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Attachment and Effortful Control: Relationships with Maladjustment in Early Adolescence

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Abstract

Based on former research, it can be assumed that attachment relationships provide a context in which children develop both the effortful control (EC) capacity and the repertoire of responses to regulate distress. Both are important to understand children's (mal)adjustment. While the latter assumption has been supported in several studies, less is known about links between attachment and EC. We administered questionnaires to measure anxious and avoidant attachment or trust in maternal support in two samples of early adolescents. EC was reported by the child in Sample 1 ($N = 244$), and by mother in Sample 2 ($N = 177$). In both samples mothers reported children's maladjustment. Consistent with predictions, insecure attachment was related to reduced EC. Moreover, EC indirectly linked insecure attachment to maladjustment. This study provides evidence that studying EC is important to understand the self-regulatory mechanisms explaining the link between attachment and (mal)adjustment in early adolescence.

Keywords: attachment, developmental psychopathology, self-regulation, effortful control

Attachment and Effortful Control: Relationships with Maladjustment in Early Adolescence

Attachment relationships provide a context in which children develop both the self-regulatory capacity and the repertoire of responses by which they regulate affect (Bowlby, 1969; Cassidy, 1994; Mikulincer & Shaver, 2007). Thus far, research has mainly focused on the role of attachment in the development of emotion regulation (e.g., Kobak, Cole, Ferenz-Gillies, Fleming, & Gamble, 1993; Mikulincer & Shaver, 2007), whereas less attention has been given to the simultaneous development of self-regulatory capacity, which reflects the ability to regulate attention and behavior (Carver & Scheier, 2011; Posner & Rothbart, 1998). Since self-regulatory capacity in childhood predicts later (mal)adjustment (e.g., Eisenberg, Spinrad, & Eggum, 2010), it is important to know (1) whether this capacity is related to attachment and (2) whether deficits in self-regulatory capacity can help explain why less securely attached children are more vulnerable to maladjustment.

Studying these associations seems to be especially relevant in early adolescence. At this age, children must cope with the physical, emotional and social changes that go along with puberty (Eccles, 1999). Thus, it is no surprise that the cognitive, emotional and self-regulatory capacities children develop in early adolescence predict resilience throughout adolescence (Masten, 2004; Tsukayama, Toomey, Faith, & Dukworth, 2010). Insofar as research suggests that during the transition to adolescence these capacities are especially malleable in the context of parent-child interactions (Mezulis, Hyde, & Abramson, 2006), it is surprising that little research has focused on the relationship between attachment and self-regulatory capacity in early adolescence.

Self-Regulatory Capacity

Self-regulatory capacity can be defined as the ability, originating within the person, to control, direct and correct attention and behavior to respond effectively to both internal and environmental demands (Carver & Scheier, 2011). It has traditionally been studied from either a temperament or neurocognitive perspective. From a temperament framework, effortful control (EC) has been defined as the capacity to override a dominant response in order to perform a more adaptive subdominant response through attentional, inhibitory, and activation control (Rothbart,

1989). Similarly, the neurocognitive framework has mainly focused on executive functioning (EF), which can be conceptualized as the higher-order cognitive processes involved in self-regulation (Eslinger, 1996), such as working memory, attentional set shifting and inhibitory control (Miyake et al., 2000). Individual differences in EC are commonly assessed by questionnaires (Ellis & Rothbart, 2001; Lonigan & Philips, 2002), whereas EF is typically assessed with performance-based measures (Miyake et al., 2000). Although both perspectives originated from different research traditions, there is considerable overlap in the definitions of both constructs (Zhou, Chen, & Main, 2012). This overlap was recently confirmed by genetic (e.g., Fan, Fossella, Sommer, Wu, & Posner, 2003; Friedman et al., 2008) and neuroimaging studies (Avlarez & Emory, 2006; Posner & Fan, 2004), supporting the assumption that EC and EF have a similar biological basis. Nevertheless, using self- and parent-reports of EC has the advantage of taking into account self- or other's perception of an individual's self-regulatory capacity. As perceived EC is an important predictor of later (mal)adjustment (Eisenberg, Spinrad, et al., 2010), the current study operationalized self-regulation as EC.

