

---

**Linda Webster\***

**Rachelle Kisst**

**Hackett**

University of the Pacific, Stockton,  
California, USA

**David Joubert**

University of Ottawa, Ottawa,  
Ontario, Canada

---

# The Association of Unresolved Attachment Status and Cognitive Processes in Maltreated Adolescents

**‘38 adolescents  
with a history  
of maltreatment’**

**‘Early experiences  
with a primary  
caregiver impact on  
the child’s  
interpersonal  
relationships as  
well as emotional  
regulation across  
the lifespan’**

This exploratory investigation sought to gain a better understanding of the mental representations of attachment in maltreated adolescents, and how, if at all, unresolved attachment representations are related to cognitive processes in this population. Measures of cognitive functioning, attachment state of mind and parent ratings on attention were obtained from 38 adolescents with a history of maltreatment. Results showed that maltreated adolescents with unresolved states of mind in regard to attachment scored significantly lower on measures of cognitive processes of attention, working memory and cognitive efficiency, even when intelligence was controlled for in the analyses. Theoretical considerations, implications for future research and clinical implications are discussed. Copyright © 2009 John Wiley & Sons, Ltd.

**KEY WORDS:** attachment; child maltreatment; cognitive processes; adolescents

**A** central premise of attachment theory is that the child’s early experiences with a primary caregiver impact on the child’s interpersonal relationships as well as emotional regulation across the lifespan. Bowlby (1979) predicted that early attachment experiences and the representations of those experiences affect relationships, self-esteem, and self-regulation of emotion and behaviour. Emotion-relevant regulation can be defined as

‘the process of initiating, maintaining, modulating, or changing the occurrence, intensity, or duration of internal feeling states, emotion-related

\* Correspondence to: Linda Webster, Ph.D., Associate Professor, Benerd School of Education, University of the Pacific, Stockton, CA 95211, USA. E-mail: lwebster@pacific.edu

physiological processes, and the behavioral concomitants of emotion' (Eisenberg *et al.*, 2001, p. 1114).

Under optimal conditions of responsive and sensitive caregiving, the attachment system is flexibly integrated and organised in such a way that allows the infant to seek comfort when he or she needs it, and pursue exploration of the environment when threats in the environment are minimal. Under conditions associated with neglect, rejection and abuse, the child develops defensive processes that serve to keep painful feelings and thoughts from consciousness. Although Bowlby conceptualised three distinct forms of defensive exclusion—deactivation, cognitive disconnection and segregated systems—it was not until later that these defensive processes were delineated and measured (George *et al.*, 1997; George and Solomon, 1996; George and West, 2001; Solomon *et al.*, 1995; Solomon and George, 1996). George and colleagues conceptualise deactivation as a process of blocking or reducing awareness of cues that might activate the attachment system. The child is thus able to effectively 'shut down' the system from being activated and avoids the possibility of experiencing rejection or disappointment. This type of defensive process is typically associated with children classified as "avoidant" in the Strange Situation Procedure (Ainsworth *et al.*, 1978). In the defence of cognitive disconnection, the child is aware of attachment-related feelings, but the defensive system employs a number of strategies to distract or 'disconnect' the individual from the source of the activation of the attachment system. This defensive process is typical of 'ambivalent' children. Finally, Bowlby (1980) postulated the existence of segregated systems that were produced as a form of defensive exclusion to keep trauma-related attachment memories and emotions in separate mental models. The purpose of this defence is to keep conflictual attachment-related material outside consciousness in order to prevent interference with psychological functioning, but this cannot occur indefinitely (George *et al.*, 1997). When the individual's attachment system is intensely activated, the segregated system is at risk of failing and the individual's thinking and behaviour may show signs of disorganisation, which may be expressed in subtle or more obvious forms.

### Unresolved Attachment

Main and Goldwyn (1985/1991/1994) define lack of resolution, or an unresolved state of mind, as a form of psychological disorganisation involving multiple (segregated) internal working models of attachment which are kept completely outside the individual's awareness. These multiple internal working models are created as a form of extreme defensive exclusion in response to conditions of

**'Under conditions associated with neglect, rejection and abuse, the child develops defensive processes'**

**'A form of defensive exclusion to keep trauma-related attachment memories and emotions in separate mental models'**

**‘Such an extreme form of defensive exclusion is costly’**

**‘Linked segregated systems to pathological mourning and mental health risk’**

**‘Child maltreatment has been consistently associated in the research literature with disorganised attachment’**

severe perceived threats to attachment. By segregating threatening or highly conflictual attachment-related thoughts, fantasies or affects into multiple representational structures outside consciousness, the individual can maintain a facade of adaptation while avoiding the discomfort associated with the conflictual material. Such an extreme form of defensive exclusion is costly, however, and the segregated attachment-related material is at risk of resurfacing and disrupting the individual’s thinking and behaviour in conditions where the attachment behavioural system is strongly activated. By comparison, individuals who are considered ‘resolved’, whether secure or insecure, are able to evoke mental or behavioural strategies that integrate or contain segregated material, thus protecting the individual from becoming overwhelmed, disorganised, dysregulated, or disoriented.

Bowlby (1980) linked segregated systems to pathological mourning and mental health risk. There is accumulating evidence suggesting that disorganised attachment (the unresolved corollary in children) places the child at significant risk for maladaptive outcomes (Carlson, 1998; Lyons-Ruth *et al.*, 1990, 1993; Moss *et al.*, 1998; Solomon *et al.*, 1995), including both internalising and externalising behaviour problems. In a recent study, for example, Aikins *et al.* (2005) examined how unresolved attachment status in adolescence may act as a moderator for various measures of adjustment including self-esteem, mother-child relationship quality and friendship quality. Participants in the Aikins *et al.* (2005) study were 48 16-year-olds who were initially recruited as infants in a larger longitudinal study. Results indicated that attachment status and the presence of high levels of anxiety and depression moderated negative outcomes such that outcomes were poorer for unresolved versus resolved adolescents. Similarly, Webster and Joubert (2006) found significant associations between unresolved attachment status and impairments in thought processes, self-other boundaries, reality testing and emotional constriction as assessed using the Rorschach Inkblot Method.

