 2004; Feinstein & Verma, 2010; Matson et al., 2000). Therefore, we need more precise instruments that would allow us to assess specific areas of social adaptive skills, in order to better define social functioning profiles in the ID population. Distinctive traits of behaviour phenotype were reported in ID individuals that change over time, particularly those of genetic origin (Di Nuovo & Buono, 2011; Dodd & Porter, 2009). The more precise evaluation of social behaviour in ID adults could provide a framework for person-reference re-education goals and individualised support strategies (Luckasson & Schalock, 2013; Tassé et al., 2012).

In this perspective, the aims of the present study were: (1) to assess the psychometric properties of the experimental version of the "Social Behaviour Questionnaire" developed for French speaking adults with ID (2) to compare the social skills and behaviour of a large number of ID participants of non-specific aetiology and those with DS; (3) to investigate the possible mediation effect of psychopathology on the relation between the aetiology of ID and social skills.

2. Method

2.1. Participants

The participants in the study were five hundred eighty adults with ID. The inclusion criteria were (1) adult aged over 18 years; (2) have a medical diagnosis of ID; and (3) have neither profound ID nor severe motor or sensory deficits. Additionally, the participants with DS were screened for signs of dementia using the Dementia Screening Questionnaire (Beciani, Vetro, Barisnikov, Detraux, & VanderLinden, 2011) completed by referent caregivers; the participants who performed below the cut-off score (< 20) were included in the study. The participants were recruited from sheltered workshops and care institutions across French-speaking regions of Switzerland and Belgium. A letter describing the research project was sent to the legal guardians of all recruited individuals. They were asked to provide written consent authorizing the participant's referent caregivers (the professionals qualified to work with the ID population who knew the participants at least 6 months prior to assessment) to complete two questionnaires; and a trained psychologist to assess non-verbal intellectual abilities with the Raven's Coloured Progressive Matrices (CPM; Raven, Court, & Raven, 1998). Furthermore, the ID participants gave their oral consent to take part in the study and were free to withdraw from the assessment at any time. This research project was approved by the Institutional Review Board and by the Ethics Committee of the University of Geneva and was conducted in accordance with the declaration of Helsinki. Nine protocols (1.6%) were withheld from the sample because they were incomplete.

Thus, the final sample consisted of 571 ID participants recruited from French-speaking regions of Switzerland ($n = 386$, 67.6%) and Belgium ($n = 185$, 32.4%). The mean chronological age of the sample was 38.09 years ($SD = 12.17$, range 18–73), with 58% of the group being men ($n = 331$).

The aetiology of the ID was collected by using the medical diagnosis included in the participants' clinical file. Most participants were reported to have ID of non-specific aetiology ($n = 331$, 57.9%) and ninety-three had a medical diagnosis of Down syndrome (16.3%). Biological causes – for example, anoxia – were reported in 83 clinical files (14.6%), whereas autism spectrum disorder was reported for 24 participants (4.2%). The ID level was obtained from the clinical files for 344 (60.3%) participants. For those for whom this information was not available, the assessment with the CPM task (Raven et al., 1998) was proposed. The CPM task was administered to only 107 (18.7%) participants. Thus, the ID level could not be estimated in 120 participants (21.0%) for the following

reasons: (1) The participants' legal guardians agreed only with the procedure concerning the questionnaire but not with the cognitive task; (2) institutional inconveniences, such as the participants' busy schedules conflicted with the timing of the study; and (3) lack of attention and/or motivation in a few participants prevented them from completing the task.

In total, the ID level could be estimated for 451 participants (79%). One hundred eighty-one participants (31.7%) had a mild level of ID, 235 (41.2%) a moderate level of ID, and the remaining 35 (6.1%) a severe level of ID.

3. Measures

Nonverbal reasoning intellectual efficiency was measured with the CPM (Raven et al., 1998). It consists of 36 items that present visual patterns with a piece missing. Participants are asked to choose among several pieces to complete the pattern. The global raw score, which corresponds to the sum of the correct answers, has been used for further analysis.

The Social adaptive skills were assessed with the experimental version of the Social Behaviour Questionnaire ("Questionnaire de Comportement Social": Barisnikov & Straccia, 2012; Barisnikov, Van der Linden, & Hippolyte, 2005). It consists of 48 items related to several domains of social behaviour skills such as social attitude, social competence, respect for social rules and socio-emotional behaviour. The questionnaire was created on the basis of the concept of socio-cognitive abilities (Adolphs, 2009; Tager-Flusberg & Sullivan, 2000) where different domains included proved to be relevant for the development of adapted social behaviour. Furthermore, several items were inspired by questionnaires that assess social skills in individuals with ID, such as the SPSS (Matson et al., 1983), the MESSIER, (see Matson, Smiroldo et al., 1998), and the SISQ, (see Jones et al., 2000), which were described above.

The items are rated on a 3-point scale (0 = *not true;* 1 = *somewhat or sometimes true;* 2 = *very true or often true)* and are designed to assess competent behaviour. High scores correspond to better social skills. Some items are formulated as negative (e.g. "asking strangers personal questions") where the higher presence of these behaviours is scored low (0 = very true) and the highest score (2-not true) is attributed to the absence of these behaviours. These scores are automatically computed in order to measure an ability and not the lack of it (or disability).

The psychopathology problem was assessed with the French version of the Reiss Screen for Maladaptive Behaviour (RSMB, Reiss, 1988). This questionnaire consists of 38 items that were designed to screen for mental health problems in adolescents and adults with ID. It was developed on the basis of symptom descriptions of the DSM-III-R and adapted to the specificity of psychopathological manifestation in people with ID. The good reliability and validity were reported for the French adult version on a Canadian sample (see Lecavalier & Tassé, 2005) and recently confirmed on a Swiss and Belgian sample (see Straccia et al., 2013). The questionnaire can be used to obtain a total score (26-items) and eight subscale scores assessing psychopathology problems (e.g. Aggressive Behaviour, Autism, Paranoia, Depression) as well as scores on six special maladaptive items. The 38 RSMB items are scored on ratings of 0, 1, and 2, where 0 = "not a problem", 1 = "a problem", and 2 = "a major problem". The total score (26 items) has been used for further analysis.