Since EC is considered an aspect of temperament, one could argue that it is an innate, stable trait (Rothbart, Derryberry, & Hershey, 2000). However, from birth onwards, EC development results from exposure to environmental influences during brain maturation (Farah et al., 2006; Goldsmith, Buss, & Lemery, 1997). For example, research found that parent-child interactions can increase or decrease EC throughout childhood (Eisenberg, Spinrad, et al., 2010). More specifically, several longitudinal studies demonstrated that responsive and supportive parenting shapes children's capacity to regulate their behavior and thoughts, which is related to their adjustment later in life (e.g., Kochanska, Murray, & Harlan, 2000; Lengua, Honorado, & Bush, 2007).

In spite of the clear importance of parental support for the development of EC, increasing evidence suggests that throughout adolescence (mal)adjustment is not directly influenced by parental care per se. Rather, it is increasingly affected by children's expectations regarding parental availability and support. More specifically, recent research indicates that adolescents' trust in their parents' ability to provide support in times of need mediates the link between parental care and

(mal)adjustment (e.g., Cai, Hardy, Olsen, Nelson, & Yamawaki, 2013; Gallarin & Alonso-Arbiol, 2012).

This suggests that the expectations regarding parental support are the more proximal variable to focus on, when studying the impact of parental support on EC in early adolescence.

Attachment and Effortful Control

Expectations regarding parental support are investigated predominantly from the perspective of attachment theory (Bowlby, 1969). According to this theory, experiencing responsive and sensitive parenting leads to secure attachment, which is reflected in trust regarding parental support and support seeking as a biologically driven, attachment-related affect regulation strategy (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1980). Experiencing unresponsive and insensitive parenting leads to insecure attachment. This is reflected in uncertainty regarding maternal support and two different styles of insecure attachment. Anxious attachment refers to ambivalent support seeking while fearing rejection and abandonment by the attachment figure. Avoidant attachment refers to creating emotional distance and avoiding dependence on others.

Attachment theory assumes that multiple pathways may link a secure attachment relationship with the development of EC (Bowlby, 1969; Cassidy, 1994; Fonagy & Target, 2002). First, since children who trust in the availability of their attachment figure express their emotions more freely and seek support in times of need (Cassidy, 1994), their attachment figure can act as a co-regulator and role model, gradually promoting securely attached children's capacity for behavioral and emotional control (Kopp, 1982). Second, with the help of the attachment figure, these children are better able to regulate their emotional arousal. This allows them to invest energy in curious and competent exploration of the environment (Mikulincer, Shaver, & Pereg, 2003). Exploration of the environment offers them the opportunity to practice and strengthen their self-regulation abilities autonomously and to develop self-regulation skills in the service of goal-corrected action (Grossman, Grossman, Kindler, & Zimmermann, 2008). Finally, by experiencing their attachment figure as a safe haven in times of need and a secure base from which to explore, children gain not only competence, but also confidence in their own self-regulation abilities (Sroufe, 2005). These assumptions lead to

the prediction that more securely attached early adolescents should be higher in EC.

Research provides preliminary support for this prediction. For example, in a study by Bernier, Carlson, Deschênes, and Matte-Gagné (2012), secure attachment predicted infants' performance on a set of EF tasks one year later. Likewise, Thorell, Rydell, and Bohlin (2012) found an association between the quality of 8-year-olds' attachment relationships and deficits in their EF. Furthermore, Drake, Belsky, and Fearon (2014) showed that attachment in infancy was associated with children's attentional control three years later. Similarly, Jacobsen, Huss, Fendrich, Kruesi, and Ziegenhain (1997) found that the quality of the attachment relationship in infancy predicted how long the children could wait in a delay of gratification task at the age of six. Moreover, in 4- to 6-year-olds attachment security was positively related to inhibitory control as assessed with a questionnaire (Booth-LaForce & Oxford, 2008) or stop-signal task (Heikamp, Trommsdorff, Druey, Hübner, & von Suchodoletz, 2013).

Although these previous studies show that self-regulatory capacity may develop within the context of the attachment relationship, the available evidence in early adolescence is still sparse. To the best of our knowledge, the only study that examined whether attachment is related to self-regulatory capacity in early adolescence was conducted by Muris and Dietvorst (2006). They found that early adolescents' insecure attachment was associated with lower levels of EC. However, the Muris and Dietvorst (2006) study had significant limitations. First, it focused on peer attachment rather than attachment to the primary caregiver. Although peer attachment relationships start gaining importance at this age, the mother remains the most important attachment figure in early adolescence (Kerns, Tomich, & Kim, 2006), suggesting the latter is a more important focus of research in children at this age. Furthermore, only 18 of 71 children were classified as insecurely attached (18 avoidantly attached, 6 ambivalently attached). Therefore, the result that both insecure attachment styles are linked with lower EC should be interpreted with caution, as the small numbers of subjects in each insecure group raises doubt about the generalizability of this finding.