### **Child Maltreatment and Attachment**

Child maltreatment has been consistently associated in the research literature with disorganised attachment (Shonk and Cicchetti, 2001; van Ijzendoorn *et al.*, 1999). Maltreatment has also been associated with a variety of negative outcomes, including delinquency and conduct problems (Cook *et al.*, 2005; Grotevant *et al.*, 2006; McCabe *et al.*, 2005; Ryan and Testa, 2005). Interestingly, it has been proposed that child abuse and neglect may contribute to the development of externalising problems as a result of inadequate affective regulation, involving difficulties inhibiting behaviour and

controlling attention and cognitive processing (Olson *et al.*, 1999; Oosterlaan and Sergeant, 1996; Rothbart *et al.*, 1995). It therefore seems legitimate to hypothesise that variations in attachment states of mind may, at least partially, be responsible for some of the behaviour problems and difficulties in affect regulation that are associated with child maltreatment. It may be, for example, that disorganised attachment stemming from experiences of abuse or maltreatment results in an impaired ability to control attention and other cognitive processes, which in turn sets the individual on a trajectory leading to significant behavioural difficulties.

### Attachment-Related Trauma

Schore (2002) reasoned that traumatic attachments, such as those involved in maltreatment, impact the developing limbic and autonomic nervous systems of the developing right brain. These areas are thought to be associated with processing negative emotions such as fear and the retrieval of autobiographical memory, respectively (Hariri *et al.*, 2000; Morris *et al.*, 1999; Schore, 2001; Whalen *et al.*, 1998). Schore (2002) argues that the research findings available have strong implications for understanding the aetiology of disorders of affect regulation, and he hypothesises that the structural changes that occur as a result of these traumatic attachments result in ineffective stress coping mechanisms that leave the individual vulnerable to the development of post-traumatic stress disorder (PTSD).

In a recent study that supports Schore's argument, Buchheim *et al.* (2006) exposed adults classified as resolved and unresolved to a set of pictures describing attachment-related situations in a Functional Magnetic Resonance Imaging [fMRI] environment, and found that the unresolved adults showed increasing activation of the amygdala and hippocampal regions of the brain. Buchheim *et al.* (2006) hypothesised that activation of the attachment system by way of visual stimuli (Adult Attachment Projective Picture System) resulted in a reactivation of unresolved traumatic attachment experiences or losses. Research on individuals with PTSD suggests that impairment in the right prefrontal cortex impairs the brain's ability to use cognitive processes to modulate amygdala functions (Hariri *et al.*, 2000; Schore, 2001), thus leaving the individual vulnerable to the chronic experience of trauma states.

Research investigating the psychobiological development of maltreated children provides evidence for the adverse effect of maltreatment on brain development (De Bellis, 2001, 2005; De Bellis *et al.*, 1999; Tupler and De Bellis, 2006) that parallels findings in the research on trauma and PTSD, providing a potential structural foundation for affect dysregulation that implicates

**'Sets the individual on a trajectory leading to significant behavioural difficulties'**

**'Unresolved adults showed increasing activation of the amygdala and hippocampal regions of the brain'**

**‘Little research has investigated adolescents, particularly using measures assessing processes of defensive exclusion’**

**‘It was hypothesised that adolescents classified as “unresolved” would present with lower levels of cognitive functioning’**

impairment in right hemisphere functions. For example, the orbital prefrontal region is thought to act in the capacity of an executive control system (Pribraun, 1991; Schore, 2003) that coordinates attention and memory, as well as inhibitory control, in order to regulate behaviour (Garavan *et al.*, 1999). Research on adults with PTSD (Sutker *et al.*, 1995) found that stress-related psychopathology was associated with deficits in attention and mental tracking, tasks of learning and memory, and measures of executive functioning such as anticipation, goal selection, planning, monitoring and use of feedback. Schore (2003) argues that attachment processes may be implicated in the impaired functioning of the right frontal circuits involved in attention-deficit disorder as well as right hemisphere learning disabilities.

Much of the research on child maltreatment and attachment, however, has focused on infants and children, and little research has investigated adolescents, particularly using measures assessing processes of defensive exclusion as identified by Bowlby (1969/1982) and others. Individuals categorised as *unresolved/disorganised* have usually experienced a death of an attachment figure or have experienced the attachment figure to behave in frightening or abusive ways, as is often the case with maltreated youngsters. This has been associated with adolescent psychopathology, particularly involving difficulty with self-regulation and interpersonal relatedness (Allen *et al.*, 1996; Cook *et al.*, 2005). In an investigation using data obtained from the National Longitudinal Study of Adolescent Health, Grotevant *et al.* (2006) found that early child maltreatment predicted both aggressive and nonaggressive forms of antisocial behaviour in adolescents.

Consistent with research on attachment-related trauma, this study sought to investigate the relationship between unresolved attachment and behaviour in a maltreatment sample, in order to better understand the impact of unresolved segregated systems on executive cognitive processes such as attention and working memory. It was hypothesised that adolescents classified as ‘unresolved’ would present with lower levels of cognitive functioning than adolescents classified as ‘resolved’.

## Method

### *Participants*

Participants were 38 adolescents with a history of maltreatment who were referred to a mental health clinic for a psychological evaluation. The reason for the referral varied, but most were referred for diagnostic clarification and to make treatment and placement recommendations. As such, these adolescents cannot be said to

reflect the larger population of maltreated children in general. Participants were excluded from this analysis if they were mentally retarded, or had co-morbid substance abuse or psychotic disorders. All evaluations were conducted by the primary investigator over a five-year period. All relevant permissions were obtained, and the data included in this study were approved for use by the University of the Pacific's Institutional Review Board. The average age was 14.3 years old ( $SD = 1.73$  years) with a range of 11.67 to 17.92 years. Twenty-seven (71.1%) adolescents were female and 11 (28.9%) were male. The sample consisted of 23 African American (61%), ten Caucasian (26%), three Hispanic (8%), one Asian (3%) and one Bi-racial (3%) individuals. The majority of the adolescents had experienced neglect ( $n = 26$ ; 70%), four had experienced physical abuse (11%), six had experienced neglect and physical abuse (16%), and one had experienced neglect and sexual abuse (3%). Twenty-three of the adolescents were placed in regular foster homes (61%), four were placed in designated therapeutic foster homes (11%), another nine were placed in group home placements (24%) and the remaining two were placed in adoptive homes (5%). The average age at time of removal from their biological parents was 6.9 years ( $SD = 4.7$  years), and the mean number of placements was 4.0 ( $SD = 2.9$  placements), with a range of one to 15 placements. Six adolescents had been in only one placement (16%), five had been in two (13%), seven had been in three (18%), four had been in four (11%), four had been in five (11%), five had been in six (13%), and one each had been in eight, ten and 15 placements, respectively (3% each). The number of placements was unavailable for four cases. The average length of time that these adolescents had been in their current placement was 16.9 months ( $SD = 28.9$  months), with a range from one month to 13.08 years.