3.1. Statistical analysis

Since the "Social Behaviour Questionnaire" is a new tool, the first aim of this study was to explore the questionnaire's factor structure. Therefore, we tested the resultant factor structure by computing a confirmatory factor analysis and including the internal consistency analysis of each factor. In order to perform the exploratory (EFA) and the confirmatory (CFA) factor analysis we randomly split the total sample into two equal sub-samples (about 50% each).

In order to examine the influence of DS aetiology on social skills we firstly compared the participants with DS (n = 92) to those with ID of non-specified aetiology (n = 328) on the questionnaire total and sub scores. An independent samples t-test was computed for this first comparison. Secondly we ran a hierarchical multiple linear regressions for each social skills outcomes variable that showed a statistically significant difference on the first comparison. Aetiology composed the first hierarchical level, ID level and chronological age the second level and the RSMB total score the third level. These analyses aimed to examine a possible mediation effect of psychopathology regarding the relation between aetiology and social skills. Since the two groups presented significant differences in ID level (χ^2 (2) = 14.29, p = .001) and chronological age (t (418) = 2.58, p = .010), we controlled for the effect of those variables. When the third hierarchical model was retained, a mediation analysis was conducted between aetiology (IV), psychopathology (M) and social skills (DV). None of the outcome variables was normally distributed in both groups and the homogeneity of variance was different in the two groups for three out of five outcome variables. Given this and the unequal group sizes, all analyses were conducted using bootstrap (B = 1000, corrected bias).

4. Results

4.1. Exploratory Factor Analysis (EFA)

The EFA aimed to show the total variance explained by the retained factors as well as suggesting which items could be removed in order to make the instrument easier and faster to complete. Since the scale of the Social behaviour questionnaire items is categorical, we performed the EFA by extracting the factors with the principal axis factoring method and promax rotation. The adequacy of the sample size used was good (Kaiser-Meyer-Olkin index = .928).

The scree plot suggested a four-factor solution. This structure explained 37% of the total variance. In order to improve the amount of variance explained, we excluded several items following two criteria: communality values lower than .30 and items cross-loading

Table 1
Standardized estimates of the Social Behavior Questionnaire items and factor intercorrelation matrix.

SBQ items	Socio-emotional abilities	Sociability	Social relating	Respect of social rules
Item 20	.816			
Item 17	.788			
Item 12	.737			
Item 16	.606			
Item 14	.538			
Item 18	.512			
Item 37	.485			
Item 19	.473			
Item 11	.453			
Item 22	.432			
Item 2	.312			
Item 3		.720		
Item 10		.692		
Item 4		.679		
Item 31		.514		
Item 1		.502		
Item 13		.396		
Item 39			.644	
Item 29			.574	
Item 28			.546	
Item 26			.523	
Item 23			.511	
Item 48			.419	
Item 30				.708
Item 36				.708
Item 6				.631
Item 32				.556
Item 42				.537
Socio-emotional abilities	1.000	0.601	0.597	0.113
Sociability	0.601	1.000	0.472	−0.028
Social relating	0.597	0.472	1.000	−0.095
Respect of social rules	0.113	−0.028	−0.095	1.000

on more than one factor (with a difference between the loadings lower than .20). When an item was excluded, the entire procedure was started all over, which led to the exclusion of 20 items (14 due to the first criterion and 6 due to the second one). For example, the items like “Makes inappropriate noises, disturbing for others”; “Is preoccupied by his/her health”; “Talks repetitively about personal problems”, were excluded. Thus, the retained four-factor solution included 28 items and explained 43.1% of the total variance.

More detailed information on EFA is provided in two tables of Appendix. Table 1: Initial and after-extraction communalities for the first exploratory factor analysis tested. Table 2: Pattern matrix for the first exploratory factor analysis tested.

4.2. Confirmatory Factor Analysis (CFA)

In order to test the adjustment of the retained model to the data, we collected and calculated a CFA on the second subsample. As presented in Table 1, all items presented statistically significant, positive estimates. As expected, the 28 items loaded in the same factors as in the retained solution issued from the EFA. Several fit indices indicated that the model presented an adequate fit to the data, χ^2 (344, n = 286) = 799. The relative chi-square (ratio χ^2/df) of the model was 2.32, which is very close to the value of 2, which is considered to represent a good fit by Byrne (1991). The Steiger-Lind Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1992) was .068, which is also very close to the cut-off of a good fit (equal to or higher than .95) suggested by Hu and Bentler (1999). The Gamma Hat of the tested model was .97 showing a very good fit. Given these results, we can conclude that the four-factor structure was successfully replicated. Therefore this instrument showed good construct validity.

More information on the CFA is provided in the Appendix Table A3: Factor correlation matrix for the model tested using confirmatory factor analysis.

4.3. Factor description

The Confirmatory Factor Analysis conducted on the 28 remaining items confirmed the four-factor structure that explained 43.1% of the total variance. Factor 1 included 11 items that assess “Socio-emotional abilities”. Factor 2 included 6 items assessing “Sociability”. Factor 3 included 6 items that assess “Social relating”. Factor 4 included 5 items that assess the “Respect for social rules”. This new questionnaire is now composed of 28 items providing global information on social-adaptive skills (“Questionnaire des Compétences socio-adapatives”) and four specific domain sub-scales, defined by these four factors.

Table 2
Multiple linear regression analysis.

