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Attachment representations among school-age children with intellectual disability

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ABSTRACT

Keywords:

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Down syndrome

Background: Research data documenting a high risk of insecure and disorganized attachment among children with intellectual disability (ID) in infancy and early childhood raises the question of mutual influences between ID and attachment in later childhood.

Aims: The objectives of the present study were to examine attachment among school-age children with ID and whether attachment varies according to level of intellectual functioning, adaptive functioning, and presence of a genetic syndrome (i.e. Down syndrome).

Methods: Attachment among 54 children with ID aged 8–12 years (30 with Down Syndrome, 24 with non-specific ID) was assessed using the Attachment Story Completion Task, and compared with that of 108 typically developing children, 54 of the same chronological age and 54 of the same mental age.

Outcomes: Results show (1) less security among children with ID than among same-age controls (2) more disorganization among children with ID compared to the two control groups, (3) a link between attachment disorganization and level of adaptive functioning among children with ID and (4) no difference in attachment between children with DS and children with non-specific ID.

Conclusions: Children with ID remain vulnerable to disorganization during late childhood. More research is needed to understand the factors underlying disorganized attachment representations.

What this paper adds?

A higher risk of disorganized attachment has been described among infants and young children with ID. It is unclear whether this is also true during late childhood. This study shows that attachment representations of school-age children with ID are less secure than those of typically developing children of the same chronological age and more disorganized than those of typically developing children of the same chronological age or of the same mental age.

Previous research has raised the question of a link between level of intellectual functioning and attachment. Findings suggest that attachment representations are related to level of adaptive functioning but not to intellectual functioning.

In the literature, it was unclear whether attachment varies as a consequence of a genetic syndrome underlying ID. In this study, no differences were found in security and disorganized representations between children with Down Syndrome and children with non-specific ID.

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1. Introduction

According to Bowlby (1969), seeking contact and proximity with familiar caregivers and the development of an attachment bond are necessary to survive and to adapt to the environment. The attachment system is an innate behavioral system that ensures protection by eliciting care from adult caregivers. Thereby, it enables infants and children to regulate emotions, especially distress, via the intervention of adults. For this to happen, children need to signal attachment cues that elicit appropriate and effective responses from caregivers (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1973/1980). This is characteristic of children who are secure in the relationship with their attachment figure: they signal distress efficiently enough to receive sensitive and prompt responses. Insecure children however need to adapt their innate attachment signals to their caregivers' responses by either deactivating (avoidant attachment) or hyperactivating (resistant attachment) their attachment system (Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993; Main, 1990). A fourth classification (disorganized attachment) concerns infants who exhibit conflicting tendencies (e.g., avoidance and approach) or disorientation (Main & Solomon, 1990) or whose behavior patterns are unusual, bizarre, or contradictory, suggesting failure to develop a coherent attachment strategy.

Because early experiences within attachment relationships contribute to shape mental health (Mikulincer & Shaver, 2012) and because individuals with intellectual disability (ID) are at increased risk of developing mental health disorders (Dykens, 2000), researchers have examined links between ID and attachment (for a review see Schuengel, Schipper, Sterkenburg, & Kef, 2013). Research suggests high rates of disorganized attachment among infants and preschool children with ID (Feniger-Schaal & Joels, 2018; Vaughn et al., 1994). This calls for special attention as disorganized attachment is also associated with poor social development and the emergence of externalizing behavior disorders (Granqvist et al., 2017; Groh, Fearon, van IJzendoorn, Bakermans-Kranenburg, & Roisman, 2017). The links between ID and attachment are still poorly documented and empirical studies are scarce. Namely, it is unknown whether the high proportion of disorganized attachment also concerns school-age children. The objectives of the present study were to examine attachment representations among children with ID in late childhood and whether attachment is associated with IQ, adaptation, and presence of a genetic syndrome (i.e. Down syndrome).

1.1. Attachment and ID in the preschool years

Attachment in preschoolers with ID has been studied using the Strange Situation Procedure (SSP; Ainsworth et al., 1978). This procedure consists in triggering infants' or young children's attachment behaviors by exposing them to short separation-reunion sequences with the attachment figure, in the presence of an unfamiliar adult. In this situation, children normally adopt a specific behavioral pattern that reflects quality of attachment to their caregiver: secure (children exhibit distress but are easily calmed and able to explore once the attachment figure is back), insecure-avoidant (infants inhibit attachment behaviors and avoid their attachment figure upon their her return), insecure-resistant (infants show proximity seeking and resistant behaviors during reunion episodes, as well as persisting distress) or disorganized (conflicting attachment strategies).