#### *Attachment Classification Procedure*

The adolescents were administered the Adult Attachment Projective Picture System (AAPPS), an assessment instrument developed by George *et al.* (1997), as part of a larger psychological evaluation. The AAPPS is a relatively new measure of mental representation of attachment classification based on the analysis of a set of projective stimuli designed to systematically activate the attachment system (George *et al.*, 1997). It was developed to provide researchers and clinicians with a construct validated measure of attachment that preserves the emphasis on mental representation and defensive processes that is one of the primary features of attachment theory.

For the purpose of establishing construct validity, the AAPPS has been validated using the Adult Attachment Interview (AAI) classification, with an overall agreement between the two instruments at 92 per cent ( $kappa = 0.89$ ,  $p < 0.0001$ ). Interjudge reliability

**'All evaluations were conducted by the primary investigator over a five-year period'**

**'The adolescents were administered the Adult Attachment Projective Picture System'**

**‘Inter-rater reliability was calculated with a random set of 22 cases with a trained and reliable judge’**

**‘Individuals are judged “unresolved” under several features that indicate resolution or containment of segregated material’**

**‘The primary caregivers of these adolescents completed the Parent Rating Scales of the Behavioural Assessment System for Children’**

for the four-group classification (secure, dismissing, preoccupied, unresolved) is kappa = 0.82 ( $p < 0.0001$ ) and test-retest reliability is kappa = 0.79 ( $p < 0.0001$ ) (George and West, in press). The primary author had achieved reliability with George and West on over 90 cases, following training on the administration and coding procedure. Inter-rater reliability was calculated with a random set of 22 (55%) cases with a trained and reliable judge. Classification agreement was kappa = 0.90 ( $p < 0.0001$ ) for the ‘resolved’ versus ‘unresolved’ classification. George (2008) recently presented some preliminary data on her teen AAPPS validity study. Although her sample is small ( $n = 39$ ), she found significant associations in the predicted direction between classification on the AAPPS and the Adolescent Unresolved Attachment Questionnaire (West *et al.*, 1998, 2000) which has been independently validated using the AAI. At present there are few studies available that use the AAPPS with adolescents, but the available evidence appears promising, and offers both convergent and discriminant validity for its use with this population (Aiken *et al.*, 2005; Lis *et al.*, 2008; Webster and Hackett, 2007; Webster and Joubert, 2006).

When making coding judgments regarding resolved or unresolved status, the judge must first identify the presence of segregated systems content or process markers across stories. In the AAPPS system, individuals are judged ‘unresolved’ under several features that indicate resolution or containment of segregated material. Forms of resolution include: use of an internalised secure base as evidenced by a character thinking or reflecting on a situation; appeal to relationships to solve a problem or to provide safety; a clear statement or action of self-protection, or a description of the character as being able to engage in a specific action that moves them away from the attachment threat or concern. Stories in which segregated markers are not resolved are coded unresolved.

Sixteen adolescents were judged to be ‘unresolved’ (42%), six were ‘preoccupied’ (16%), seven were ‘dismissing’ (18%) and nine were judged to be ‘secure’ (24%). Because the research questions address the link between unresolved attachment and cognitive functioning, and given the small sample size, we contrasted the 16 ‘unresolved’ versus the remaining 22 ‘resolved’ (whether those in the latter group are judged to be ‘dismissing’, ‘preoccupied’, or ‘secure’).

#### Outcome Measures

The primary caregivers of these adolescents (typically the foster mother) completed the Parent Rating Scales of the Behavioural Assessment System for Children (BASC; Reynolds and Kamphaus, 1998). Although the BASC yields a number of clinical scales, for the purpose of this study only the Attention scale was investigated,

due to its conceptual relation with cognitive functioning. In addition to the BASC's widespread use among clinicians and educators, reliability values for all scales are reported by others to be 0.85 or higher for test-retest, and in the mid- to upper 0.70s on the internal consistency measures. The Cronbach alpha reliability based on the sample used in this study was 0.72 for the Attention Problems scale.

The adolescents were also administered the Woodcock-Johnson Tests of Cognitive Ability, Third Edition (WJ-III; Woodcock *et al.*, 2001). The WJ-III is a well-researched and widely utilised measure of cognitive abilities. The domains of Attention, Working Memory, Executive Processing, Cognitive Fluency and Cognitive Efficiency were selected based on prior research or theory suggesting a possible link between these or similar domains of cognitive functioning and attachment disorganisation (e.g. Jacobsen *et al.*, 1994). Attention can be defined as a 'cognitive mechanism that selects relevant environmental information and controls task performance in support of an individual's goal' (Yantis, 1994, p. 146). Attention is a complex and multifaceted construct by which an individual focuses on certain stimuli for information processing. These facets include focused or selective attention, vigilance or sustained attention, divided attention and attentional capacity. Working memory refers to a 'set of cognitive functions that can temporarily store information and run through procedures which processes the information' (Logie, 1996, p. 55). Executive functioning refers to a set of mental faculties that allow individuals to mediate their behaviour, focus their attention, plan for the future and generally monitor their decision-making (Elliott, 2003). Cognitive Fluency concerns the relative ease with which cognitive operations are performed (Unkelbach, 2006). Cognitive Efficiency refers to a more 'automatic' information processing, and '(...) reflects the individual's capacity to hold information in conscious awareness and to perform automatic tasks rapidly' (Mather and Woodcock, 2001, p. 79). Reliability values reported in other studies for the clusters of interest in this study range from 0.92 to 0.96 (Mather and Woodcock, 2001).