Predictor and step	B	R^2	ΔR^2	ΔF
SBQ total score				
Step 1				
Aetiology	2.54*	.014	.014	4.46*
Step 2				
Aetiology	2.71*	.022	.008	1.20
ID level	−.99			
Age	−.04			
Step 3				
Aetiology	.36	.161	.150	54.85***
ID level	−.84			
Age	−.02			
RSMB total score	−.50***			
Sociability				
Step 1				
Aetiology	.80**	.019	.019	6.09*
Step 2				
Aetiology	.61*	.043	.024	3.87*
ID level	.30			
Age	−.03*			
Step 3				
Aetiology	.09	.135	.093	33.31***
ID level	.33			
Age	−.022[b]			
RSMB total score	−.11***			
Social relationships				
Step 1				
Aetiology	.75*	.012	.012	3.77[b]
Step 2				
Aetiology	.95**	.052	.040	6.50**
ID level	−.87**			
Age	−.02			
Step 3				
Aetiology	.40	.121	.081	28.51***
ID level	−.83**			
Age	−.01			
RSMB total score	−.12***			
Respect for social rules				
Step 1				
Aetiology	.90**	.023	.023	7.46**
Step 2				
Aetiology	.90**	.024	.001	.08
ID level	.05			
Age	.00			
Step 3				
Aetiology	.31	.128	.116	41.83***
ID level	.10			
Age	.01			
RSMB total score	−.12***			

Note. [a] Bootstrapped regression coefficients. [b] $p < .060$. * $p < .050$. ** $p < .010$. *** $p < .001$.

4.4. Internal consistency reliability

The internal consistency reliability of the global score and of the four subscales of the "Social-adaptive skills questionnaire" was evaluated with Cronbach's alpha. DeVellis (2003) suggested that values between .65 and .70 are considered "minimally acceptable"; between .70 and .80 they are "respectable", and higher than .80 they are "very good". The results computed on the global sample (n = 567) showed a "very good" internal consistency for the global score (.89), "Socio-emotional abilities" (.86) and "Sociability" (.81), as well as a "respectable" internal consistency for "Social relating" (.78) and the "Respect for social rules" (.72). In the five scales analyzed, deleting one item never increased the internal consistency of the factor. As our questionnaire is multidimensional we also computed McDonald's Omega (McDonald, 1981). The results showed slightly lower scores than on Cronbach's alpha for the global score (0.77), for "Sociability" (.76), "Social relating" (.71) and for "Respect for social rules" (.77), but higher for "Socio-emotional abilities" (.84). Considering the scores from both analyses, we can conclude that the "Social-adaptive skills questionnaire" presented factors with "respectable" to "very good" internal consistency and reliability, and a very good fit (.97), showing this new assessment tool has a good construct validity.

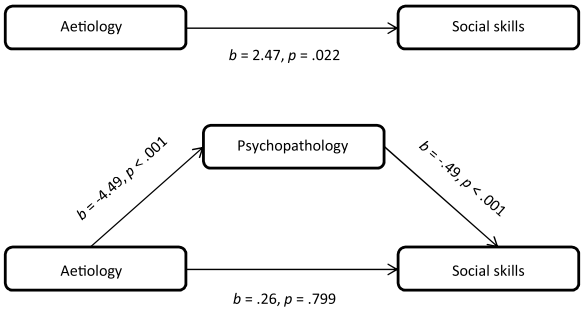

Fig. 1. Regressions coefficients for each effect.

4.5. Psychopathology mediating aetiology and social skills

On average, participants with DS presented higher levels of social-adaptive skills compared to their counterparts with non-specific aetiology). In fact, the two groups significantly differed on the total score ($t(401) = -2.60$, $p = .010$, $\hat{d} = .30$, $\Delta_{mean} = -2.78$, BCa 95% CI [−4.74, −1.00]), on the Sociability ($t(204) = -3.60$, $p < .001$, $\hat{d} = .33$, $\Delta_{mean} = -.84$, BCa 95% CI [−1.30, −.37]), Social relating ($t(161) = -2.31$, $p = .022$, $\hat{d} = .25$, $\Delta_{mean} = -.73$, BCa 95% CI [−1.36, −.09]) and Respect for social rules ($t(155) = -3.57$, $p < .001$, $\hat{d} = .39$, $\Delta_{mean} = -1.00$, BCa 95% CI [−1.57, −.50]) sub-scale scores. The two groups did not differ on the Socio-emotional sub-scale scores ($t(401) = -.34$, $p = .731$, $\Delta_{mean} = -.20$, BCa 95% CI [−1.36, .93]).

Table 2 shows the hierarchical multiple regression models for outcomes that presented a significant group difference. The general level of psychopathology (RSMB total score) significantly improved the explained variance (R^2) in all models. Furthermore, for all models, aetiology was significantly related to the outcome at Step 1 and even after controlling for level of ID and chronological age (Step 2) but not after the inclusion of the general level of psychopathology (Step 3). These results suggested that the relation between aetiology and social skills could be moderated by the general level of psychopathology.

According to Field (2013), four conditions have to be met in order to confirm a mediation effect: the predictor must be significantly related to the outcome (1) and to the mediator (2); the mediator must be significantly related to the outcome (3), and when the mediator is included in the analysis, the relationship between the predictor and the outcome must disappear or greatly decrease (4). The regression coefficients confirmed that all four conditions are met and that the general level of psychopathology fully mediated the relationship between aetiology and the general level of social skills. Fig. 1 presents the regression coefficients for each effect. The indirect effect ($b = 2.21$, BCa 95% CI [1.52, 3.06]) represents a medium effect ($\kappa^2 = .11$, BCa 95% CI [.07, .15]). The same pattern was found for the remaining three variables' outcomes. Specifically, we found a significant indirect effect – though a general level of psychopathology – between aetiology and sociability ($b = .48$, BCa 95% CI [.30, .70]), between aetiology and social relating ($b = .58$, BCa 95% CI [.34, .84]), as well as between aetiology and respect for social rules ($b = .59$, BCa 95% CI [.39, .83]). In terms of effect size, these indirect effects represent a medium effect for the three Social adaptive skills subscales: sociability ($\kappa^2 = .08$, BCa 95% CI [.05, .12]), social relating ($\kappa^2 = .08$, BCa 95% CI [.05, .12]) and respect for social rules ($\kappa^2 = .09$, BCa 95% CI [.06, .13]).

