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Effects of intellectual disability and attachment on hostile intent attribution bias

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ABSTRACT

Understanding hostile intent attribution (HIA) seems important for prevention of problems in social adaptation. This study aimed to explore whether HIA in childhood is determined by both a cognitive factor (i.e. intellectual disability) and an affective factor (i.e. attachment representations). One hundred and eight 8- to 12-year-old children (54 with intellectual disability and 54 with typical development) passed the Attachment Story Completion Task and the Intention Attribution Test for Children. Results indicated that in ambiguous situations, attachment disorganization was associated with HIA, whereas intellectual disability was not. In nonintentional situations, both attachment hyperactivation and intellectual disability were linked with HIA. These results highlight the importance of helping children develop organized attachment representations and optimal activation of their attachment system to prevent social maladaptation.

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1. Introduction

Children with intellectual disability have cognitive and adaptive functioning deficits, such as difficulty understanding others (American Psychiatric Association, 2013). Research findings show that their cognitive impairments limit understanding of others, namely intent attribution in unintentional situations of harm (e.g. a character breaks another child's tower of blocks by accident, Leffert et al., 2010). In situations where the intent of a person who caused harm is ambiguous (e.g. there is no cue as to whether breaking the tower of blocks was intentional or not), cognitive deficits may cause children with intellectual disability to fail to process the ambiguous information of the situation and develop a hostile intent attribution (HIA) bias, which is a "tendency to attribute hostile intent to others in social situations with a negative outcome for the individual, where the intent of the other person is ambiguous" (Verhoef et al., 2019). These children's interpretation of negative situations may however also depend on past experience, especially in attachment relationships (Bowlby, 1973/1980; Crick & Dodge, 1994; Dykas & Cassidy, 2011). Because interpretation is a key mechanism of social adaptation (Crick & Dodge,

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1994) and because social adaptation is difficult for children with intellectual disability (American Psychiatric Association, 2013), it is important to understand the factors involved in the interpretation of social situations among children with intellectual disability. The purpose of this study is to determine whether, like cognitive factors, affective factors are associated with interpretation biases among children with intellectual disability. If so, affective factors could become therapeutic goals for the care of these children. In this perspective, this study aims to test whether the interpretation of negative ambiguous or nonintentional social situations of children with mild to moderate intellectual disability is linked with both cognitive impairments (by comparison with children without intellectual disability) and attachment. To our knowledge, this study is the first to consider the influence of both factors together.

1.1. Interpretation of negative social situations

In new social situations, behavior is guided by the cognitive processing of social information (Crick & Dodge, 1994). According to Crick and Dodge's (1994) social information-processing model, there are several successive stages: (1) encoding of both internal and external cues, (2) interpretation and mental representation of those cues including intent attribution, (3) selection of a goal, (4) response access, (5) response decision, and (6) behavioral enactment. Dodge (2006) proposes that in a negative situation where a protagonist suffers harm, if the intent of the protagonist who caused the harm is ambiguous, children would all first develop a HIA bias but then, most of them would learn to make benign attributions, after noticing that some damages are not due to hostility. This progress lies on cognitive flexibility abilities that enable children to change their representation of ambiguous negative situations from “hostile” to “possibly unintentional.” According to Dodge (2006), HIA is a failure to learn to make benign attributions. Children with intellectual disability have limited resources for cognitive flexibility (Danielsson et al., 2012), which is part of their overall cognitive deficit (American Psychiatric Association, 2013). This deficit of flexibility seems to be involved in errors of intent attribution in negative unintentional situations (Leffert et al., 2000, 2010; Maheady et al., 1984). They have cognitive difficulties in decentring attention from the salient dimension of the situation (i.e. the damage that occurred) and integrating cues of nonintentionality of the action (Leffert et al., 2010).

Similarly, in situations where harm is committed and intent is ambiguous, children with intellectual disability may not be able to shift attention from the HIA bias to a more flexible interpretation of the situation that takes into account the lack of cues relative to any negative intention in the person who caused the harm. They may all the more be expected to exhibit a HIA bias. Van Nieuwenhuijzen et al. (2011) found that children with mild to borderline intellectual disabilities (mean IQ of 80) tend to make more HIA of ambiguous situations than their typically developing peers. Recent research indicated that adolescents (13–17 years old) with intellectual disability (IQ < 70) also showed biased social information processing: they more often attributed hostile intent in both ambiguous and accidental situations than peers with borderline or average IQ (Van Rest et al., 2020). These results highlight the importance of assessing bias in both ambiguous and nonintentional situations of damage among people with intellectual disability. In light of the literature, it seems reasonable to expect HIA bias in both ambiguous and nonintentional situations of damage among school-aged children with more severe intellectual disability than van Nieuwenhuijzen's participants (i.e. children with mild to moderate intellectual disability).