There were a few participants for whom the data sets were not complete. There are thus sample size fluctuations found in the results tables presented in this study.

## Results

Due to the exploratory nature of this study and the relatively small sample size involved, main statistical analyses consisted of one-tailed tests using an alpha of 0.05. It is recognised that this may lead to falsely rejecting the null hypotheses (i.e. committing a 'Type I'

**'The adolescents were also administered the Woodcock-Johnson Tests of Cognitive Ability'**

**'Attention is a complex and multifaceted construct'**

**Table 1.** Comparison of the backgrounds of resolved versus unresolved adolescents

Background variable	Resolved			Unresolved			<i>t</i>	Mean Diff.	90% CI (Mean diff.)	Eta squared
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>				
Age (in months)	22	173.0	22.8	16	170.8	18.4	0.32	2.23	-9.5, 13.9	0.003
Age at Removal	21	71.9	55.1	13	100.4	56.2	-1.46	-28.53	-61.7, 4.7	0.062
Number of Placements	21	3.6	1.9	13	4.6	4.1	-0.83	-1.00	-3.1, 1.1	0.029
Length of Time in Current Placement	22	19.4	34.4	15	13.2	18.9	0.63	6.16	-10.4, 22.7	0.011

\*  $p < 0.10$  (two-tailed). CI = Confidence interval.

**‘The direction of the one-tailed tests corresponds to our hypothesis’**

**‘No evidence was found to suggest the “unresolved” and “resolved” adolescents differ on any of these background variables’**

error), yet it will also help detect trends that can later be subject to replication. The direction of the one-tailed tests corresponds to our hypothesis that the ‘unresolved’ adolescents would have less favourable results on measures of cognitive functioning.

#### *Preliminary Analyses*

To investigate selection threats and allow for clearer conclusions about differences between ‘resolved’ ( $n = 22$ ) versus ‘unresolved’ ( $n = 16$ ) adolescents, two-tailed *t*-tests (with alpha set at 0.10) were used to compare the independent samples with respect to age, age at removal, the number of placements and the length of time in the current placement (see Table 1). Similarly, the ‘resolved’ and ‘unresolved’ groups were compared with respect to ethnicity, sex, reason for removal and level of care. Due to the small sample size, it was necessary to dichotomise some of these background variables and then apply Fisher’s exact test (rather than Pearson’s chi-square test). In addition, the differences between the proportions of ‘unresolved’ adolescents in each of two independent samples (based on each background variable) and 90 per cent confidence intervals for these differences are reported in Table 2. No evidence was found to suggest the ‘unresolved’ and ‘resolved’ adolescents differ on any of these background variables. Still, it should be noted that the small sample size limits the power to detect differences and that we cannot

**Table 2.** Comparing the percentage of ‘unresolved’ adolescents within subgroups based on background variables

		All	Unresolved		Difference between proportions	90% CI for difference	Phi	Fisher’s Exact Test <i>p</i> (two-sided)
		<i>N</i>	<i>n</i>	%				
Ethnicity	African American	23	10	43	-0.07	-0.40, 0.26	0.06	1.00
	Caucasian	10	5	50				
Sex	Male	11	3	27	-0.21	-0.51, 0.09	0.19	0.30
	Female	27	13	48				
Reason for Placement	Neglect only	26	9	35	-0.20	-0.50, 0.10	0.19	0.30
	Abuse or more	11	6	55				
Level of Care	‘Less Restrictive’	25	9	36	-0.18	-0.47, 0.11	0.17	0.32
	‘More Restrictive’	13	7	54				

\*  $p < 0.10$  (two-tailed). CI = Confidence interval.

completely rule out selection as a threat, especially since other background factors, on which we have no data collected, may differ between the groups judged to be 'resolved' versus 'unresolved'.

### *Parental Rating of Maltreated Adolescents on Attention Problems*

Results indicated significant group differences on the BASC Parent Rating Form for Attention Problems,  $t(35) = -2.28, p = 0.015$  (one-tailed),  $\eta^2 = 0.13$ , in the predicted direction, with unresolved adolescents ( $M = 71.88, SD = 11.14$ ) scoring significantly higher than resolved adolescents ( $M = 64.38, SD = 8.83$ ; 90% confidence interval =  $-13.04, -1.95$ ). In addition, although the means for both groups' scores were elevated, the average score for the 'unresolved' group was in the clinically significant range.

### *WJ-III*

Results indicated significant differences for Cognitive Efficiency [ $t(34) = 2.540, p < 0.01, \eta^2 = 0.16$ ], Cognitive Fluency [ $t(34) = 1.697, p < 0.05, \eta^2 = 0.08$ ], Broad Attention [ $t(33.963) = 3.562, p < 0.01, \eta^2 = 0.25$ ], and Working Memory [ $t(34.789) = 3.164, p < 0.01, \eta^2 = 0.19$ ]. The 'unresolved' adolescents scored lower than the 'resolved' adolescents on these measures. Table 3 provides descriptive statistics for each group, as well as the related 90 per cent confidence intervals for the differences between the means. No statistically significant difference was found regarding executive processing, although the results were in the expected direction with the 'resolved' adolescents scoring higher than their 'unresolved' peers.

### *Additional Analyses of WJ-III*

To more confidently interpret the results above related to cognitive abilities, we compared the 'resolved' versus 'unresolved' groups on a general measure of verbal abilities and found

**'Results indicated significant differences for Cognitive Efficiency, Cognitive Fluency, Broad Attention and Working Memory'**

**Table 3.** Comparison of Woodcock-Johnson scores for resolved versus unresolved adolescents

Woodcock-Johnson scale	Resolved			Unresolved			<i>t</i>	Mean diff.	90% CI (Mean diff.)	Eta squared
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>				
Cognitive Efficiency	21	100.8	16.4	15	87.7	13.2	2.540**	13.03	4.36, 21.70	0.16
Cognitive Fluency	21	102.2	14.7	15	92.4	20.2	1.697*	9.84	0.04, 19.64	0.08
Broad Attention	21	97.7	16.1	15	81.6	11.0	3.562**	16.11	8.47, 23.76	0.25
Executive Processes	21	97.9	12.5	15	92.1	11.3	1.436	5.84	-1.04, 12.71	0.06
Working Memory	22	97.6	18.4	15	82.0	11.4	3.164**	15.55	7.24, 23.85	0.19

\*  $p < 0.05$  (one-tailed); \*\*  $p < 0.01$  (one-tailed).