In a meta-analysis, Van IJzendoorn, Schuengel, and Bakermans-Kranenburg (1999) observed that in low-risk samples 62 % of infants were secure, 15 % were avoidant, 9 % were resistant, and 15 % were disorganized. In older children, the same percentage of disorganization was found. The few studies on attachment behavior patterns among young children with ID showed different proportions: A recent study on 2–6-year-olds with non-specific ID reported that only 40 % of them were secure and 32.5 % were disorganized (Feniger-Schaal & Joels, 2018). The proportions of avoidant (12.5 %) or resistant (15 %) attachment classifications were close to those of the general population (Van IJzendoorn et al., 1999). In an earlier study involving 138 children with Down Syndrome (DS) aged 14–54 months (Vaughn et al., 1994), a smaller proportion of secure children (46 %) was also found. Of the remaining children, 9 % were avoidant, 3 % resistant, and 42 % “unclassifiable” (see also Atkinson et al., 1999 for age-specific results on a subsample of the Vaughn et al. study). In this study, the authors did not use the disorganized category, which was not yet very used at the time. Behavioral patterns of children in the unclassifiable category did not fit any of those of the three Ainsworth categories. Thus, the unclassifiable category presumably overlaps the disorganized category. Both studies suggest a lower proportion of secure attachment and higher rates of disorganized or unclassifiable attachment behavior patterns among preschoolers with ID compared to typically developing children. This raises questions as to possible factors underlying disorganized/unclassifiable attachment and of their continued effect in later childhood. In later childhood, attachment is measured through representational measures, using narrative story stems (Allen, Bendixsen, Babcock Fenerci, & Green, 2018), rather than through behavioral measures (Solomon & George, 2016).

1.2. Caregiver sensitivity and attachment

In their review on attachment, intellectual disabilities, and mental health, Schuengel et al. (2013) highlighted that context, starting with caregiver sensitivity, is important to consider when attachment behavior is problematic. During the SSP, children with ID show different attachment patterns (Atkinson et al., 1999; Feniger-Schaal & Joels, 2018; Vaughn et al., 1994), suggesting that they can adapt their attachment behaviors to their caregivers. Similar to what is observed among typically developing children, significant links were found between maternal sensitivity and quality of attachment of children with ID, with insecurity being negatively associated with sensitivity (Atkinson et al., 1999; Feniger-Schaal & Joels, 2018). Given the high rates of insecure and disorganized attachment behavior patterns, this finding prompts the question of what may compromise sensitivity among parents of children with ID. Preliminary research suggests that parents may fail to identify their children's attachment needs due to the latter's emotional peculiarities. More specifically, infants and young children with ID exhibit lower intensity of emotional reactivity (Moore, Oates, Goodwin, & Hobson, 2008), less frequent and more fleeting smiles during the first six months of life (when ID is related to DS; Berger &

Cunningham, 1986), and greater difficulty in communicating emotions to adults (Carvajal & Iglesias, 2006). These particularities may compromise co-adaptive processes and increase affective communication errors. Such interactive disturbances are associated with disorganized attachment (Beebe et al., 2012; Lyons-Ruth, Bronfman, & Parsons, 1999; Solomon & George, 2011). Lack of maternal responsiveness in infancy is also known to predict attachment disorganization at the level of representation in the preschool years (Miljkovitch et al., 2013). Therefore, children with ID may be at an increased risk of insecure and disorganized attachment representations due to challenges for their caregivers to properly capture their emotional needs and provide sensitive responses.

1.3. Intellectual and adaptive impairments and attachment

Atkinson et al. (1999) showed that the interaction between level of intellectual functioning and maternal sensitivity predicted attachment security among young children with ID: High levels in these two areas were associated with a greater probability of secure attachment behavior patterns, measured with the Attachment Q-sort (Waters & Deane, 1985). According to these authors, children with the lowest level of intellectual functioning may have more limited resources in terms of intersubjective sharing capacity (expressing needs, understanding the adult's emotional state or intention), making it more difficult for them to co-construct a secure attachment relationship with their attachment figure. However, in Feniger-Schaal and Joels' study (2018) on 2–6-year-olds with non-specific ID, level of intellectual functioning was not associated with attachment. They also found no evidence of a link between level of adaptive functioning and attachment. Yet these non-significant results may be caused by limited statistical power due to the use of attachment classifications (rather than continuous security scores as in the Attachment Q-sort) and smaller sample sizes.