In addition to the effect of cognitive deficits, one may wonder if, as observed among children without intellectual disability, attachment could also contribute to explain HIA bias (Zaccagnino et al., 2013).

1.2. Disorganized attachment and interpretation of negative ambiguous social situations

According to Crick and Dodge (1994), new social situations are likely to be interpreted according to past experiences, including attachment experiences. Bowlby (1973/1980/1982) proposed that attachment experiences are encoded in long-term memory in the form of mental models of relationships called Internal Working Models (IWM). IWMs are thought to guide the "live" interpretation of new social situations and to direct behavior (Bowlby, 1973/1980/1982). Bowlby suggested that IWMs of self and attachment figures are generalized to representations of social interactions outside the relationship with attachment figures. Secure models of attachment allow people to process social stimuli in an open, positively biased, full and flexible manner (Dykas & Cassidy, 2011). Conversely, people with insecure IWMs would process information in a negatively biased manner, expecting rejection and ascribing negative intention to others. Thus, the attribution of intent is thought to differ according to what has been internalized from attachment relationships. Because people who feel insecure are also believed to defensively exclude social information likely to elicit psychological pain, their IWMs may not be properly updated according to new contradictory information (Bowlby, 1980; Cassidy & Kobak, 1988; Main et al., 1985; Main, 1991). Consequently, IWMs may inappropriately generalize to other relationships and be somewhat disconnected from experience (Bretherton & Munholland, 2008; for a review, see Zimmermann & Iwanski, 2015). Similarly, intent attribution in new social situations may be guided by IWMs without contradictory information being integrated.

Several studies conducted with typically developing children support the view that the attribution of intent differs according to what has been internalized from attachment relationships: Indeed, attachment insecurity and disorganization are associated with HIA (Cassidy et al., 1996; Clark & Symons, 2009; Suess et al., 1992; Zaccagnino et al., 2013; Zajac et al., 2020). Some of these studies assessed attachment through the quality of the dyadic relationship with an attachment figure during infancy and tested its links with later intent attribution during childhood (Cassidy et al., 1996; Suess et al., 1992; Zajac et al., 2020). Cassidy et al. (1996) noted that associations between attachment and HIA were significant but moderate, perhaps due to the time lag between the two measures. More recent studies assessed generalized attachment-related cognitions at the same time as HIA (Clark & Symons, 2009; Zaccagnino et al., 2013). As expected, children with secure representations made more positive attributions about the intentions of others than children with insecure representations (Clark & Symons, 2009) and hostile attributional bias was associated with disorganized representations (Zaccagnino et al., 2013). These results support the idea that children process information in a biased schematic fashion in new social situations that is congruent with their attachment-related cognitions.

Moreover, children with intellectual disability are at higher risk of developing disorganized or atypical attachment behaviors in infancy and early childhood than typically developing children (Atkinson et al., 1999; Feniger-Schaal & Joels, 2018; Vaughn et al., 1994). Children with disorganized attachment lack a coherent strategy to act upon their attachment figure in stressful situations (Main, 1990). This prevents them from dealing efficiently with stress and alleviating associated anxiety (for a review see Lyons-Ruth & Jacobvitz, 2016). Consequently, they are at higher risk of social maladaptation (Granqvist et al., 2017), such as relational aggression (Seibert & Kerns, 2015) or externalized behavior problems (Fearon et al., 2010; NICHD Early Child Care Research Network, 2006). At the level of representation, a higher risk of disorganization has also been documented among children with intellectual disability (Vanwalleghem et al., 2021). Development of attachment representations lies on the integration of multimodal sensory, emotional, and cognitive information from attachment experiences. Disorganized representations can be tapped in attachment narratives by identifying lack of integration of attachment-related information (Main & Hesse, 1990; Solomon et al., 1995). In childhood, attachment representations can be assessed with story completion tasks (Bretherton et al., 1990; Green et al., 2000; Solomon et al., 1995). Story beginnings that are supposed to activate the attachment system are presented to participants, who are then asked to show what happens next with the help of dolls. It is assumed that children will complete the story beginnings according to interiorized attachment scripts (Bretherton et al., 1990; see Miljkovitch et al., 2012 for evidence). Attachment representations are coded according to the quality and content of narratives, as well as to the participant's overall responses (eg., collaboration) and emotional expressions during play. Disorganization is coded when lack of coherence in the narratives, themes of aggression, destruction, helplessness, and/or failure to resolve the situation are observed (Miljkovitch et al., 2004; Solomon et al., 1995). Note that although children with ID are at higher risk of exhibiting disorganized attachment representations, some are able to produce narratives suggesting organized or even secure attachment representations (Vanwalleghem et al., 2021).