Note: All scales represent positive outcomes; we hypothesised the 'resolved' group would score higher, on average. CI = Confidence interval.

**Table 4.** Hierarchical multiple regression results which control for general intelligence at the first step and then enter the unresolved indicator variable

Woodcock-Johnson scale	$R^2$ change	$p$	Partial correl.	$B$	95% CI for $B$
Cognitive Efficiency	0.035	0.007**	-0.447	-6.307	-10.78, -1.84
Cognitive Fluency	0.007	0.545	-0.108	-2.943	-12.73, 6.85
Broad Attention	0.071	0.002**	-0.508	-8.961	-14.43, -3.50
Executive Processes	0.000	0.895	-0.024	-0.396	-6.46, 5.67
Working Memory	0.059	0.009**	-0.435	-8.838	-15.32, -2.35

\*\*  $p < 0.01$ .

Note: The grouping variable was coded 1 = 'unresolved', 0 = 'resolved' therefore the regression coefficients indicate how the 'unresolved' compare to the 'resolved' adolescents. CI = Confidence interval.

**'Insufficient evidence to suggest that differences in verbal abilities explain the differences found in cognitive abilities'**

insufficient evidence to suggest that differences in verbal abilities explain the differences found in cognitive abilities (cognitive efficiency, cognitive fluency, broad attention and working memory) that were noted above,  $t(34) = 1.074$ ,  $p = 0.29$  (two-tailed),  $\eta^2 = 0.03$ , 90% confidence interval = (-2.58, 11.55).

We also attempted to control for general intelligence by running hierarchical regressions where the intelligence measure was entered before adding in the grouping variable that distinguishes 'resolved' from 'unresolved' adolescents. If the grouping variable is found to be significant with the general intelligence measure being partialled out in the model, it indicates that the 'resolved' versus 'unresolved' indicator captures additional differences in cognitive abilities that are unexplained by general intelligence alone. The results are summarised in Table 4 which shows the change in  $R$  squares, significance levels and partial correlations, unstandardised regression weights and 95 per cent confidence intervals for these regression coefficients (i.e. the mean differences between 'unresolved' versus 'resolved' adolescents after controlling for general intelligence). The groups are still found to differ with respect to Cognitive Efficiency, Broad Attention, and Working Memory whereby the 'unresolved' attachment status lowers the respective Woodcock-Johnson scores by approximately six, nine and nine points.

### Discussion

The findings of this exploratory study suggest that the presence of an 'unresolved' state of mind in regards to attachment may place maltreated adolescents at greater risk for the development of deficiencies in certain cognitive processes. Specifically, maltreated adolescents who were labelled as 'unresolved' had lower scores on Broad Attention, Cognitive Efficiency and Working Memory than their peers who were 'resolved'. The scores for the 'resolved' group were all in the average range, indicating average or typical functioning in these areas. Cognitive Efficiency scores were, on average, six points (0.4 standard deviation units) lower in the 'unresolved' group. Broad Attention and Working Memory were

**'Maltreated adolescents who were labelled as "unresolved" had lower scores on Broad Attention, Cognitive Efficiency and Working Memory'**

each nine points, or 0.6 standard deviation units, lower in the 'unresolved' group. In addition, foster parents rated 'unresolved' adolescents significantly higher on the Attention Problems scale of the BASC, with the average scores of the 'unresolved' group falling into the 'clinically significant' range.

Main *et al.* (1993) have argued that individuals who are unresolved for trauma or loss evidence behaviour that indicates that attention, working memory and consciousness are being overwhelmed or severely disrupted by attachment-related internal conflict. These authors have proposed that such disturbance would be observed only when the attachment system is activated. The presence of 'context-specific' deficits has received some support in the literature on developmental psychopathology (Cohen and Trayer, 1996; Masten and Coatsworth, 1998).

In contrast, the results presented here suggest that some cognitive processes may show more long-term, pervasive impairment in 'unresolved' individuals, regardless of whether the attachment system is activated or not. Interestingly, this finding is consistent with other research on deficits in higher order (e.g. executive system) functions as related to stress-related psychopathology (e.g. Sutker *et al.*, 1995; Uddo *et al.*, 1993; van der Kolk, 1987; Vasterling *et al.*, 1994). These findings are also consistent with Schore's (2001, 2002) research that suggests that attachment trauma can have a significant and lasting negative impact on coping ability and personality development generally. Research with children has shown that disorganised attachment is a significant predictor of cognitive functioning, with difficulties observed in areas such as deductive reasoning (Jacobsen *et al.*, 1994), metacognition (Judd, 2005), joint attention skills (Claussen *et al.*, 2002) and joint problem-solving (Moss *et al.*, 1999). Data from the present study suggest that the association between attachment disorganisation at the representational level and impairments in cognitive functioning is also present in older children.