5. Discussion

The present study aimed: to assess the psychometric proprieties of the experimental version of the "Social Behaviour Questionnaire" (Barisnikov & Straccia, 2012) developed for French speaking adults with ID; to examine the relations between psychopathology on social adaptive skills in ID adults with DS and those of non-specific aetiology.

Regarding the psychometric proprieties of the questionnaire, the exploratory factor analysis led to the exclusion of 20 items out of 48 and yielded a four-factor structure. The Confirmatory Factor Analysis conducted on 28 remaining items confirmed a four-factor structure explaining 43% of the total variance. Furthermore, the results computed on the global sample (n = 567) showed a "good" internal consistency for the global score and for all four factor subscales, with a very good fit. Thus, this new assessment tool presented a good conceptual validity for assessing social-adaptive skills in adults with ID.

Factor 1 accounts for a large part of the variance, which includes 11 items that constitute the "Socio-emotional abilities" sub-scale and shows very good internal consistency. These items are designed to assess social awareness and inter-subjectivity as well as the ability to express a particular emotional behaviour during interaction (e.g. items like: "expresses thankfulness for services received"; "compliments others"; "shows enthusiasm regarding others' achievements"; "cares about others' health and well-being"; "feels sorry when someone is sad or ill). As seen in the introduction, these skills rely on the series of socio-cognitive abilities that have an important impact on learning social skills (Adolphs, 2009; Tager-Flusberg & Sullivan, 2000). This could explain significant variability in socio-emotional behaviour observed among people with different aetiologies of ID (Annaz et al., 2009). Furthermore, a lack of these skills has been associated with internalizing and externalizing behaviour problems and peer rejection (Bornstein Hahn & Haynes, 2010).

Factor 2 accounts for the variance of 6 items, which constitute the "Sociability" sub-scale and show very good internal consistency. These items assess pro-social aspects of behaviour, such as approachability, interest in others, friendliness (e.g. items like "appreciates going out and partying", "appreciates receiving visitors", "smiles at others", "is friendly to others"). The social behaviour

in WS and DS individuals is described as pro-socially oriented, showing higher affinity and approachability towards others, in contrast to individuals with X-fragile or ASD (Annaz et al., 2009; Sucksmith, Allison, Baron-Cohen, Chakrabarti, & Hoekstra, 2013). Although, prosaically oriented behaviour seems to have a positive impact on learning social skills, the presence of "hypersociability" in WS individuals may cause them difficulties in regulating interpersonal relationships (Jawaid et al., 2012). Thus our Sociability sub-scale could provide important information about social attitudes, the behaviour that ID individuals manifest toward their surroundings.

Factor 3 accounts for the variance of 6 items, which constitute the "social relating" sub-scale and show a "respectable" internal consistency. These items assess specific aspects of social relationships by the individual and his/her surroundings (e.g. "maintains long term friendships"; "shares responsibility in groups"; "others seek out his/her company"; "receives compliments from others", "keeps promises"). These items assess a more active reciprocal role that is played by both parties to establish and maintain interaction and long-term social relations. They make it possible to measure not only personal abilities to engage and develop positive social interactions but also a social "acceptance" by others that impacts on the development of a pattern (style) of long-term social relations. However, the presence of psychopathological disorders and behaviour problems in ID individuals has a negative influence on social interaction, causing difficulties in developing social networks and maintaining friendships over time (Feinstein & Verma, 2010; Soresi & Nota, 2000).

Factor 4 accounts for the variance of 5 items that constitute the "Respect for social rules" sub-scale and show a "respectable" internal consistency. These items assess behaviour related to social convention rules (e.g. "dominates the conversation"; "makes embarrassing comments"; "ordersrather than asks to obtain service", "seeks attention in public places"). The conventional rules are related to conventional proscriptions, such as consensus, rules and authority, while the moral rules are context-free, and their transgression (e.g. hitting someone), is defined by its consequences for the rights and welfare of others (Turiel, 1983). Social/moral rules knowledge helps to select the most adapted behavioural response to a specific social situation (Beer, Mitchell, & Ochsner, 2006) and to implement positive social interaction. Transgressions of social rules have been associated with aggression, social anxiety and low popularity with peers (Parker et al., 2006). Relations between social rules knowledge and social emotional behaviour were reported in several neurodevelopmental disorders in individuals with ASD (Shulman, Guberman, Shiling, & Bauminger, 2012), in adults with DS (Hippolyte, Iglesias, Van der Linden, & Barisnikov, 2010) and those with ID of non-specific origin (Lachavanne & Barisnikov, 2013).

To sum up, this new social-adaptive skills questionnaire is a well adapted tool for assessment of adults with ID; 28 items provide global information about these skills and four specific domain sub-scale scores, as described above. It is to be noticed that the lack of information on ID level for 21% of the participants limits the generalization of our results.

Regarding relations between maladaptive behaviour and social-adaptive skills in adults with ID, the results showed that participants with DS (n = 92) exhibited a higher global score of social adaptive skills compared to adults with ID of non-specific aetiology (no = 328). Additionally, the DS group presented a lower level of psychopathology symptoms (RSMB total score). It is to be noted that although the RSMB was developed on the basis of the DSM-III-R (Reiss, 1984) it is considered one of the best developed and most studied questionnaires to assess psychopathology among people with ID (see Matson, Belva, Hattier, & Matson, 2012). Recent studies in French speaking adults showed that RSMB is sensitive to ID aetiology, reporting lower level of psychopathology symptoms in DS adults than in their peers with non-specific aetiology of ID (Straccia et al., 2013, 2014).

Regarding social skills, overall, these results, in accordance with rare comparative studies, showed significantly higher levels of these skills in DS adults compared to their ID peers of non-specific origin (Straccia et al., 2014). They were also more socially accepted by their peers and their communities, as they have more friends and were more frequently invited by others. This was also the case in DS adolescents and adults (Lecavalier & Tassé, 2005) as well as in older DS adults with high psychopathology symptoms (Straccia et al., 2013, 2014; Tassé, Macho et al., 2016), which seem to have less of an effect on their social adaptive abilities than on their ID peers.