It thus seems reasonable to expect that, like typically developing children, children with intellectual disability are also more likely to show HIA when they have disorganized attachment representations (Zaccagnino et al., 2013). Then again, the link between HIA in ambiguous negative social situations and attachment models involves the cognitive ability to map existing attachment models onto current interactions with others. The overall deficit in cognitive functioning that characterizes intellectual disability (American Psychiatric Association, 2013) raises the question of whether the cognitive resources of children with intellectual disability are sufficient to link these experiences together (see Karmiloff-Smith, 1992), and hence, whether a HIA bias associated with disorganization is also observed among these children.

To summarize, research findings suggest that the cognitive deficits of children with intellectual disability cause them to make attribution errors in situations of unintentional harm. Similarly, they may also affect intent attribution in ambiguous negative social situations, leading to a HIA bias, because of the difficulty shifting from the negative valence of the damage to the absence of cues suggesting intentional harm. It is unclear whether attachment representations also contribute to increased HIA in children with intellectual disability. Knowing that children with intellectual disability are at risk of being disorganized, and because attachment experiences are believed to guide the interpretation of new social situations (Bowlby, 1973/1980/1982; Crick & Dodge, 1994; Dykas & Cassidy, 2011), links between attachment and intent attribution among these children seem important to examine. The objective of this study is to explore whether HIA is explained by both a cognitive factor, i.e. intellectual disability, and an affective factor, i.e. attachment representations.

2. Materials and method

2.1. Participants

The clinical sample included 54 children with intellectual disability, 30 with intellectual disability linked with Down syndrome (DS) and 24 with non-specific intellectual disability. There were 34 boys and 20 girls, aged 8 to 12 years (*M* = 10.8 years, *SD* = 1.2 year). In accordance with DSM-5 criteria of intellectual disability (American Psychiatric Association, 2013), all children showed significant limitations in intellectual functioning, according to the Wechsler Intelligence Scale for Children, fourth edition, WISC-IV (Wechsler, 2005; *M* = 43, *SD* = 10) and in adaptive functioning accoring o the total score of the Vineland-II (Sparrow et al., 2015; *M* = 37, *SD* = 18). They had mild to moderate intellectual disability. No differences were found between children with Down syndrome and children with a non-specific intellectual disability regarding attachment and HIA. Thus, they were included in a single group.

Typically developing participants were randomly recruited in schools, after making sure that they were not at risk of intellectual disability using the subtests of the WISC-IV (Wechsler, 2005). The group of typically developing participants included 54 children, 28 boys, 26 girls (*M* = 10.5 years, *SD* = 1.5 year). Their intellectual level of functioning was within the norm (*M* = 106, *SD* = 17).

2.2. Procedure

The tests were administered individually at home or at school for children with intellectual disability and at school for typically developing children. The tests used to assess attachment and HIA both evoke emotions. Because the emotional state elicited by one test can affect the next test, intellectual level of functioning was assessed first. Because theoretical assumptions support the view that attachment representations influence intent attribution, we administered the test assessing attachment before the test evaluating HIA. All parents and children gave their informed consent for the study. The procedure received the favorable opinion of the Comité Consultatif sur le Traitement de l'Information en matière de Recherche dans le domaine de la Santé (file number: CCTIRS N°15.507bis) and the authorization of the Commission Nationale de l'Informatique et des Libertés (CNIL file number: MMS/CWR/AR164494) for the implementation. In accordance with their requirement, the data were made anonymous.