Reciprocally, because disorganized attachment is associated with poor social development (Granqvist et al., 2017), disorganized attachment in children with ID may increase limitations in cognitive and adaptive functioning. In sum, although there may be reasons to expect links between attachment and, respectively, level of cognitive and adaptive functioning among children with ID, more research is needed to document this issue.

1.4. Genetic syndrome and attachment

Genetic syndromes are at the origin of some cases of intellectual disability (Schalock, Luckasson, & Tassé, 2019). They develop during the antenatal period and, beyond intellectual disability, are characterized by cognitive and adaptive features inherent to each syndrome (Farran & Karmiloff-Smith, 2012). For example, children with DS are generally prosocial and insufficiently wary of strangers (Porter, Colheart, & Langdon, 2007). Thus, they may not feel threatened in situations such as the strange situation, when they are alone with a stranger. These features raise questions as to the effect of this syndrome on attachment. Studies carried out so far have not explored this question. Yet data from studies conducted on children with DS (Atkinson et al., 1999; Vaughn et al., 1994) are consistent with those on children with non-specific ID (Feniger-Schaal & Joels, 2018), in that there is an under-representation of the secure category and increased rates of disorganized or unclassifiable attachment behavior patterns. These data suggest links between attachment and ID, but not between attachment and genetic syndromes more specifically.

To summarize, a higher risk of insecure and disorganized or unclassifiable attachment behavior patterns has been observed among infants and young children with ID (Atkinson et al., 1999; Feniger-Schaal & Joels, 2018; Vaughn et al., 1994). However, to our knowledge, no study has explored the link between ID and attachment among school-age children with ID. Authors suggest that these increased rates of insecure or disorganized attachment may be due to problems in parent-child interactions resulting from parental difficulties in capturing their children's needs, given the emotional features of children with ID (Atkinson et al., 1999; Granqvist et al., 2017). Reciprocally, insecure or disorganized attachment may prevent the proper development of cognition and adaptation (Granqvist et al., 2017).

The present study is aimed at examining attachment representations among school-age children with ID and determining whether increased insecurity and disorganization continue to be observed. Given the contextual factors that may explain increased rates of insecure and disorganized attachment found in previous studies (e.g., lack of parental sensitivity), we expected children with ID to have more insecure and disorganized attachment representations than typically developing children of the same mental age (H1). Based on the assumption of a mutual influence between attachment and cognitive or adaptive functioning, we expected children with ID to have more insecure and disorganized attachment representations than controls of the same chronological age (H2). We expected to find a link between attachment representations and both IQ and adaptive functioning within the ID group (H3). Finally, as found in previous studies, we did not expect to find differences in security and disorganization between children with DS and children with non-specific ID (H4).

2. Method

2.1. Design and procedure section

The research project was presented to directors and health professionals from medico-social institutions in charge of children with ID and to school teachers for the typically developing children. When the teachers agreed to participate, a letter presenting the study was sent to the parents. Informed written consent was obtained from participants' parents and then participants gave their oral agreement. The experiment was conducted in accordance with the World Medical Association Declaration of Helsinki on Ethical Principles for Medical Research Involving Human Subjects. This study received a favorable opinion of the "Comité Consultatif sur le Traitement de l'Information en matière de Recherche dans le domaine de la Santé" (CCTIRS n°15.507bis).

Direct assessments were conducted. The tests were administered individually by graduate students in a quiet room in the children's school for typically developing children. For children with ID, assessments were administered at home or in the medico-social institution, at the families' convenience. The duration of the assessments was approximately 45 min.

2.2. Measures

2.2.1. Level of intellectual functioning and reasoning among children with ID

Grégoire's (2009) short-form Intellectual Quotient (IQs) was used to determine the level of intellectual functioning of participants with ID, and to make sure children with ID all met the DSM-5 (APA, 2013) significant limitation of cognitive functioning criterion for the diagnosis of ID. In accordance with Grégoire's IQs recommendations (2009), the assessment of the level of intellectual functioning was based on the *Similarities*, *Matrix reasoning*, *Letter-Number Sequencing* and *Symbol Search* subtests of the Wechsler Intelligence Scale for Children, 4th edition (WISC-4, Wechsler, 2005). These four subtests were selected because they highly correlate with total IQ calculated with the ten main subtests of the WISC-4 at all ages (Wechsler, 2005). Short-form IQs are highly reliable with regards to IQs obtained using the 10 main subtests of the WISC-4 (Grégoire, 2009). IQs scores follow a normal distribution with a mean of 100 and a standard deviation of 15. Scores below 70 indicated the presence of intellectual disability.