Socially, DS children and adults are described as charming, pro social, friendly and engaging (Dykens et al., 2000). This social behaviour profile combined with a low rate of negative behaviours could explain their better social adaptive behaviour compared to their peers with ID of different aetiology (Einfeld et al., 2006; Rosner, Hodapp, Fidler, Sagun, & Dykens, 2004). The population with DS is also reported to show more compliance and less transgression of social rules. Hippolytte et al. (2010), reported that DS adults with difficulties on "Social relating" subscales of "Developmental Behaviour Checklist" (Mohr et al., 2005) obtained low scores on the "Social resolution task" (understanding of social/moral rule transgressions). The sociability, social relating and respect for social rules had a positive impact on social adaptive skills in our adults with DS. On the other hand, individuals with DS are reported to have difficulties in the conceptual (e.g. communication) and practical (e.g. self-care) domains of adaptive skills (Dykens et al., 2006). It has been suggested that individuals with DS produce specific nonverbal behaviour that may compensate for their difficulties in expressive skills and personality traits that facilitate their social interaction (see Lecavalier & Tassé, 2005).

In contrast, our two groups did not differ on socio-emotional sub-scale scores. It is to be noted that our socio-emotional sub-scale assesses several aspects of socio-cognitive and emotional abilities. Thus qualitative analyses indicated that DS adults scored higher on items related to social-emotional abilities such as expression of empathy (e.g. "feels sorry when someone is sad or ill"; "shows enthusiasm for others' success"), while scoring lower on items that are related to social-cognitive abilities (e.g. "keeps in touch, gets information about others (questions, telephone, send messages, etc.); makes eye contact during conversation"). This is in accordance with literature reporting DS individuals as being empathetic and friendly, but presenting low social cognitive abilities such as theory of mind, recognition of emotion expressions or executive functioning (Abbeduto & Murphy, 2004; Hippolyte, Barisnikov, Van der Linden, & Detraux, 2009; Wishart, Cebula, Willis, & Pitcairn, 2007) that may cause them difficulties in adapting their behaviour according to social cues and context. Furthermore, a high "emotionality" (affected by their own or others' emotional state) reported

by families and caregivers could cause their emotion regulation difficulties (Jahromi, Gulsrud, & Kasari, 2008), which may negatively impact the development of effective coping strategies, preventing them from implementing an adapted social behaviour to the situation. Some studies reported emotional and relational problems (e.g. oppositional and intrusive behaviour; stubbornness) that could cause social difficulties (Fidler, Most, & Philofsky, 2008). According to Soresi and Nota (2000), social integration difficulties have been underscored in young DS adults who presented problems building a social network and maintaining friendships. Nevertheless, overall results have demonstrated higher social-adaptive skills and low global psychopathology symptoms in adults with DS compared to their ID peers of non-specific aetiology. The hierarchical multiple regressions analyses showed that aetiology was significantly related to group differences, even after controlling for level of ID and chronological age.

However, the regression coefficients analyses showed that the general level of psychopathology fully mediated the relationship between aetiology and the general level of social skills, as presented in Fig. 1. The same pattern was found for the three social adaptive skills sub-scales (sociability, social relating and respect for social rules). These results are in line with Lecavalier and Tassé (2005) showing that the relation between ID aetiology and adaptive behaviour is mediated by the general level of psychopathology. These results suggest that the evaluation of different domains of social adaptive skills should be combined with the assessment of psychopathology in order to better understand the social functioning in the ID population and to target remediation of specific difficulties. Most importantly, the clinical follow-up should give particular attention to these relations. The difficulties in social adaptive skills in ID adults could be a sign of emerging psychopathology problems, but the re-education program should target both dimensions for improving their social functioning.

Thus further studies are needed with the ID population of different aetiology to confirm these results and to define more precisely the impact of different psychopathology problems on social adaptive skills. Finally, our results showed the limits of the group comparative study urging for studies on predictive factors for adaptive social functioning in adults with ID.

6. Conclusion

The new social adaptive skills questionnaire shows good psychometric proprieties and is a well-adapted tool for assessing adults with ID. It provides information about four specific domains (sociability, social relating, respect for social rules and social-emotional skills), which are important for adapted social functioning. Although DS adults displayed higher social skills compared to adults of non-specific ID, the relation between ID aetiology and social skills is fully mediated by the general level of psychopathology.

Assessing the social skills and behaviour in ID adults jointly should provide a framework for specific re-education goals and individual support strategies to maximise their social integration and well–being.

Appendix A

See Tables A1 and A2.

Table A1
Initial and after-extraction communalities for the first exploratory factor analysis tested.

	Initial	Extraction
Item 1	0.567	0.534
Item 2	0.426	0.320
Item 3	0.479	0.368
Item 4	0.582	0.496
Item 5	0.616	0.499
Item 6	0.470	0.332
Item 7	0.472	0.235
Item 8	0.500	0.422
Item 9	0.580	0.446
Item 10	0.463	0.369
Item 11	0.518	0.411
Item 12	0.636	0.546
Item 13	0.480	0.386
Item 14	0.544	0.462
Item 15	0.376	0.192
Item 16	0.546	0.450
Item 17	0.606	0.515
Item 18	0.570	0.427
Item 19	0.556	0.312
Item 20	0.697	0.626
Item 21	0.426	0.261
Item 22	0.480	0.375
Item 23	0.493	0.396
Item 24	0.521	0.378

(*continued on next page*)

Table A1 (*continued*)

	Initial	Extraction
Item 25	0.486	0.382
Item 26	0.512	0.400
Item 27	0.415	0.293
Item 28	0.439	0.427
Item 29	0.563	0.529
Item 30	0.572	0.522
Item 31	0.502	0.397
Item 32	0.470	0.388
Item 33	0.455	0.271
Item 34	0.328	0.219
Item 35	0.295	0.127
Item 36	0.545	0.483
Item 37	0.494	0.352
Item 38	0.411	0.299
Item 39	0.465	0.391
Item 40	0.336	0.115
Item 41	0.287	0.108
Item 42	0.499	0.410
Item 43	0.590	0.529
Item 44	0.398	0.320
Item 45	0.411	0.224
Item 46	0.409	0.269
Item 47	0.417	0.271
Item 48	0.484	0.352

Table A2
Pattern matrix for the first exploratory factor analysis tested.