### *Clinical Implications*

The findings described in this paper may be of interest to clinicians working with adolescents with a history of abuse or neglect. Cognitive functioning has been shown to consistently moderate the link between adverse life conditions or experiences, and behaviour problems or psychopathology in children and adolescents (Goodyer *et al.*, 2000). Research by Mary Main and others (Jacobsen *et al.*, 1994; Main, 1995; Moss and St-Laurent, 2001) has highlighted the potential impact of disorganised attachment on cognitive functioning. Although the specific features of attachment disorganisation that may contribute to disruptions in cognitive processes remain to be established, it is likely that dysregulation stemming from

**'Some cognitive processes may show more long-term, pervasive impairment in "unresolved" individuals, regardless of whether the attachment system is activated'**

**‘The importance of the individual resolving or containing the loss and trauma in a coherent and integrated fashion’**

**‘Listening for coherence, for themes of loss and abandonment, and the qualities of attributions and defences’**

representations of attachment figures as helpless, fearful, threatening or abdicating their role as caregivers (Lyons-Ruth and Spielman, 2004) may interfere with many areas of ego functioning, including cognition. Liotti (1999) has discussed the role of segregated systems involving multiple internal models of attachment relationships in creating lapses in cognition and self-awareness in individuals with dissociative disorders. Given the well-established association between the history of maltreatment and attachment disorganisation (van Ijzendoorn *et al.*, 1999), it may be that developing more integrated, cohesive models of attachment in the context of a therapeutic relationship would help protect the child from experiencing impaired cognitive functioning in the future. The results of this study specifically highlight the importance of the individual *resolving* or *containing* the loss and trauma in a coherent and integrated fashion. ‘Unresolved’ individuals have been observed to experience frequent crises and have difficulty connecting current thoughts and feelings to past losses and traumas (Bernier and Dozier, 2002). Thus, one goal of therapeutic intervention would be to help the individual connect current thought patterns, feelings and actions to their past. Fonagy and colleagues (e.g. Fonagy and Bateman, 2006; Twemlow *et al.*, 2005) have developed what they term ‘mentalisation-focused’ psychotherapy, which focuses on exploring thoughts and feelings in a safe environment, encouraging the individual to think reflectively about the actions of self and others, and the integration of thoughts and feelings. The overall goal is to help the person recognise, process and integrate past losses and trauma in such a way that it no longer overwhelms them and drives their behaviour.

Given the association that was found between attachment states of mind and various domains of cognitive functioning, it appears that a thorough assessment of not only cognitive functions but also their emotional underpinnings might be most helpful in identifying targets for intervention. The present study suggests that unresolved traumatic experiences with attachment figures may underlie some of the difficulties in attention, working memory and cognitive efficiency observed in the sample. Therefore, a comprehensive treatment plan that addresses both cognitive abilities and relational experiences with attachment figures may have the best chance of improving the functioning of adolescents with a history of maltreatment. Slade (2004) proposes that this can be accomplished by listening for coherence, for themes of loss and abandonment, and the qualities of attributions and defences that emerge when the individual discusses interpersonal experiences.

#### *Methodological Limitations and Conclusion*

The implications of these findings are constrained by the small sample size that precludes an analysis of various associations between

sub-classifications and particular outcomes. For example, Warren *et al.* (1997) found that children who were, at age 16, identified as meeting the criteria for an anxiety disorder were more likely to have been classified as having an anxious/resistant (ambivalent) attachment as an infant. In addition, Eisenberg *et al.* (2001) found that internalising and externalising problems were characterised by two distinct types of emotion and emotional regulation processes. It may be that sub-classifications within the ‘unresolved’ group predispose the adolescent to a particular development pathway, but the sample size for this study does not allow for detection of such potential links. In addition, the inferences that can be drawn from these results are limited by the cross-sectional design used, which means that determining causal relationships is not possible. Without a longitudinal design, important links between the cause, timing, or duration of the adolescents’ ‘unresolved’ status, association of behavioural and emotional difficulties, and/or impairment in executive processes cannot be investigated.

The results, however, are consistent with John Bowlby’s original ideas and other research investigating the relationships between the psychobiology of trauma, impairments in affect regulation and cognitive processes. As such, the data illuminate a path for future research that investigates the relationships between child maltreatment and affect regulation, behaviour and executive processes.

## References

- Aikins JW, Hamilton CE, Howes C. 2005. A stress diathesis model: Unresolved attachment representations and adolescent adjustment. Paper presented at the Biennial Meeting of the Society for Research in Child Development, Atlanta, GA, April.
- Ainsworth MD, Blehar MC, Waters E, Wall S. 1978. *Patterns of Attachment: A Psychological Study of the Strange Situation*. Erlbaum: Hillsdale, NJ.
- Allen JP, Hauser ST, Borman-Spurrell E. 1996. Attachment theory as a framework for understanding sequelae of severe adolescent psychopathology: An 11-year follow-up study. *Journal of Consulting and Clinical Psychology* **64**(2): 254–263.
- Bernier A, Dozier M. 2002. The client-counselor match and the corrective emotional experience: Evidence from interpersonal and attachment research. *Psychotherapy: Theory, Research, Practice, Training* **39**(1): 32–43.
- Bowlby J. 1969/1982. *Attachment and loss*. (Volume 1). New York: Basic Books. (Original work published in 1969.)
- Bowlby J. 1979. *The making and breaking of affectional bonds*. London: Tavistock.
- Bowlby J. 1980. *Attachment and loss*. (Volume 3). New York: Basic Books.
- Buchheim A, Erk S, George C, Kachele H, Ruchsow M, Spitzer M, Kircher T, Walter H. 2006. Measuring attachment representation in an fMRI environment: A pilot study. *Psychopathology* **39**(3): 144–152.
- Carlson EA. 1998. A prospective longitudinal study of disorganized/disoriented attachment. *Child Development* **69**: 1107–1128.

**‘Consistent with John Bowlby’s original ideas and other research investigating the relationships between the psychobiology of trauma’**