2.3. Tests

2.3.1. Hostile intent attribution bias

HIA bias was assessed using the Intention Attribution Test for Children (IAC, Vanwalleghem et al., 2019). The IAC is a projective test composed of 16 cartoon strips presenting negative situations in which one character, either a child or an adult, causes harm to another. For 8 of the 16 cartoon strips, the intent of the protagonist who causes the harm is ambiguous (e.g. a child knocks down another child's tower of blocks and there is no clue as to whether he/she did it on purpose or not). These ambiguous cartoons allow the assessment of hostile/non-hostile intent attribution bias. The remaining eight cartoons are unambiguous. For 4 of them, the hostile action is intentional (e.g. a child deliberately destroys another child's snowman). For the others, the action is nonintentional (e.g. a child carried on an adult's shoulders receives a tree branch in the face after which the adult comforts her/him). Ambiguous and unambiguous cartoons are alternated. Participants assign a hostile intent (score 1) or non-hostile intent (score 0) to the character that caused damage from each cartoon strip. Three scores are calculated: (1) the HIA ambiguous score, which is the sum of the scores for the eight ambiguous items, with scores ranging from 0 to 8; (2) the HIA nonintentional score, which is the sum of the scores for the 4 nonintentional items, with scores ranging from 0 to 4, and (3) the HIA global score, which is the sum of the HIA ambiguous score and the HIA nonintentional score, with scores ranging from 0 to 12. There is a correct answer for each nonintentional situation but not for the ambiguous situations, in which no clear indices of intent are depicted. The score of intentional harm has not been taken into account because the scale does not contribute to the overall construct of HIA bias (Vanwalleghem et al., 2019). This test has good psychometric qualities and has been validated on children aged 4–12 years (Vanwalleghem et al., 2019). Scores are not associated with IQ (Vanwalleghem, 2016).

2.3.2. Attachment

The Attachment Story Completion Task (ASCT, Bretherton et al., 1990) was used to assess attachment representations. It was adapted to school-aged children according to accommodations proposed by Granot and Mayseless (2001). During the ASCT, the examiner uses dolls representing family members to stage story beginnings that are supposed to activate the attachment system (e.g. children injure themselves by falling off a rock). Then participants are asked to complete the stories.

A Q-sort questionnaire consisting of 65 items describing behaviors observed during play was used to analyze the narratives (Miljkovitch et al., 2003, 2004). This analysis provided a *T*-score (mean of 50, standard deviation of 10) for each attachment dimension, including the disorganization dimension. Children with secure representations are collaborative and depict a wide range of affective states without difficulty. In their narratives, the child protagonist finds security with the parental figures. Participants with representations suggesting deactivation tend to be more anxious and reluctant to complete stories. They produce stereotypical stories in which protagonists seem isolated and no negative emotions are attributed to parental figures. Participants with high hyperactivation scores tend to be anxious, wary, and angry. They seem unable to present constructive resolutions for the story stems and focus on the negative aspects of the stories. Children with disorganized representations show disorganized and incoherent narratives marked by loss of control, catastrophic endings, or characters depicted as helpless and unprotected, themes of disintegration of family members, exaggerated or violent controlling attitudes, or themes of aggression or destruction. Participants may also be totally silent, inhibited and anxious. The disorganization pattern is based on the classification scheme proposed by Solomon et al. (1995; see also George & Solomon, 1990–2016), a coding system of an abridged version of the ASCT, which was developed according to 6-year-old children's strange situation procedure classifications.

Coders were supervised and trained by one of the researchers who created the coding system and regular meetings were held to build consensus among coders. The inter-rater reliability of the test has been established on 68 cases chosen at random: reliability ranged between .90 and .94 (Miljkovitch et al., 2003). More recently, Charest et al. (2019) also found that the coding system had good inter-rater reliability. Construct validity has been established by significant associations between maternal Adult Attachment Interview (AAI) classifications (Main, Goldwyn & Hesse, 2002) and each of the ASCT Q-sort attachment dimensions, including disorganization (Miljkovitch et al., 2004), in line with observed links between the SSP and maternal attachment representations according to the AAI (for meta-analyses, see Van IJzendoorn & Bakermans-Kranenburg, 1997; Verhage et al., 2016). Theoretically consistent links with parental attachment states of mind (Bernier & Miljkovitch, 2009; Miljkovitch et al., 2004, 2012) further established the construct validity of this coding system of the ASCT. The disorganization scale's convergent validity was also demonstrated by consistently higher scores among abused children (Berdot-Talmier et al., 2016; Charest et al., 2018; Fresno et al., 2014; Hébert et al., 2020), similar to research findings with the strange situation (Cyr et al., 2010), and consistently higher scores among children with conduct disorders (Miljkovitch et al., 2019), similar to the many studies which showed that children with disorganized attachment were at elevated risk of externalizing behavior (for a review, see Fearon et al., 2010). 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).