SBQ items	Socio-emotional abilities	Sociability	Social relating	Respect of social rules
Item 1	0.291	0.509*	−0.254	0.016
Item 2	0.332*	0.200	0.012	0.143
Item 3	0.007	0.604*	−0.165	0.005
Item 4	0.077	0.665*	0.033	−0.051
Item 5	0.222	0.536*	0.211	−0.252
Item 6	0.135	0.317*	0.177	0.195
Item 7	−0.005	0.369*	0.106	0.183
Item 8	−0.098	0.219	0.656*	0.202
Item 9	0.412*	−0.036	0.481*	−0.061
Item 10	−0.205	0.668*	0.020	0.120
Item 11	0.463*	0.219	−0.284	0.016
Item 12	0.711*	−0.036	0.105	0.049
Item 13	0.318*	0.333*	−0.287	0.040
Item 14	0.551*	0.184	−0.144	0.025
Item 15	0.157	0.171	0.117	0.179
Item 16	0.594*	0.012	−0.135	0.138
Item 17	0.760*	−0.017	−0.076	−0.047
Item 18	0.443*	0.113	0.356*	−0.374*
Item 19	0.501*	0.083	−0.093	0.025
Item 20	0.758*	0.006	−0.004	0.059
Item 21	0.051	−0.062	0.502*	−0.074
Item 22	0.454*	−0.058	0.218	0.203
Item 23	0.040	0.275	−0.092	0.448*
Item 24	0.020	0.154	0.293	0.447*
Item 25	0.381*	0.138	−0.138	0.230
Item 26	0.212	−0.031	0.130	0.500*
Item 27	0.346*	−0.162	0.090	0.354*
Item 28	0.233	−0.030	−0.280	0.471*
Item 29	0.086	0.252	−0.094	0.541*
Item 30	0.083	0.021	0.634*	0.269
Item 31	0.162	0.518*	−0.052	0.016
Item 32	0.112	−0.223	0.612*	0.015
Item 33	−0.025	0.333*	0.218	0.237
Item 34	0.073	0.161	0.296	0.184
Item 35	0.118	0.169	0.081	0.130

(*continued on next page*)

Table A2 (*continued*)

SBQ items	Socio-emotional abilities	Sociability	Social relating	Respect of social rules
Item 36	−0.133	0.197	0.671*	0.009
Item 37	0.496*	0.004	0.116	0.117
Item 38	0.347*	−0.198	0.436*	−0.199
Item 39	0.228	−0.088	−0.212	0.491*
Item 40	−0.139	0.087	0.309*	−0.084
Item 41	−0.152	0.276	0.053	0.216
Item 42	−0.248	0.347*	0.558*	−0.098
Item 43	0.278	0.418*	0.289	−0.030
Item 44	−0.052	0.019	−0.189	0.543*
Item 45	0.406*	−0.218	0.178	0.181
Item 46	0.211	−0.034	−0.467*	0.135
Item 47	0.401*	0.030	0.055	0.152
Item 48	0.170	0.153	−0.013	0.402*

Note. * Loadings > .3.

Table A3
Factor correlation matrix for the model tested using confirmatory factor analysis.

Factors	1	2	3	4
1. Socio-emotional abilities	1.000	0.782	0.831	0.272
2. Sociability	0.782	1.000	0.826	0.010
3. Social relating	0.831	0.826	1.000	0.036
4. Respect of social rules	0.272	0.010	0.036	1.000

References

Abbeduto, L., & Murphy, M. M. (2004). *Language, social cognition, maladaptive behavior, and communication in Down syndrome and fragile X syndrome. Developmental language disorders: From phenotypes to etiologies*. Lawrence Erlbaum Associates.

Adolphs, R. (2009). The social brain: Neural basis of social knowledge. *Annual Review of Psychology, 60*, 693–716.

Annaz, D., Karmiloff-Smith, A., Johnson, M. H., & Thomas, M. S. (2009). A cross-syndrome study of the development of holistic face recognition in children with autism, Down syndrome, and Williams syndrome. *Journal of Experimental Child Psychology, 102*(4), 456–486.

Barisnikov, K., & Straccia, C. (2012). Aging influence on depression symptoms in adults with Down syndrome and without dementia. *Journal of Intellectual Disability Research, 56*(7), 690.

Barisnikov, K., Van der Linden, M., & Hippolyte, L. (2005). *Questionnatire de sociabilité.* Geneva (unpublished).

Beciani, S., Vetro, E., Barisnikov, K., Detraux, J.-J., & VanderLinden, M. (2011). Elaboration d'une batterie d'évaluation des signes de vieillissement dans la trisomie 21. *Revue Francophone de la Déficience Intellectuelle, 22*, 129–140.

Beer, J. S., Mitchell, J. P., & Ochsner, K. N. (2006). Special issue: Multiple perspectives on the psychological and neural bases of social cognition. *Brain Research, 1*(1079), 1–3.

Benson, B. A., Reiss, S., Smith, D. C., & Laman, D. S. (1985). Psychosocial correlates of depression in mentally retarded adults: II. Poor social skills. *American Journal of Mental Deficiency*.

Bielecki, J., & Swender, S. L. (2004). The assessment of social functioning in individuals with mental retardation: A review. *Behavior Modification, 28*, 694–708.

Bornstein, M. H., Hahn, C. S., & Haynes, O. M. (2010). Social competence, externalizing, and internalizing behavioral adjustment from early childhood through early adolescence: Developmental cascades. *Development and Psychopathology, 22*(04), 717–735.