The level of reasoning of children with ID was assessed to determine the age of the typically-developing children forming the control group of the same mental age. The level of reasoning was evaluated with the *Similarities* (verbal modality) and *Matrix* (visual modality) reasoning subtests of the Wechsler Scales (WISC-4/WPPSI-3). The raw score in these two subtests were converted into a developmental age of reasoning. When children with ID failed the *Similarities* and *Matrix* subtests of the WISC-4, those of the Wechsler Preschool and Primary Scale of Intelligence-3rd edition (Wechsler, 2004) were used.

2.2.2. Level of adaptive functioning among children with ID

The Vineland Adaptive Behavior Scales, 2nd edition (Vineland-II, Sparrow, Cicchetti, & Balla, 2015) were used to determine an overall adaptive level of functioning (Adaptive Behaviour Composite score) and three sub-scores related to communication, daily living skills, and socialization. These scores follow a normal distribution with a mean of 100 and a standard deviation of 15. Scores below 70 indicate significant adaptive limitations. The questionnaire was completed either by a parent or an educator. These scales were also used to check that participants with ID all met the DSM-5 (APA, 2013) significant limitation of adaptive functioning criterion for the diagnosis of ID.

2.2.3. Attachment

Attachment representations were assessed with the Attachment Story Completion Task (ASCT, Bretherton, Ridgeway, & Cassidy, 1990). In this task, the examiner uses dolls representing family members to stage story beginnings that are supposed to activate the attachment system (e.g., parents leave home for a few days and leave the children with the grandmother). The examiner then asks the child to complete the stories. The ASCT has several advantages for use with children with ID: it is playful, interactive, allows expression with concrete material that doesn't have to be verbal, refers to situations familiar to the child, and stories are short and thereby suitable for children whose attentional capacities are limited. The staging with characters facilitates comprehension, verbal and non-verbal expression. The ASCT is accessible to children as early as age 3, suggesting that it requires a minimum level of cognitive functioning comparable to that of 3-year-olds. In their literature review, Segal and Pesco (2015) explained that children with DS have basic narrative skills, which match those of children of the same mental age or of the same level of language. They also mention that their stories were eased by the display of a visual aid. Moreover, the coding of the ASCT lies on the analysis of both verbal and non-verbal behaviors, which makes the ASCT all the more suitable for children with DS. The ASCT was adapted to everyday life situations of school-aged children according to accommodations proposed by Granot and Maysel (2001).

The coding system used to analyze the narratives was based on a Q-sort questionnaire consisting of 65 cards (items) describing behaviors observed during play (Miljkovitch, Pierrehumbert, Karmaniola, & Halfon, 2003; Miljkovitch, Pierrehumbert, Bretherton, & Halfon, 2004). Scores ranging from 1 to 7 were assigned for each item. Children's scores were compared to those of 4 attachment prototypes yielding 4 scores. For each participant, a secure, avoidant, resistant, and disorganization Q-score was obtained. Inter-rater reliability, tested on 68 cases chosen at random, ranged between .90 and .94 (Miljkovitch et al., 2003). The disorganization prototype is based on the classification scheme proposed by Solomon, George, and De Jong (1995; see also George and Solomon, 1990–2016, a coding system of an abridged version of the ASCT, which was developed according to 6-year-old children's SSP classifications. In line with observed links between the SSP and maternal attachment representations according to the Adult Attachment Interview (AAI: George, Kaplan, & Main, 1985; for a meta-analysis, see Van IJzendoorn & Bakermans-Kranenburg, 1997), construct validity has been established by significant associations between maternal AAI classifications and each of the ASCT Q-sort attachment dimensions, including disorganization (Miljkovitch et al., 2004). Additional theoretically consistent links with parental attachment states of mind (Bernier & Miljkovitch, 2009; Miljkovitch et al., 2004; Miljkovitch, Danet, & Bernier, 2012) further established the construct validity of this coding system. The disorganization scale's convergent validity was also demonstrated by consistently higher scores among abused children (Berdot-Talmier, Aubrion, Pierrehumbert, & Gaudron, 2016; Charest, Hébert, & Bernier, 2018; Fresno, Spencer, Ramos, & Pierrehumbert, 2014; Hébert, Langevin, & Charest, 2020), similar to research findings with the strange situation (Cyr, Euser, Bakermans-Kranenburg, & Van IJzendoorn, 2010), and consistently higher scores among children with conduct disorders (Miljkovitch, Vanwalleghem, & Vinter, 2019), similar to research findings with the Manchester Child Attachment Story Task (Green, Stanley, & Peters, 2007). Expected longitudinal links between both maternal unresponsiveness and lack of sensitivity in infancy with child disorganization at 42 months further established convergent validity (Miljkovitch et al., 2013). In addition, in a preliminary study