The ASCT is accessible to children as early as age 3, and there is no influence of IQ on any of the four attachment dimensions (Miljkovitch et al., 2004). The task is playful and interactive, allows expression with concrete material that doesn't have to be verbal, and refers to situations familiar to the child. Stories are short and thereby suitable for children whose attentional capacities are limited. Moreover, the coding of the ASCT lies on the analysis of either verbal or non-verbal behavior. All these features make the ASCT suitable for children with intellectual disability.

2.3.3. Socio-economic status

Socio-economic status was measured using Barratt's simplified measure of social status (BSMSS, Barratt, 2006). BSMSS scores vary from 8 (lower socio-economic status) to 66. They are based on the profession and on the level of education of each parent and on family status (married parents, separated parents, single parent families, etc.).

2.3.4. Cognitive and adaptive level of functioning

To make sure children with intellectual disability all met the DSM-5 (American Psychiatric Association, 2013) significant limitations in cognitive and adaptive functioning criterion for the diagnosis of intellectual disability, level of intellectual functioning was assessed with the Wechsler Intelligence Scale for Children, 4th edition (WISC-4, Wechsler, 2005) and the overall adaptive level of functioning with The Vineland Adaptive Behavior Scales, 2nd edition (Vineland-II, Sparrow et al., 2015). Intellectual Quotient scores and Adaptive Behavior Composite scores both follow a normal distribution with a mean of 100 and a standard deviation of 15. Scores below 70 indicate the presence of intellectual disability or significative adaptive limitations. The Vineland-II questionnaire was completed either by a parent or an educator. Level of intellectual functioning of typically developing participants was also assessed with the WISC-4 (Wechsler, 2005) to be sure they had no intellectual disability.

2.4. Data analysis

To determine which variables had to be controlled for in the main analyses, the effects of age and socio-economic status (BSMSS) on attachment dimensions and on HIA scores (HIA global, HIA ambiguous, HIA nonintentional) were examined using correlations. The effect of gender was examined with Student *t*-tests. Among children with intellectual disability, correlations were run between IQ and respectively HIA and attachment scores to determine whether IQ had to be controlled for in the main analyses. The control variables which were correlated with the dependent and/or independent variables were used as covariates in the main analyses.

To assess the effect of group (children with intellectual disability vs typically developing children) on HIA, nonparametric ANCOVAs with Quade test were carried out (assumption of normality was not met for MANCOVA).

To assess the effect of attachment on HIA, correlations were computed between the four dimensions of attachment and the three HIA scales, for each group (children with intellectual disability versus typically developing children).

Multiple regression analyses were then run to test whether intellectual disability and attachment dimensions independently explained HIA. We ran regressions with the two HIA subscales to investigate possible specific effects. Because findings for ambiguous and for non-intentional situations were very different, regressions with the global score were not performed.

3. Results

3.1. Preliminary analysis

The proportions of girls and boys in the two groups did not differ ($\chi^2 = 1.85$, $p = .17$). No difference in the mean age ($t(106) = 1.27$, $p = .21$) was observed either.

Concerning socio-economic status, the BSMSS score of the group with intellectual disability was lower than that of typically developing children ($t(96.5) = -2.58$, $p = .011$). There was an effect of SES on disorganization ($r = -.20$, $p = .037$), on the score of HIA for ambiguous situations ($r = -.22$, $p = .023$) and on the global HIA score ($r = -21$, $p = .033$). SES was therefore controlled for in the main analyses. There was no effect of age on attachment dimensions (all p_s >.40) nor on HIA scores (all p_s > .10).

Gender was also controlled for because of an effect on disorganization ($t(106) = 2.52$, $p = .013$), on deactivation ($t(106) = 2.23$, $p = .028$), and on security ($t(106) = -2.44$, $p = .016$): Boys ($M_{Boys} = 53.5$; $SD_{Boys} = 15.7$) had higher scores of disorganization ($M_{Girls} = 47$; $SD_{Girls} = 10.8$), higher scores of deactivation ($M_{Boys} = 50.9$; $SD_{Boys} = 11.0$; $M_{Girls} = 46.6$; $SD_{Girls} = 8.86$), and lower scores of security ($M_{Boys} = 48.2$; $SD_{Boys} = 12.7$; $M_{Girls} = 53.3$; $SD_{Girls} = 9.20$) than girls. There was no effect of gender on HIA for ambiguous situations ($t(106) = .41$, $p = .68$), nonintentional situations ($t(106) = 1.74$, $p = .084$), and global HIA ($t(106) = .99$, $p = .32$).