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods & Research, 21*, 230–258.

Byrne, B. M. (1991). The Maslach Burnout Inventory: Validating factorial structure and invariance across intermediate, secondary, and university educators. *Multivariate Behavioral Research, 26*(4), 583–605.

(2nd ed.). DeVellis, R. F. (Vol. Ed.), (2003). *Scale development: Theory and applications: Vol. 26*. Thousand Oaks, CA: Sage Publications.

Di Nuovo, S., & Buono, S. (2011). Behavioral phenotypes of genetic syndromes with intellectual disability: Comparison of adaptive profiles. *Psychiatry Research, 189*(3), 440–445 2011.

Dodd, H. F., & Porter, M. A. (2009). Psychopathology in Williams syndrome: The effect of individual differences across the life span. *Journal of Mental Health Research in Intellectual Disabilities, 2*(2), 89–109.

Doyle, T. F., Bellugi, U., Korenberg, J. R., & Graham, J. (2004). Everybody in the world is my friend" hypersociability in young children with Williams syndrome. *American Journal of Medical Genetics Part A, 124*(3), 263–273.

Duncan, D., Matson, J. L., Bamburg, J. W., Cherry, K. E., & Buckley, T. (1999). The relationship of self-injurious behavior and aggression to social skills in persons with severe and profound learning disability. *Research in Developmental Disabilities, 20*(6), 441–448.

Dykens, E. M. (2007). Psychiatric and behavioral disorders in persons with Down syndrome. *Developmental Disabilities Research Reviews, 13*(3), 272–278.

Dykens, E. M., Hodapp, R. M., & Finucane, B. M. (2000). *Genetics and mental retardation syndromes: A new look at behavior and interventions.* Paul H Brookes Publishing.

Dykens, E., Hodapp, R., & Evans, D. (2006). Profiles and development of adaptive behavior in children with Down syndrome. *Down Syndrome Research and Practice, 9*(3), 45–50.

Einfeld, S., Piccinin, A. M., Mackinnon, A., Hofer, S. M., Taffe, J., Gray, K. M., et al. (2006). Psychopathology in young people with intellectual disability. *Journal of the American Medical Association, 296*, 1981–1989.

Esbensen, A. J., Mailick, M., & Krauss, M. W. (2008). Stability and change in health, functional abilities, and behavior problems among adults with and without Down syndrome. *American Journal on Mental Retardation, 113*(4), 263–277.

Feinstein, C., & Verma, S. (2010). Social phenotypes in genetically based neurodevelopmental disorders. In B. K. Shapiro, & P. J. Accardo (Eds.). *Neurogenetic syndromes: Behavioral issues and their treatment* (pp. 277–292). Baltimore, MD: Brookes.

Fidler, D., Most, D., & Philofsky, A. (2008). The Down syndrome behavioural phenotype: Taking a developmental approach. *Down Syndrom Research and Practice, 10*, 37–44.