(Vanwallegem, 2016), the narratives of 96 subjects were coded using two coding methods, the one proposed by Granot and Mayslees (2001) and the Q-Sort (Miljkovitch et al., 2003). The distributions of children in the 4 attachment categories, including disorganization, were compared. There was no significant difference between the two distributions. This also shows the validity of the Q-sort coding system. Coders were trained and supervised by one of the authors of the coding system. Regular meetings were held to build consensus among coders.

2.2.4. Socio-economic status

The socio-economic status (SES) was estimated using Barratt’s simplified measure of social status (BSMSS, Barratt, 2006). BSMSS score is based on both the level of education and the profession of each parent and on family status (married parents, separated, single parent families, etc.). BSMSS scores vary from 8 (lower SES) to 66 (higher SES).

2.3. Participants

The study population consisted of a clinical sample, participants with ID, and two control samples. Participants from one control group had the same mental age as participants with ID; mental age was assessed by the level of reasoning. Participants from the second control group had the same chronological age as participants with ID. Control children were randomly recruited in schools. The level of reasoning of children with ID was assessed with the *Similarities* and *Matrix reasoning* subtests of Wechsler Scales (WISC-4/WPPSI-3); the estimation has given an age range of 4–6 years.

The clinical sample included 54 children with ID, 34 boys and 20 girls, aged 8–12 years ($M = 10.8$ years, $SD = 1.2$ year). Thirty children presented an ID linked with Down syndrome (DS) and 24 a non-specific ID. The presence of an ID was attested by significant limitations in intellectual functioning and adaptive functioning, in accordance with DSM-5 criteria (APA, 2013). The control group of the same level of reasoning, included 54 typically developing children, 27 boys, 27 girls, aged 4–6 years ($M = 5.1$ years, $SD = 0.5$ year). The control group of the same chronological age included 54 typically developing children, 28 boys, 26 girls, of 8–12 years of age ($M = 10.5$ years, $SD = 1.5$ year).

Participation rate in this study was about 35 % for controls aged 8–12 years, 50 % for controls aged 4–6 years, and 20 % for children with ID. Some parents of children with ID found participation to be an additional burden given the numerous appointments their children already had for medical follow-up and psychosocial care. Others were not in favor of psychological study. A few parents refused for fear that the experimental protocol would set their child up for failure. Some did not give an explanation.

2.4. Data analysis

To compare attachment security and disorganization between children with ID and typically developing children, the Welch’s ANOVA method was used and was followed by post-hoc Scheffé tests. Then, to explore the links between levels of intellectual and adaptive functioning and attachment among children with ID, partial correlations were used. Finally differences in security and disorganization between children with DS and children with non-specific ID were examined using a MANCOVA.

3. Results

3.1. Preliminary analyses

The proportions of girls and boys in the three groups were comparable: $\chi^2 = 2.14, p > .30$. Concerning socio-economic status, the BSMSS score of the ID subgroup was lower than that of control children aged 4–6 years, $t(82) = -3.40, p = .001$, and of control children Aged 8–12 years, $t(88) = -3.08, p = .003$. The BSMSS score of the non-specific ID subgroup was lower than that of children with DS, $t(52) = 8.72, p < .001$. The BSMSS score was therefore controlled in the main analyses. The BSMSS scores are presented in Tables 1 and 2.

Among children with ID, the IQ short-form (IQs) was lower in children with Down Syndrome (DS) than in children with non-specific ID, $t(52) = -8.31, p < .001$. The Vineland Adaptive Behaviour Composite score was also lower in children with DS than in children with non-specific ID, $t(52) = -4.19, p < .001$. These two scores were therefore controlled in the statistical analyses comparing these two subgroups. The BSMSS scores, IQ scores and Adaptive Behaviour Composite of children with DS and with non-specific ID are presented in Table 2.

Table 1

BSMSS scores of children with ID, typically developing children of same mental age and of same chronological age.