Correlations controlled by SES and gender indicated no effect of IQ on the HIA score for ambiguous situations ($r = -.05$, $p = .73$), nonintentional situations ($r = .05$, $p = .69$), nor on scores of security ($r = .04$, $p = .78$), deactivation ($r = -.03$, $p = .84$), hyperactivation ($r = -.13$, $p = .35$), or disorganization ($r = -.07$, $p = .63$) within the group of children with intellectual disability. Therefore, IQ was not controlled for in the main analyses.

3.2. Cognitive level of functioning and hostile attribution bias

HIA scores for children with intellectual disability and for typically developing children are presented in Table 1.

The nonparametric ANCOVAs showed that HIA was higher in children with intellectual disability than in typically developing children for ambiguous situations ($F(1,106) = 5.43$, $p = .022$, *partial* $\varepsilon = .08$, 95% CI [.003, .19]), for nonintentional situations ($F(1,106) = 44.43$, $p < .001$, *partial* $\varepsilon = .29$, 95% CI [.15, .41]) and for the HIA global score ($F(1, 106) = 16.49$, $p < .001$, *partial* $\varepsilon = .18$, 95% CI [.06, .31]).

3.3. Attachment and hostile intent attribution

Correlations, controlled by SES and gender, between attachment and HIA (respectively ambiguous, nonintentional, global) are presented in Table 2 for each group (children with intellectual disability and typically developing children).

Among children with intellectual disability, hyperactivation was positively correlated with HIA for ambiguous situations ($r = .41$, $p = .003$, 95% CI [.15, .61]), nonintentional situations ($r = .34$, $p = .014$, 95% CI [.08, .56]), and with global HIA ($r = .44$, $p = .001$, 95% CI [.20, .63]). Disorganization was positively correlated with HIA

Table 1. HIA mean scores for children with intellectual disability and typically developing children.

		Children with intellectual disability		Typically developing children	
	Situations	*M*	*SD*	*M*	*SD*
HIA score	Ambiguous	4.33	2.31	3.06	1.85
	Nonintentional	1.57	1.24	0.31	0.64
	Global	5.91	3.07	3.37	2.17

Table 2. Correlations, controlled by SES and gender, between attachment and HIA for each group (children with intellectual disability versus typically developing children).

	HIA score	Security	Deactivation	Hyperactivation	Disorganization
ID	Ambiguous	-.20	.03	.41**	.41**
	Nonintentional	-.04	-.03	.34*	.19
	Global	-0.16	.01	.44**	.39**
TD	Ambiguous	-.05	.01	.17	.28*
	Nonintentional	-.00	.02	.09	-.05
	Global	-.05	.01	.17	.22

ID = Children with Intellectual disability; TD = Typically Developing Children; HIA = Hostile Intent Attribution; * = $p < .05$; ** = $p < .01$.

for ambiguous situations ($r = .41$, $p = .002$, 95% CI [.32, .71]) and with global HIA ($r = .39$, $p = .005$, 95% CI [.14, .60]). Security and deactivation were correlated with none of the HIA scales.

Among typically developing children, only disorganization was positively correlated with HIA for ambiguous situations ($r = .28$, $p = .047$, 95% CI [.03, .52]).

3.4. Links between attachment and intellectual disability to hostile intent attribution

3.4.1. Hostile intent attribution in ambiguous situations

To test whether intellectual disability and attachment dimensions independently explained HIA in ambiguous situations, a multiple linear regression analysis was run with the HIA ambiguous scale as the dependent variable. Because the correlations between HIA scores and respectively security and deactivation were not significant, only hyperactivation and disorganization were included as independent variables in the regression. Intellectual disability (group membership), SES, and gender were also entered as independent variables. This first model was significant ($F(5,102) = 6.43$, $p < .001$) and explained 24% of the variance. Regression coefficients for independent variables of the HIA ambiguous scale are presented in Table 3. The disorganization regression coefficient ($ß = 0.28$) was significant ($t = 2.26$, $p = .026$, 95% CI [0.03, 0.53]). The hyperactivation regression coefficient was not significant, nor were the intellectual disability, the SES and the gender regression coefficients (see Table 3).

To examine whether the attachment-HIA link varies according to ID, a second model was then run with SES, gender, disorganization, and the interaction term between intellectual disability and disorganization. This second model was significant ($F(6, 101) =$

Table 3. Regression coefficients for independent variables of the HIA ambiguous scale.

	ß	95% CI	*p*
SES	-0.11	-0.29 to 0.06	.210
Gender	0.12	-0.23 to 0.48	.494
Hyperactivation	0.16	-0.06 to 0.35	.157
Disorganization	0.28	0.03 to 0.53	.026
ID	-.211	-0.60 to 0.18	.285

CI = Confidence Interval; β = Standardized regression coefficients; SES = socioeconomic status; ID = Intellectual disability.