To overcome the previous study's limitations, the current study's first aim was to examine

whether attachment to mother is linked with EC in early adolescence. Thereby, we tested this hypothesis in sufficiently large samples, using measures of both trust regarding parental support, as an attachment measure reflecting the general dimension of secure versus insecure attachment and a two-dimensional measure of the specific anxious and avoidant insecure attachment styles.

Attachment, Effortful Control, and Child Adjustment

Because the quality of the attachment relationship and low EC in childhood have both been linked with maladjustment (e.g., DeKleyen & Greenberg, 2008; Eisenberg et al., 2010a), it is surprising that hardly any research has focused on the interrelations between attachment and EC in explaining maladaptive development. Instead, some studies showed that EC mediates the effect of supportive parenting on (mal)adjustment. For example, Eisenberg et al. (2001) showed that EC mediated the association between mother's emotional expressivity and social competence in younger children. In the same vein, Eisenberg et al. (2005) found that EC mediated the relationship between positive parenting and externalizing problems in early adolescence. Given these findings, and given the mediating role of attachment in the link between responsive parenting and (mal)adjustment (e.g., Cai et al., 2013; Gallarin & Alonso-Arbiol, 2012), it is reasonable to assume that a similar pattern of associations should be found for the interrelations between attachment and EC in explaining maladjustment. Hence, the current study's second aim was to examine whether the link between attachment and maladjustment is mediated by EC. Such an effect would suggest that because insecure attachment is a poor context for developing EC, it should be associated with diminished EC, which in turn increases the risk for maladjustment.

Summary

The current study aimed to investigate whether insecure attachment is related to EC in early adolescence and whether the association between insecure attachment and maladjustment may be explained in part by a deficit in EC. More specifically, we hypothesized that (1) early adolescents who are less securely attached would have lower levels of EC and (2) attachment and maladjustment in early adolescence would be indirectly linked through EC. These predictions were tested in two

independent samples.

General Method

Participants

Sample 1 was an urban community sample consisting of 244 children (103 boys and 141 girls) with ages ranging from 8 to 13 years old ($M = 10.46$, $SD = .95$). In this sample 80% lived together with both biological parents, 16% had divorced parents, 2% had a deceased father, and 2% had irregular contact with their father. No data on race are available. All children were primarily raised by their mother during the first three years of their life. Furthermore, all children reported attachment towards their biological mother except for one child that was adopted after birth. Regarding maternal level of education, 0.8% of the mothers had an elementary school degree, 27.0% had a high school degree, 43.9% had a post-high school technical training or a technical bachelor's degree, and 27.9% had a master's degree (information on education was missing for one mother).

Sample 2 was an urban community sample consisting of 177 children (79 boys and 98 girls), ranging in age from 8 to 13 years old ($M = 10.31$, $SD = .95$). The sample was mainly Caucasian, except for two children. Furthermore, 84.7% of the children lived together with both biological parents, 13.6% had divorced parents, 0.6% had a deceased father and 1.1% never had contact with their father. All children were primarily raised by their mother during the first three years of their life. Moreover, except for two children who were adopted between their first and third years of life, all children reported attachment towards their biological mother. Regarding parental level of education, 32.8% of the mothers had a high school degree, 49.2% had a post-high school technical training or a technical bachelor's degree, and 18.1% had a master's degree.

Procedure

In both samples data were collected as part of three different experimental attachment studies. The recruitment and research procedures were always similar. Using a flyer distributed in the classrooms of the fourth, fifth, and sixth grades of urban elementary schools, we invited children and their mothers to participate in a study on the mother-child relationship. The flyer informed

children and their parents about the content and procedure (e.g., questionnaires, experimental attentional task) of the study. Those who were interested could return the flyer to the school with their personal contact information. Subsequently they were contacted by the experimenter, who personally informed them about the specific content and methodology of the study and about their right to refuse participation. All those who initially expressed interest ultimately chose to participate and gave their written informed consent. Data were collected either during home visits or while mother and child visited the lab. Questionnaires were always collected before the experiments started. The current study was approved by the university's ethical committee.