- Claussen AH, Mundy PC, Mallik SA, Milloughby JC. 2002. Joint attention and disorganized attachment status in infants at risk. *Development and Psychopathology* **14**: 279–291.
- Cohen D, Trayer S. 1996. Overlap across domains in conduct-disordered and comparison youth. *Developmental Psychology* **32**: 988–998.
- Cook A, Spinazzola J, Ford J, Lanktree C, Blaustein M, Cloitre M, DeRosa R, Hubbard R, Kagan R, Liataud J, Mallah K, Olafson E, van der Kolk B. 2005. Complex trauma in children and adolescents. *Psychiatric Annals* **35**: 390–393.
- De Bellis MD. 2001. Developmental traumatology: The psychobiological development of maltreated children and its implications for research, treatment, and policy. *Development and Psychopathology* **13**: 539–564.
- De Bellis MD. 2005. The psychobiology of neglect. *Child Maltreatment: Journal of the American Professional Society on the Abuse of Children* **10**(2): 150–172.
- De Bellis MD, Baum AS, Birmaher B, Keshavan MS, Eccard CH, Boring AM, Jenkins FJ, Ryan ND. 1999. Developmental traumatology: Part I: Biological stress systems. *Biological Psychiatry* **45**: 1259–1270.
- Eisenberg N, Cumberland A, Spinard TL, Fabes RA, Shepard SA, Reiser M, Murphy BC, Losoya SH, Guthrie IK. 2001. The relations of regulation and emotionality to children's externalizing and internalizing problem behavior. *Child Development* **72**(4): 1112–1134.
- Elliott R. 2003. Executive functions and their disorders. *British Medical Bulletin* **65**: 49–59.
- Fonagy P, Bateman AW. 2006. Mechanisms of change in mentalization-based treatment of BPD. *Journal of Clinical Psychology* **62**(4): 411–430.
- Garavan H, Ross TJ, Stein EA. 1999. Right hemisphere dominance of inhibitory control: An event-related functional MRI study. *Proceedings of the National Academy of Sciences of the United States of America* **96**: 8301–8306.
- George C. 2008. Assessing attachment in adolescence: using the Adult Attachment Projective Picture System with teens. In *Integrating Attachment in Adolescent Assessment and Clinical Cases*, George C, Lis A (co-chairs). Symposium conducted at the annual meeting of the Society for Personality Assessment, New Orleans, LA, March.
- George C, Solomon J. 1996. Representational models of relationships: Links between caregiving and representation. *Infant Mental Health Journal* **17**: 198–216.
- George C, West M. 2001. The development and preliminary validation of a new measure of adult attachment: The adult attachment projective. *Attachment & Human Development* **3**: 30–61.
- George C, West M, Pettem O. 1997. The Adult Attachment Projective. Unpublished attachment measure and coding manual, Mills College, Oakland, CA.
- Goodyer IM, Herbert J, Tamplin A, Altham PME. 2000. First-episode major depression in adolescents: Affective, cognitive and endocrine characteristics of risk status and predictors of onset. *British Journal of Psychiatry* **176**: 142–149.
- Grotvant HD, van Dulmen MHM, Dunbar N, Nelson-Christinedaughter J, Christensen M, Fan X, Miller BC. 2006. Antisocial behavior of adoptees and nonadoptees: Prediction from early history and adolescent relationships. *Journal of Research on Adolescence* **16**: 105–131.
- Hariri AR, Bookheimer SY, Mazziotta JC. 2000. Modulating emotional responses: Effects of a neurocortical network on the limbic system. *Neuroreport* **11**: 43–48.
- Jacobsen T, Edelstein W, Hofmann V. 1994. A longitudinal study of the relation between representations of attachment in childhood and cognitive functioning in childhood and adolescence. *Developmental Psychology* **30**(1): 112–124.

- Judd PH. 2005. Neurocognitive impairment as a moderator in the development of borderline personality disorder. *Development and Psychopathology* **17**: 1173–1196.
- Liotti G. 1999. Understanding the dissociative process: The contribution of attachment theory. *Psychoanalytic Inquiry* **19**: 757–783.
- Lis A, Di Riso D, Mazzeschi C. 2008. Attachment and AAP assessment in a normative sample of Italian adolescents. In *Integrating Attachment in Adolescent Assessment and Clinical Cases*, George C, Lis A (co-chairs). Symposium conducted at the annual meeting of the Society for Personality Assessment, New Orleans, LA, March.
- Logie RH. 1996. The seven ages of working memory. In *Counter Points: Cognition, Memory, and Language: Working Memory and Human Cognition*, Marschark M (series ed.) and Richardson JT, Engle RW, Hasher L, Logie RH, Stoltzfus ER, Zacks RT (vol. eds). Oxford University Press: New York; 31–65.
- Lyons-Ruth K, Spielman E. 2004. Disorganized infant attachment strategies and helpless-fearful profiles of parenting: Integrating attachment research with clinical intervention. *Infant Mental Health Journal* **25**: 318–335.
- Lyons-Ruth K, Connell DB, Grunebaum HU, Botein S. 1990. Infants at social risk: Maternal depression and family support services as mediators of infant development and security of attachment. *Child Development* **61**: 85–98.
- Lyons-Ruth K, Alpern L, Repacholi B. 1993. Disorganized infant attachment classification and maternal psychosocial problems as predictors of hostile-aggressive behavior in the preschool classroom. *Child Development* **64**: 572–585.
- Main M. 1995. Recent studies in attachment: Overview, with selected implications for clinical work. In *Attachment theory: Social, developmental, and clinical perspectives*, Goldberg S, Muir R, Kerr J (eds). Analytic Press: Hillsdale, NJ; 407–474.
- Main M, Goldwyn R. 1985/1991/1994. Adult Attachment Scoring and Classification Systems. Unpublished classification manual, University of California, Berkeley.
- Main M, van Ijzendoorn MH, Hesse E. 1993. Unresolved/unclassifiable responses to the AAI: Predictable from unresolved states and anomalous beliefs in the Berkeley-Leiden Adult Attachment Questionnaire. Paper presented at the 60<sup>th</sup> Anniversary Meeting of the Society for Research in Child Development, New Orleans, LA.
- Masten A, Coatsworth J. 1998. The development of competence in favorable and unfavorable environments. *American Psychologist* **53**: 505–520.
- Mather N, Woodcock RW. 2001. Examiner's manual. *Woodcock-Johnson III Tests of Cognitive Abilities*. Itasca, IL: Riverside Publishing.
- McCabe KM, Lucchini SE, Hough RL, Yeh M, Hazen A. 2005. The relation between violence exposure and conduct problems among adolescents: A prospective study. *American Journal of Orthopsychiatry* **75**: 575–584.
- Morris JS, Ohman A, Dolan RJ. 1999. A subcortical pathway to the right amygdala mediating 'unseen' fear. *Proceedings of the National Academy of Sciences of the United States of America* **96**: 1680–1685.
- Moss E, St-Laurent D. 2001. Attachment at school age and academic performance. *Developmental Psychology* **37**: 863–874.
- Moss E, Rousseau D, Parent S, St-Laurent D, Saintonge J. 1998. Correlates of attachment at school age: Maternal reported stress, mother-child interaction, and behavior problems. *Child Development* **69**: 1390–1405.
- Moss E, St-Laurent D, Parent S. 1999. Disorganized attachment and developmental risk at school-age. In *Attachment Disorganization*, Salomon J, George C (eds). New York, NY: Guilford Press; 160–186.