	ID				Control 4–6 years				Control 8–12 years			
	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max
BSMSS	29.3	21.8	8.0	66.0	43.9	12.2	19.0	66.0	42.5	16.7	8.0	66.0

Note. BSMSS = socio-economic status score; ID = Intellectual Disability.

Table 2
BSMSS scores of children with Down Syndrome and children with non-specific ID.

	DS				Non-specific ID				
	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max	
BSMSS	44.1	18.7	11	66	10.7	1.38	8	15	
IQs	36	3.49	35	47	51	8.84	40	69	
Vineland	28.7	12.5	20	67	46.5	18.8	20	70	

Note. BSMSS = socio-economic status score; IQs: Intellectual Quotient short-form; Vineland = Vineland Adaptive Behaviour Composite score; DS = Down Syndrome; ID = Intellectual Disability.

3.2. Main analyses

3.2.1. Comparisons of attachment scores between children with ID and control children

The ASCT scores for the three groups are presented in Table 3.

A Welch's ANOVA aimed at testing the effect of the group on the secure dimension indicated a significant group effect, $F(2, 98) = 75.94, p = .004$. Post-hoc Scheffé tests showed that children with ID were significantly less secure than controls aged 8–12 years ($p = .011$) but did not differ from controls aged 4–6 years ($p > .10$). No significant difference was found between the two control groups on the secure dimension ($p > .50$) and the two groups were statistically equivalent to 0 according to a two-one-sided-t-tests (TOST) procedure, $t(105.78) = 2.38, p = .009$, given equivalence bounds of -28.83 and 28.83 (on a raw scale) and an alpha of .05.

Run on the disorganized dimension, a Welch's ANOVA indicated a significant group effect, $F(2, 89) = 14.3, p < .001$, children with ID being significantly more disorganized than controls aged 4–6 years (post-hoc Scheffé test, $p < .001$) and than controls aged 8–12 years ($p < .001$). No significant difference was found between the two control groups (post-hoc Scheffé test, $p > .40$) and the two groups were statistically equivalent to 0 according to the TOST procedure, $t(105.97) = -2.23, p = .014$, given equivalence bounds of -21.62 and 21.62 (on a raw scale) and an alpha of .05.

3.2.2. Level of intellectual and adaptive functioning and attachment in children with ID

Partial correlations controlling for BSMSS between the ASCT secure and disorganized dimensions and, respectively, IQs, Vineland Adaptive Behaviour Composite scores, and the three Vineland subscores (socialization, daily living skills, and communication) are presented in Table 4. Partial correlations between the ASCT scales and IQs were non-significant (all $|r_s| < .14$). Revealing that IQs scores were not linked to ASCT scores. Negative correlations were found between the disorganization dimension and, respectively, the Vineland adaptive behaviour composite score, $r = -.31, p = .026$, and the daily living skills sub-score, $r = -.29, p = .035$.

3.2.3. Attachment and ID subgroups

The results of the MANCOVA comparing children with Down syndrome (DS) to children with non-specific ID showed that there was no group effect on attachment: $F(2, 48) = 0.25; p > .70$). There was also no effect of BSMSS on attachment: $F(2, 48) = 0.81; p > .40$ nor on IQs: $F(2, 48) = 0.10; p > .90$. However, a significant effect of the Vineland adaptive behaviour composite score on attachment was found: $F(2, 48) = 3.62, p = .003$. Univariate analyses specified that the effect of the Vineland adaptive behaviour composite score concerned the disorganized dimension only: $F(1, 49) = 6.78, p = .012$, consistent with the negative correlation between the Vineland adaptive behaviour composite score and disorganization.

4. Discussion

4.1. Attachment among school-age children with ID

The first objective of this study was to compare secure and disorganized attachment representations among children with ID aged 8–12 years with typically developing children. Results showed that children with ID had less secure attachment representations than controls of the same chronological age (8–12 years old) but did not differ from controls of the same mental age (4–6 years old). They also that children with ID had more disorganized attachment representations than controls of the same chronological age or of the same mental age.

Concerning security, results involving the ID group may at first suggest that security scores vary according to mental age given that a significant difference was found with typically developing children of the same age but not with those of the same mental age. It must

Table 3
ASCT scores of children with ID, typically developing children of same mental age and of same chronological age.

	ID				Control 4–6 years				Control 8–12 years			
	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max	<i>M</i>	<i>SD</i>	Min	Max
Secure	46.8	13.2	18.8	66.1	51.5	15.1	10.7	66.1	54.0	8.1	34.9	68.1
Disorganized	57.0	16.8	33.2	92.7	47.3	12.3	32.8	76.5	44.2	5.9	35.3	73.4

Note. ASCT = Attachment Story Completion Task; ID = Intellectual Disability.