Measures

Attachment anxiety and avoidance. Children in both samples completed the Experiences in Close Relationships Scale – Revised Child version (ECR-RC; Brenning, Soenens, Braet, & Bosmans, 2011). The ECR-RC is a child-friendly version of the frequently used Experiences in Close Relationships Scale-Revised (ECR-R; Fraley, Waller, & Brennan, 2000) adapted for administration to children and early adolescents from 8 to 14 years old. The ECR-RC includes 36 items. For the current study only the items relating to mother were used. Participants were asked to indicate for each item the degree to which they agree with the statements on a 7-point Likert-scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The ECR-RC contains two subscales, which reflect the two-dimensional approach of individual differences in attachment. The attachment anxiety scale contains 18 items tapping fear of abandonment and rejection as well as strong desires for interpersonal merger (e.g., “I worry about being abandoned by my mother”). The attachment avoidance scale contains 18 items tapping into avoidance of intimacy, discomfort with closeness and self-reliance (e.g., “I prefer not to show to my mother how I feel deep down.”). The reliability of these scales has been supported in several studies and convergent and concurrent validity have been demonstrated (e.g., Brenning et al., 2011; Dujardin et al., in press). Table 1 provides an overview of the internal consistency ratings of the measures in both Sample 1 and Sample 2.

Trust in the availability of maternal support. In Sample 2, the trust-subscale of the People in

My Life Questionnaire (PIML; Ridenour, Greenberg, & Cook, 2006) was used. The PIML is a self-report questionnaire designed to assess children's internal representations of their relationships with their attachment figures. It is a child-friendly version of the Inventory of Parent and Peer Attachment (IPPA; Armsden & Greenberg, 1987) adapted for administration to children from 10 to 12 years old. In the present study, only the questions of the trust-subscale regarding mother were used. Trust in maternal support is conceptualized as the positive affective or cognitive experiences of trust in the availability and responsiveness of mother. Children responded to 10 items (e.g., "I can count on my mother to help me when I have a problem.") on a 4-point Likert-scale ranging from 1 (*almost never true*) to 4 (*almost always true*). The concurrent and convergent validity of the trust-scale has been demonstrated by links with parenting behaviors, support seeking behavior in distressed children and the attentional processing of mother (e.g., Bosmans, Braet, Heylen, & De Raedt, 2015).

Effortful control. In Sample 1 EC was measured with the Effortful Control Scale (ECS; Lonigan & Philips, 2002). The ECS is a self-report questionnaire designed to assess the behavioral and attentional component of EC in children from 8 to 17 years old. The ECS consists of 24 self-report items, which are rated on a 5-point scale ranging from 1 (*not at all like me*) to 5 (*very much like me*) with regard to how much each item describes the individual most of the time. The items tap persistence/lack of distractibility (e.g., "I start many things that I don't finish." (R) and "Even little things distract me.") and lack of impulsivity (e.g., "I can easily stop an activity when told to do so."). The items can be adequately summed in a total EC score (e.g., Verstraeten, Vasey, Raes, & Bijttebier, 2009). Research shows the ECS has excellent reliability and correlates strongly with parent-report measures of child EC (e.g., Verstraeten, Vasey, Claes, & Bijttebier, 2010).

In Sample 2, EC was measured with the parent-report form of the Early Adolescent Temperament Questionnaire-Revised (EATQ-R; Ellis & Rothbart, 2001) administered to mother. The EATQ-R is designed to measure temperament in children and adolescents from 9 to 15 years old. It is a revised and updated version of the Early Adolescent Temperament Questionnaire (EATQ; Capaldi & Rothbart, 1992). Each of the EATQ-R's 62 items is to be answered using a 5-point Likert-scale ranging

from 1 (*almost never true*) to 5 (*almost always true*). For the current study, only the items of the EC-factor were used, which tap activation control (e.g., “If my child has a hard assignment to do, he gets started right away.”), attentional control (e.g., “It is easy for my child to really concentrate on homework problems.”), and inhibitory control (e.g., “When someone tells my child to stop doing something, it is easy for him/her to stop.”). The EC-scale has demonstrated sufficient reliability (e.g., Ellis & Rothbart, 2001) and predictive validity (e.g., Ellis, 2002) in several studies. The convergent validity of the EC-scale is suggested by links with child-reported and performance based measures of EC (e.g., Verstraeten et al., 2010).