- Olson SL, Schilling EM, Bates JE. 1999. Measurement of impulsivity: Construct coherence, longitudinal stability, and relationship with externalizing problems in middle childhood and adolescence. *Journal of Abnormal Child Psychology* **27**: 151–165.
- Oosterlaan J, Sergeant JA. 1996. Inhibition in ADHD, aggressive, and anxious children: A biologically based model of child psychopathology. *Journal of Abnormal Child Psychology* **24**: 19–36.
- Pribram KH. 1991. *Brain and perception: Holonomy and structure in figural processing*. Hillsdale, NJ: Erlbaum.
- Reynolds CR, Kamphaus RW. 1998. *Behavioral Assessment System for Children: Technical Manual*. Circle Pines, MN: American Guidance Service, Inc.
- Rothbart MK, Posner MI, Hershey KL. 1995. Temperament, attention, and developmental psychopathology. In *Developmental Psychopathology: Vol. 1. Theory and Methods*, Cicchetti D, Cohen DJ (eds). New York: Wiley; 315–340.
- Ryan JP, Testa MF. 2005. Child maltreatment and juvenile delinquency: Investigating the role of placement and placement stability. *Children and Youth Services Review* **27**(3): 227–249.
- Schore AN. 2001. The effects of relational trauma on right brain development, affect regulation, and infant mental health. *Infant Mental Health Journal* **22**: 201–269.
- Schore AN. 2002. Dysregulation of the right brain: a fundamental mechanism of traumatic attachment and the psychopathogenesis of post-traumatic stress disorder. *Australian and New Zealand Journal of Psychiatry* **36**: 9–30.
- Schore AN. 2003. *Affect Dysregulation*. New York: Norton & Company.
- Shonk SM, Cicchetti D. 2001. Maltreatment, competency deficits, and risk for academic and behavioral maladjustment. *Developmental Psychology* **37**(1): 3–17.
- Slade A. 2004. The move from categories to process: Attachment phenomena and clinical evaluation. *Infant Mental Health Journal* **25**(4): 269–283.
- Solomon J, George C. 1996. Defining the caregiving system: Toward a theory of caregiving. *Infant Mental Health Journal* **17**: 183–197.
- Solomon J, George C, DeJong A. 1995. Children classified as controlling at age six: Evidence—of disorganized representational strategies and aggression at home and at school. *Development and Psychopathology* **7**: 447–463.
- Sutker PB, Vasterling JJ, Brailey K, Allain AN. 1995. Memory, attention, and executive deficits in POW survivors: Contributing biological and psychological factors. *Neuropsychology* **9**(1): 118–125.
- Tupler LA, De Bellis MD. 2006. Segmented hippocampal volume in children and adolescents with post-traumatic stress disorder. *Biological Psychiatry* **59**(6): 523–529.
- Twemlow SW, Fonagy P, Sacco FC. 2005. A developmental approach to mentalizing communities I: A model for change. *Bulletin of the Menninger Clinic* **69**(4): 265–281.
- Uddo M, Vasterling JJ, Brailey K, Sutker PB. 1993. Memory and attention in combat-related post-traumatic stress disorder. *Journal of Psychopathology and Behavioral Assessment* **15**: 43–52.
- Unkelbach C. 2006. The learned interpretation of cognitive fluency. *Psychological Science* **17**(4): 339–345.
- van der Kolk BA. 1987. *Psychological Trauma*. Washington, DC: American Psychiatric Press.
- van Ijzendoorn MH, Schuengel C, Bakermans-Kranenburg MJ. 1999. Disorganized attachment in early childhood: Meta-analysis of precursors, concomitants, and sequelae. *Development and Psychopathology* **11**: 225–249.

- Vasterling JJ, Root L, Brailey K, Uddo M, Sutker PB. 1994. Attention and memory performances in post-traumatic stress disorder. Paper presented at the 22<sup>nd</sup> Annual Meeting of the International Neuropsychological Society, Cincinnati, OH.
- Warren SL, Huston L, Egeland B, Sroufe LA. 1997. Child and adolescent anxiety disorders and early attachment. *Journal of American Academy of Child and Adolescent Psychiatry* **36**(5): 637–644.
- Webster L, Hackett RK. 2007. A comparison of unresolved versus resolved status and its relationship to behavior in maltreated adolescents. *School Psychology International* **28**(3): 365–378.
- Webster L, Joubert D. 2006. Rorschach correlates of unresolved attachment in adolescents placed in foster care. Poster presented at the Annual Meeting of the Society for Personality Assessment, San Diego, CA.
- West M, Rose S, Spreng S, Sheldon-Keller Adam K. 1998. Adolescent Attachment Questionnaire: A brief assessment of attachment in adolescence. *Journal of Youth and Adolescence* **27**(5): 661–673.
- West M, Rose S, Spreng S, Adam K. 2000. The Adolescent Unresolved Attachment Questionnaire: The assessment of perceptions of parental abdication of caregiving behavior. *Journal of Genetic Psychology* **161**(4): 493–503.
- Whalen PJ, Rauch SL, Etkoff N, McInerney SC, Lee MB, Jenike MA. 1998. Masked presentations of emotional facial expressions modulate amygdale activity without explicit knowledge. *Journal of Neuroscience* **18**: 411–418.
- Woodcock RW, McGrew KS, Mather N. 2001. *Woodcock-Johnson III Tests of Cognitive Abilities*. Itasca, IL: Riverside Publishing.
- Yantis S. 1994. Attention. In *Encyclopedia of human intelligence*, Sternberg RJ (ed.). New York: Macmillan; 146–152.

Copyright of *Child Abuse Review* is the property of John Wiley & Sons Ltd 1996 and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.