Field, A. (2013). *Discovering statistics using SPSS* (4th ed.). London: Sage Publications.
Gresham, F. M., & Elliott, S. N. (1987). The relationship between adaptive behavior and social skills: Issues in definition and assessment. *The Journal of Special Education, 21*(1), 167–181.
Harrison, P., & Oakland, T. (2015). *Adaptive behavior assessment system* (third edition). Torrance, CA: Western Psychological Services.
Hippolyte, L., Barisnikov, K., Van der Linden, M., & Detraux, J.-J. (2009). From facial emotional recognition abilities to emotional attribution: a study in Down syndrome. *Research in Developmental Disabilities, 30*(5), 1007–1022.
Hippolyte, L., Iglesias, K., Van der Linden, M., & Barisnikov, K. (2010). Social reasoning skills in adults with Down syndrome: the role of language, executive functions and socio-emotional behaviour. *Journal of Intellectual Disability Research, 54*(8), 714–726.
Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*, 1–55.
Jahromi, L. B., Gulsrud, A., & Kasari, C. (2008). Emotional competence in children with Down syndrome: Negativity and regulation. *American Journal on Mental Retardation, 113*(1), 32–43.
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 neuro--developmental disorders. *Journal of Intellectual Disability Research, 56*(4), 335–350.
Jones, W., Bellugi, U., Lai, Z., Chiles, M., Reilly, J., Lincoln, A., et al. (2000). Hypersociability in Williams syndrome. *Journal of Cognitive Neuroscience, 12*, 43–71.
Lachavanne, A., & Barisnikov, K. (2013). Rééducation des compétences socio-émotionnelles pour des adultes présentant une déficience intellectuelle. *Revue Européenne de Psychologie Appliquée/European Review of Applied Psychology, 63*(6), 345–352.
Lecavalier, L., & Butter, E. M. (2010). *Assessment of social skills and intellectual disability. Practitioner's guide to empirically based measures of social skills*. New York: Springer179–192.
Lecavalier, L., & Tassé, M. J. (2005). An exploratory study of the "personality" of adolescents and adults with Down syndrome. *Journal of Intellectual & Developmental Disability, 30*(2), 67–74.
Luckasson, R., & Schalock, R. L. (2013). Defining and applying a functionality approach to intellectual disability. *Journal of Intellectual Disability Research, 57*(7), 657–668.
Mantry, D., Cooper, S. A., Smiley, E., Morrison, J., Allan, L., Williamson, A., et al. (2008). The prevalence and incidence of mental ill-health in adults with Down syndrome. *Journal of Intellectual Disability Research, 52*(2), 141–155.
Matson, J. L., Anderson, S. J., & Bamburg, J. W. (2000). The relationship of social skills to psychopathology for individuals with mild and moderate mental retardation. *The British Journal of Development Disabilities, 46*(90), 15–22.
Matson, J. L., Belva, B. C., Hattier, M. A., & Matson, M. L. (2012). Scaling methods to measure psychopathology in persons with intellectual disabilities. *Research in Developmental Disabilities, 33*(2), 549–562.
Matson, J. L., Dempsey, T., & LoVullo, S. V. (2009). Characteristics of social skills for adults with intellectual disability, autism and PDD-NOS. *Research in Autism Spectrum Disorders, 3*, 207–213.
Matson, J. L., William, H. J., Bellack, S. A., & Senator, V. (1983). Development of a rating scale to assess social skill deficits in mentally retarded adults. *Applied Research in Mental Retardation,* (4), 399–407.
Matson, J. L., Carlisle, C. B., & Bamburg, J. W. (1998). The convergent validity of the Matson Evaluation of Social Skills for Individuals with severe retardation (MESSIER). *Research in Developmental Disabilities, 19*(6), 493–500.
Matson, J. L., Smiroldo, B. B., & Bamburg, J. W. (1998). The relationship of social skills to psychopathology for individuals with severe or profound mental retardation. *Journal of Intellectual & Developmental Disability, 23*, 137–145.
McDonald, R. P. (1981). The dimensionality of tests and items. *The British Journal of Mathematical and Statistical Psychology, 34*(1), 100–117.
Meyer, L. H., Reichle, J., McQuarter, R., Evans, I., Neel, R., & Kishi, G. (1985). *Assessment of social competence (ASC): A scale of social competence functions.* Minneapolis, MN: University of Minnesota Consortium Institute for the Education of Severely Handicapped Learners.
Mohr, C., Tonge, B. J., & Einfeld, S. L. (2005). The development of a new measure for the assessment of psychopathology in adults with intellectual disability. *Journal of Intellectual Disability Research, 49*, 469–480.
Nihira, K., Leland, H., & Lambert, N. (1993). *Adaptive behavior scale-residential and community (ABS-RC: 2).* Pro-Ed.
Parker, J. G., Rubin, K. H., Erath, S. A., Wojslawwowicz, J. C., & Buskirk, A. R. (2006). Peer relation- ships, child development, and adjustment: A developmental psychopathology. In D. Cichetti, & D. J. Cohen (Eds.). *Developmental psychopathology* (pp. 419–493). (second ed.). New York: Wiley.
Raven, J. C., Court, J. H., & Raven, J. (1998). *Progressive matrices - colour.* Oxford, UK: Psychologist Press.
Reiss, S. (1988). *Test manual for the reiss screen for maladaptive behavior.* Warthington, OH: IDS Publishing Corporation.
Rosner, B. A., Hodapp, R. M., Fidler, D. J., Sagun, J. N., & Dykens, E. (2004). Social competence in persons with Prader-Willi, Williams and Down's syndromes. *Journal of Applied Research in Intellectual Disabilities, 17*, 209–217.
Schalock, R. L., Borthwick-Duffy, S. A., Bradley, V. J., Buntinx, W. H., Coulter, D. L., Craig, E. M., et al. (2010). *Intellectual disability: Definition, classification, and systems of supports.* Washington, DC: American Association on Intellectual and Developmental Disabilities. 444 North Capitol Street NW Suite 84620001.
Shulman, C., Guberman, A., Shiling, N., & Bauminger, N. (2012). Moral and social reasoning in autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*(7), 1364–1376.
Soresi, S., & Nota, L. (2000). A social skill training for persons with Down's syndrome. *European Psychologist, 5*, 34–43.
Sparrow, S. S., Cicchetti, D. V., & Saulnier, C. A. (2016). *Vineland adaptive behavior scales* (third edition). Bloomington: NCS Pearson (Vineland-3).
Straccia, C., Baggio, S., & Barisnikov, K. (2014). Mental illness, behavior problems, and social behavior in adults with Down syndrome. *Journal of Mental Health Research in Intellectual Disabilities, 7*(1), 74–90.
Straccia, C., Tassé, M. J., Ghisletta, P., & Barisnikov, K. (2013). The French version of the Reiss Screen for Maladaptive Behavior: Factor structure, point prevalence and associated factors. *Research in Developmental Disabilities, 34*(11), 4052–4061.
Sucksmith, E., Allison, C., Baron-Cohen, S., Chakrabarti, B., & Hoekstra, R. A. (2013). Empathy and emotion recognition in people with autism, first-degree relatives, and controls. *Neuropsychologia, 51*, 98–105.
Tager-Flusberg, H., & Sullivan, K. (2000). A componential view of theory of mind: evidence from Williams syndrome. *Cognition, 76*(1), 59–90.
Tassé, M. J., Schalock, R. L., Balboni, G., Bersani, H., Jr, Borthwick-Duffy, S. A., Spreat, S., et al. (2012). The construct of adaptive behavior: Its conceptualization, measurement, and use in the field of intellectual disability. *American Journal on Intellectual and Developmental Disabilities, 117*(4), 291–303.
Tassé, M. J., Luckasson, R., & Schalock, R. L. (2016). The relation between intellectual functioning and adaptive behavior in the diagnosis of intellectual disability. *Intellectual and Developmental Disabilities, 54*(6), 381–390.
Tassé, M. J., Macho, P. N., Havercamp, S. M., Benson, B. A., Allain, D. C., Manickam, K., et al. (2016). Psychiatric Conditions Prevalent Among Adults With Down Syndrome. *Journal of Policy and Practice in Intellectual Disabilities, 2*(13), 173–180.
Turiel, E. (1983). *The development of social knowledge: Morality and convention.* Cambridge: Cambridge University Press.
Wishart, J. G., Cebula, K. R., Willis, D. S., & Pitcairn, T. K. (2007). Understanding of facial expressions of emotion by children with intellectual disabilities of differing aetiology. *Journal of Intellectual Disability Research, 51*(7), 551–563.
Yeates, K. O., Bigler, E. D., Dennis, M., Gerhardt, C. A., Rubin, K. H., Stancin, T., et al. (2007). Social outcomes in childhood brain disorder: A heuristic integration of social neuroscience and developmental psychology. *Psychological Bulletin, 133*, 535–556.