Maladjustment. In Samples 1 and 2, mothers completed the Child Behavior Checklist for Ages 6-18 (CBCL 6-18; Achenbach & Rescorla, 2001). This measure lists 112 symptoms of behavior problems, which have been frequently used as indicators of child maladjustment (e.g., Eisenberg, Spinrad, et al., 2010). Using a 3-point scale ranging from 0 (*not true*) to 2 (*very true or often true*), mothers were asked how often their child showed each problem behavior. Items aggregate to eight syndrome scales. The present study focused on broad-band measures of externalizing problems (i.e., the sum of the scores on the aggressive behavior and destructive behavior scales), and internalizing problems (i.e., the sum of the withdrawn/depressed, somatic complaints, and anxious/depressed subscales). These broad-band scales have shown good reliability and convergent/concurrent validity in many studies across different cultures (e.g., Braet et al., 2011).

Data Analysis

The statistical package for social sciences (SPSS) was used for all analyses. (1) To test the prediction that in early adolescence attachment is associated with EC we computed zero-order correlations and conducted a Multiple Linear Regression (MLR) Analysis with EC as dependent variable and attachment anxiety and avoidance as predictors to assess unique links of the insecure attachment styles with EC. (2) To test the hypothesis that EC indirectly links attachment with maladjustment we tested a mediation model with attachment as independent variable, maladjustment as dependent variable and EC as mediator (see Figure 1). The SPSS Macro provided by

Preacher and Hayes (2004) was used to determine whether attachment was significantly related to maladjustment (total effect, c-path), whether attachment was significantly associated with EC (a-path), whether EC was significantly related to maladjustment controlling for attachment (b-path), and whether the total effect remained significant after entering EC as mediator in the model (direct effect, c'-path) following the path analyses method of Baron and Kenny (1986). Next, according to the recommendations of MacKinnon, Lockwood, and Williams (2004) a nonparametric resampling method (bias-corrected bootstrap; Preacher & Hayes, 2008) was used to test the significance of the indirect effects. From the original sample, 10,000 resamples were drawn with replacement to derive a point estimate ($a*b$) and the 95% confidence interval (CI) for the indirect effect. The indirect effect is significant if zero is not in the CI. All mediation analyses for attachment anxiety were conducted controlling for attachment avoidance and vice versa. To test the robustness of the effects, in both samples the main analyses were repeated controlling for gender, age, and maternal level of education. Race was included as covariate only in Sample 2.

Results and Discussion Sample 1

Preliminary Analyses

Only 0.5% of the data were missing. As these data were missing completely at random (Little's MCAR test was not significant, $\chi^2(9) = 5.03, p = .832$) we used the expectation maximization method to estimate the missing data, resulting in $N = 244$ for all subsequent analyses. Means and standard deviations of the key variables under study are shown in Table 1.

Externalizing problems differed by gender, $t(171.21) = 2.97, p = .003, d = 0.39$. Mothers reported more externalizing problems for boys ($M = 7.16; SD = 7.24$) than for girls ($M = 4.69; SD = 5.03$). Age was not correlated with any of the dependent variables under study. Maternal level of education was significantly related to early adolescents' internalizing problems, $F(3,239) = 10.10, p < .001, \eta^2 = .11$. Post-hoc tests revealed that children from mothers with a lower level of education had significantly more internalizing problems than children from mothers with a higher level of education. There was a significant effect of maternal level of education on externalizing problems as

well, $F(3,239) = 5.496$, $p = .001$, $\eta^2 = .07$. Again, post-hoc analyses revealed that children whose mothers had a lower level of education had significantly more externalizing problems than children from mothers with a higher level of education.

Attachment and Effortful Control

Table 1 shows that both attachment anxiety and avoidance were significantly correlated with EC. To investigate unique links of EC with the two insecure attachment styles, an MLR analysis was carried out with EC as dependent variable and attachment anxiety and avoidance as predictors ($R^2 = .15$, $F(2,241) = 20.46$, $p < .001$). In line with the predictions, both attachment anxiety ($\beta = -.13$, $t(241) = -1.97$, $p = .050$) and attachment avoidance ($\beta = -.30$, $t(241) = -4.45$, $p < .001$) remained related to EC. Adding gender, age, and maternal level of education as covariates in the MLR analysis did not substantially alter the results.¹ In summary, these findings support the hypothesis that early adolescents who are less securely attached to mother show decreased EC and this was true for both insecure attachment styles.

Attachment, Effortful Control, and Child Maladjustment

Table 2 summarizes for each analysis the unstandardized regression coefficients for the different paths of the mediation model, and the point estimate and CI for the indirect effect. The total effects (c-paths) of attachment anxiety and avoidance on mother-reported externalizing and internalizing problems did not reach significance. However, in line with the predictions the results demonstrated that both attachment anxiety and avoidance were significantly indirectly linked with both externalizing and internalizing problems through EC. In addition, suggesting a suppression effect, the negative direct link (c'-path) between attachment avoidance and internalizing problems was significant as well. Supporting the robustness of the indirect link between both attachment anxiety and avoidance with externalizing problems through EC, adding covariates to the analyses did not change the results. Also, the indirect link between both insecure attachment styles and internalizing problems through EC remained significant when controlling for age and gender.