Table 4. Regression coefficients for independent variables of the HIA nonintentional scale.

	ß	95% CI	p
SES	0.05	-0.12 to 0.21	.572
Gender	-0.14	-0.46 to 0.17	.463
Hyperactivation	0.24	0.07 to 0.0	.005
ID	-0.96	-1.29 to -0.35	<.001

CI = Confidence Interval; β = Standardized regression coefficients; SES = socioeconomic status; ID = Intellectual disability.

5.36, $p < .001$), explained 24% of the variance (compared to 24% for model 1) but the interaction between intellectual disability and disorganization was not significant ($ß = 0.15$, $t = 0.50$, $p = .615$, 95% CI [-0.46, 0.77]).

3.4.2. Hostile intent attribution in nonintentional situations

To test whether intellectual disability and attachment dimensions independently explained HIA in nonintentional situations, a multiple linear regression analysis was run with HIA nonintentional scores as the dependent variable. SES, gender, hyperactivation, and intellectual disability were included as independent variables. This model was significant ($F(4,103) = 14.2$, $p < .001$) and explained 35% of the variance. Regression coefficients for independent variables of the HIA nonintentional scale are presented in Table 4. The hyperactivation coefficient ($ß = 0.24$, $t = 2.87$, $p = .005$, 95% CI [0.07, 0.40]) and the intellectual disability regression coefficient were both significant ($ß = -0.96$, $t = -5.74$, $p < .001$, 95% CI [-1.29, -0.63]). SES and gender regression coefficients were not significant (see Table 4).

To examine whether the attachment-HIA link varies according to ID, a second model was run with main effects and the interaction term between intellectual disability and hyperactivation. This second model was significant ($F(5, 102) = 11.7$, $p < .001$), explained 36% of the variance (compared to 35% for model 1) but the interaction between intellectual disability and hyperactivation was not significant ($ß = -0.22$, $t = -1.26$, $p = .209$, 95% CI [-0.57, 0.13]).

4. Discussion

4.1. Intent attribution bias in children with intellectual disability

This study focused on the processing of intent attribution in ambiguous and nonintentional negative social situations among children with or without mild to moderate intellectual disability. The purpose was to explore the respective roles of both a cognitive factor, intellectual disability, and an affective factor, attachment representations, on HIA bias.

In ambiguous negative situations, mean comparisons indicated that children with mild to moderate intellectual disability were more inclined to exhibit HIA bias than typically developing children of the same age. At first, this result suggests that severe limitations in cognitive functioning are associated with a cognitive bias when interpreting ambiguous negative social situations. It is in line with the results of Van Nieuwenhuijzen et al. (2011) on children with borderline intellectual disabilities (mean IQ of 80) and those of Van Rest et al. (2020) on adolescents (13–17 years old) with intellectual disability (IQ < 70). We also expected an association between attachment and HIA among children with intellectual disability in ambiguous negative situations. Consistent with this hypothesis, and with studies conducted with typically developing children (Clark & Symons, 2009; Zaccagnino et al., 2013), correlations did suggest that HIA bias increased with disorganized attachment and with hyperactivation among children with intellectual disability. Conversely, only disorganization was significant among typically developing children. When examining these links among all participants (with or without intellectual disability) while taking into account the effect of intellectual disability, only disorganization explained HIA in ambiguous situations. Conversely, intellectual disability was no longer linked with HIA once the effect of attachment was considered. It did not moderate the attachment-HIA link either. Knowing that disorganization affects almost one third of children with intellectual disability (Feniger-Schaal & Joels, 2018), the prevalence of children with disorganized attachment among children with intellectual disability may explain why children with intellectual disability are more inclined to exhibit HIA bias than typically developing children of the same age in ambiguous negative situations. Taken together, results suggest that disorganization better explains HIA in ambiguous situations than intellectual disability *per se*. In fact, intellectual disability does not even moderate the attachment-HIA link, suggesting that disorganization is linked with HIA in ambiguous situations whether children have an intellectual disability or not. This finding fits with Crick and Dodge (1994) social information processing model according to which intent attribution is influenced by internal working models of attachment. It seems that children with intellectual disability are also able to transfer their social knowledge from internal working models (IWM) of attachment to other social situations. This finding further emphasizes that developing organized attachment representations may provide an opportunity to develop benign intent attribution.