Table 4

Partial correlations between ASCT secure and disorganized dimensions with IQs and VINELAND-II scores, controlled by BSMSS, for participants with ID.

ASCT	WISC-4	VINELAND-2			
	IQs	Composite	Communication	Daily Living Skills	Socialization
Secure	.02	.20	.11	.14	.14
Disorganized	-.04	-.31*	-.15	-.29*	-.16

Note. ASCT = Attachment Story Completion Task; IQs = Intellectual Quotient short form; Composite = Adaptive Behaviour Composite.

* = $p < .05$.

noted however that the mean score for the control group of the same mental age was intermediate to that for the control group of the same chronological age and that for the ID group and was not significantly different from either. The fact that no difference was found between the two control groups thus invalidates this hypothesis. This corroborates the assumption that other factors, such as contextual factors (Schuengel et al., 2013), may be involved in the difference in security between children with ID and typically developing children of the same age. In particular, Feniger-Schaal and Joels (2018) showed that maternal sensitivity was negatively associated with security in infants with ID. Likewise, lack of caregiver sensitivity may lead to greater insecurity in the school years as well.

Results concerning disorganization are unequivocal as children with ID obtained scores that were higher than those of the two control groups, whereas the two latter did not differ from one another. This finding is consistent with previous studies (Atkinson et al., 1999; Feniger-Schaal & Joels, 2018; Vaughn et al., 1994) showing more disorganized or unclassifiable attachment behavior patterns among infants and preschoolers with ID (14–75 months). Interestingly, disorganization at the level of representation in our sample of children with ID was negatively associated with adaptive functioning. The disorganization scale is characterized by an inability to find solutions for the story beginnings. Perhaps then, below a minimum level of adaptive functioning, children with ID have more difficulty solving stressful situations. Of the three Vineland sub-scores, only the daily living skills sub-score was related to disorganization. This subscale reflects the person's level of autonomy in daily life and is composed of items related to taking care of oneself (e.g., eating, dressing, taking care of one's appearance), taking care of one's home (e.g., being careful with hot things, putting away one's belongings, feeding animals) and living in the community (e.g., making phone calls, understanding rules, laws, safety, understanding the value of money, understanding how a clock works etc.). It could have been expected that the other two Vineland subscales relative to quality of communication and quality of socialization be linked to quality of attachment because attachment involves intersubjective emotional sharing between children and their caregivers (Atkinson et al., 1999).

The association between level of adaptive functioning and disorganized attachment may be interpreted as follows: Disorganized attachment representations may contribute to maladaptive social behaviors and thus hinder the development of adaptive functioning. Insecure attachment is associated with sub-optimal socio-emotional development (Girard, Lemelin, Provost, & Tarabulsy, 2013; Groh et al., 2017). Notably disorganized children eventually have more behavior problems (McCartney, Owen, Booth, Clarke-Stewart, & Vandell, 2004; NICHD, 2006). Knowing that people with ID are at greater risk for emotional and behavioral problems (Emerson, 2003), more studies are needed to investigate whether insecure or disorganized attachment account for this increased risk.

Environmental factors may also explain the link between attachment and level of adaptive functioning. It is likely that families in which disorganized attachment develops provide poor support for adaptive development as well. Adjusting to the needs of children with ID can be challenging and requires the provision of interactions which are neither too controlling, nor under-stimulating or lacking constant responsiveness. Inadequate co-adaptive processes and affective communication errors may lead to disorganized attachment (Beebe et al., 2012; Lyons-Ruth et al., 1999; Solomon & George, 2011) and contribute to limit the development of adaptive skills. Little is known about the way environmental factors impact both attachment and adaptive functioning in children with ID. More research is needed to determine the specific factors at play and whether those identified among typically developing children also apply to children with ID.

Although the present study established a link between level of adaptive functioning and attachment, no relationship was found with IQ. It is noteworthy that most of the children with Down syndrome from our sample had very low scores on the WISC-4 (the lowest score on the WISC-4 is 35 whereas the mean score of the DS sample was 36). Thus, it is possible that the failure to reveal an effect was related to a floor effect and insufficient sensitivity of the IQ measure. The study of a link between cognitive resources and attachment would require further investigation using an instrument that makes it possible to discriminate more finely the levels of overall cognitive functioning of children with ID. Moreover, during the interviews, we observed that children with ID whose attachment was disorganized often showed perseverations in the various assessments (e.g., repeating the same action during the ASCT, always pointing to the picture proposed last in a reasoning test where one must choose one answer among several ones). These perseverations indicate lack of cognitive flexibility, which may impact children's ability to adapt to attachment-related situations and develop organized attachment strategies. Some studies show that executive functions are often highly impaired in children with ID (Carney, Brown, & Henry, 2013; Daunhauer, Fidler, Hahn, Will, & Lee, 2014) and are associated with adaptive behavior (Sabat, Arango, Tassé, & Tenorio, 2020). Future studies that include a specific assessment of executive functions could be useful to determine whether lack of cognitive flexibility could be a specific risk factor for disorganization among children with ID.

4.2. Attachment and etiology of ID

In order to ascertain that the results from this study accurately reflect the mutual influence between ID and attachment rather than the effect of a confounding factor related to the etiology of ID (i.e. genetic syndrome), attachment security and disorganization scores of children with DS were compared to those of children with non-specific ID. No significant differences were found between the two groups, thus further confirming the role of ID *per se* in explaining the specifics of attachment among children with ID.

4.3. ASCT: a valid test to assess attachment within children with ID?

Pipp-Siegel, Siegel, and Dean (1999) have shown that some signs of attachment disorganization during the SSP could reflect neurological impairments rather than actual attachment-related behaviors, this raises the question of the validity of the disorganization scale of the SSP for children with ID. Likewise, in the present study, the question arises as to whether certain verbal and non-verbal behaviors that characterize play among children with ID during the ASCT actually reflect neurocognitive limitations rather than attachment questioning the validity of the ASCT to assess attachment representations among children with ID.

A preliminary qualitative analysis of the stories of the 30 children with DS (Vanwalleghem, Deborde, & Miljkovitch, 2017) highlighted low verbal emotional expressivity among all children, both secure and insecure. This parallels the results of Cicchetti and Serafica (1981): during the SSP, children with DS expressed their distress less intensely than control children, but the organization and sequence of their responses were comparable to those of controls. Similarly, during the ASCT, in spite of low verbal emotional expressivity, security signs appeared through structured, consistent stories, where solutions were provided to the problems presented. Regarding the dimension of disorganization, children with more disorganized representations showed distractibility, perseverations, inattention, or lack of inhibition. These manifestations may be the expression of disorganized attachment patterns or dysexecutive disorders: their indeterminate nature further questions the validity of the disorganization scale for children with ID. However, children also exhibited other specific signs of disorganization, such as lack of narrative coherence. Neurocognitive deficits may have increased the intensity of disorganization and conversely, disorganization may have increased the expression of attention and executive disturbances, which are frequent among children with DS (Pritchard, Kalback, & Capone, 2015). Given that children's narratives enable discrimination of different response patterns reflecting attachment, including secure and disorganized attachment representations in children with DS, the ASCT seems appropriate to assess attachment representations in these children. However, further research is needed to test the validity of the disorganization scale, particularly with children with ID, by testing convergent validity and the nomological network that includes known precursors of attachment disorganization.

The validity of the ASCT for measuring attachment representations in school-age children could also be questioned as this instrument was originally designed for children aged 3–7 years. To circumvent this problem, the stories were adapted to this age group, based on recommendations from Granot and Maysel (2001). The absence of differences between the ASCT scores of the two control groups, aged 4–6 years and 8–12 years, respectively, suggests that the coding was valid for the 8- to 12-year-old group as well.

5. Conclusions

In conclusion, the present study showed that school-age children with ID were more vulnerable to insecure and disorganized attachment than typically developing children and this was linked to their level of adaptive functioning. More research is needed to (1) understand the factors underlying disorganized attachment representations in these children, (2) determine whether environmental factors impact both attachment and adaptive functioning and (3) whether attachment influences level of adaptive functioning, for example by increasing the risk that children with ID develop social problems as observed among children without ID (Granqvist et al., 2017), and (4) to confirm the validity of the ASCT for children with ID.

CRedit authorship contribution statement

Stéphanie Vanwalleghem: Conceptualization, Methodology, Project administration, Formal analysis, Writing- Original Draft. **Raphaële Miljkovitch:** Conceptualization, Methodology, Writing - Review & Editing, Supervision. **Annie Vinter:** Conceptualization, Review & Editing, Supervision.

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Declaration of Competing Interest

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