In nonintentional negative situations, results also indicated that children with mild to moderate intellectual disability were more inclined to exhibit HIA bias than typically developing children. This finding is in line with our hypothesis and with those of Leffert et al. (2000, 2010) on errors of intention attribution in nonintentional situations of harm among children with intellectual disability. The presence of conflicting information (situation of harm vs benign intention) poses cognitive processing challenges, making it difficult for children with intellectual disability to accurately interpret the situation. These errors seem to result from cognitive difficulties in decentring attention from the salient dimension of the situation (i.e. the damage that occurred), thus preventing the integration of non-intentionality of the action (Leffert et al., 2010). This result highlights the pertinence of proposing training aimed at increasing social skills and mental flexibility to children with intellectual disability. Working on nonintentional negative situations through role-playing or staged stories with characters can enable children to learn to interpret these situations differently.

We also expected an association between attachment and HIA among children with intellectual disability for nonintentional negative situations. Consistent with this hypothesis, HIA in nonintentional situations was linked to attachment hyperactivation among children with intellectual disability. The HIA-hyperactivation association was not significant among typically developing children. In the regression analysis including all participants (with or without intellectual disability), both hyperactivation and intellectual disability explained HIA. Hyperactivation is characterized by excessive focus on the attachment figure to the detriment of exploration, and heightened responsiveness to minimally arousing cues to danger (Main, 1990; Miljkovitch, 2017). Consequently, in negative social situations, children with intellectual disability who hyperactivate their attachment system may be more likely to perceive the environment as hostile and as requiring parental assistance and along with that, to attribute hostile intentions to others despite signs of non-intentionality. Conversely, typically developing children may be more capable of integrating this other information at the same time, rather than focusing only on the damage, and hence be less likely to exhibit HIA bias.

According to the model of social information processing proposed by Crick and Dodge (1994), attachment experiences influence the interpretation of new social situations, and this interpretation guides the choice of behavioral responses. In typically developing children, HIA bias is often associated with aggressive behavior (for a meta-analysis, see Verhoef et al., 2019). More research is needed to understand the repercussions of HIA bias on social adaptation of children with intellectual disability, especially those who are disorganized or resistant. Knowing that the prevalence of conduct or oppositional defiant disorders is especially high among children with intellectual disability (Emerson, 2003), the respective role of attachment and HIA in the development of these disorders, and whether HIA mediates the link between attachment and social behavior, could be investigated. For the time being, the present study highlights the importance of considering attachment in understanding intent attribution among children with ID and how this can be integrated in therapeutic interventions aimed at reducing HIA bias.

4.2. Limitations of the study

One may wonder whether distractibility, perseverations, inattention, or lack of inhibition among children with intellectual disability have increased the disorganization scores and biased the assessment of disorganized attachment (Vanwalleghem et al., 2017). Then again, the ASCT does seem appropriate to assess attachment representations among children with intellectual disability because the narratives of children with Down Syndrome enable discrimination of the four response patterns reflecting each attachment classification (Vanwalleghem et al., 2021). And interestingly, disorganization in the present study was not correlated with IQ among children with intellectual disability. Although these findings are encouraging, one cannot completely rule out possible conflation of dysexecutive disorders with disorganization. Further research is needed to test the validity of the ASCT among children with intellectual disability.

The fact that we have no information on associated parental behavior does not enable us to ascertain that what is measured actually reflects attachment. To confirm our tentative interpretation of results, future research aimed at examining links between disorganization among children with ID according to the ASCT and identified parenting precursors of disorganization seem warranted.

Likewise, behavioral outcomes of HIA such as aggressiveness or oppositional behavior were not assessed. Future research is needed to determine whether HIA are associated with externalizing behavior problems in children with or without intellectual disability (Dodge et al., 2015).

In conclusion, the present study shows that HIA bias in nonintentional negative situations is associated with both intellectual disability and attachment representations, whereas in ambiguous situations, attachment representations account for HIA better than intellectual disability. These results highlight the importance of promoting organized attachment among children to prevent social maladaptation. Fostering the development of more effective attachment strategies in children who hyperactivate their attachment system and of ways for parents to help them towards that also seems important. Interventions aimed at reinforcing optimal parental responses (eg., Moss et al., 2011; Platje et al., 2018; for a meta-analysis see Van Ijzendoorn et al., 2022) may be recommended among children with intellectual disability, and even more so as their attachment signals can be difficult to grasp (Carvajal & Iglesias, 2006).

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Data availability statement

The data that support the findings of this study are available from the corresponding author, SV, upon reasonable request.

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