¹The specific results of the additional analyses with covariates included are available from the first author upon request.

However, when controlling for maternal level of education the indirect effect between both attachment anxiety (95% CI [-0.02, 0.48]) and avoidance (95% CI [-0.07, 0.70]) and internalizing problems through EC dropped to non-significance (see Footnote 1).

Results and Discussion Sample 2

Preliminary Analyses

Less than 0.5% of the data were missing. As these data were missing completely at random (Little's MCAR test was not significant: $\chi^2(12) = 12.09$, $p = .438$) we used the expectation maximization method to estimate the missing data, resulting in $N = 177$ for all subsequent analyses. Descriptive statistics of the key variables under study are shown in Table 1.

Attachment avoidance differed by gender, $t(175) = 2.05$, $p = .042$, $d = 0.31$, with higher scores for boys ($M = 2.60$, $SD = 0.87$) compared to girls ($M = 2.35$, $SD = 0.76$). Gender had an effect on EC as well, $t(175) = -2.19$, $p = .030$, $d = 0.33$. Mothers reported less EC for boys ($M = 3.35$, $SD = 0.58$) than for girls ($M = 3.53$, $SD = 0.53$). No further gender effects were found. Age was not correlated with any of the dependent variables under study. Maternal level of education was significantly related to children's EC, $F(2,174) = 3.51$, $p = .032$, $\eta^2 = 0.04$. Post-hoc tests revealed that EC was significantly lower in children from mothers with a lower level of education than in children from mothers with a higher level of education. In addition, there was a significant effect of maternal level of education on externalizing problems, $F(2,174) = 3.14$, $p = .046$, $\eta^2 = 0.03$. Post-hoc analyses revealed that children whose mothers had a lower level of education had significantly more externalizing problems than children whose mothers had a higher level of education. Also, race was significantly related to attachment anxiety, $t(175) = -4.03$, $p < .001$, $d = 2.87$, with higher scores for the non-Caucasian ($M = 4.19$, $SD = 0.12$) than for the Caucasian children ($M = 2.02$, $SD = 0.76$).

Attachment and Effortful Control

In line with the findings in Sample 1, both trust in maternal support and the specific insecure attachment styles (attachment anxiety and avoidance) were significantly correlated with EC (see Table 1). A MLR analysis with EC as dependent variable and attachment anxiety and avoidance as

independent variables was significant ($R^2 = .12$, $F(2,174) = 12.11$, $p < .001$). As in Sample 1, attachment anxiety was independently associated with EC ($\beta = -.29$, $t(174) = -3.41$, $p < .001$). However, contrary to Sample 1, there was no unique link between attachment avoidance and EC after taking attachment anxiety into account ($\beta = -.10$, $t(174) = -1.17$, $p = .243$). Adding gender, age, maternal level of education, and race as covariates in the MLR analysis did not substantially alter the results (see Footnote 1).

Attachment, Effortful Control, and Child Maladjustment

Table 3 summarizes for each analysis the unstandardized regression coefficients for the different paths of the mediation model, and the point estimate and CI for the indirect effect. The total effects (c-path) of trust in maternal support and of both specific insecure attachment styles (attachment anxiety and avoidance) on externalizing problems attained significance. Also, the direct link (c'-path) between trust in maternal support and externalizing problems remained significant. However, neither a total effect of trust in maternal support, nor of both specific insecure attachment styles on internalizing problems was found. Supporting the hypothesis that EC explains the association between attachment and (mal)adjustment, the results indicated a significant indirect effect of EC on the relationship between trust in maternal support and both externalizing and internalizing problems. Furthermore, EC significantly indirectly linked attachment anxiety, but not attachment avoidance to both externalizing and internalizing problems. The robustness of these indirect effects was supported by the fact that adding gender, age, maternal level of education, and race as covariates in the mediation analyses did not significantly alter the results (see Footnote 1).

General Discussion

The current study had two main research goals. First we sought to examine the extent to which attachment is related to EC in early adolescence. Our second goal was to investigate whether the association between insecure attachment and child maladjustment may be explained in part by a deficit in EC. Results supported both hypotheses. Specifically, results showed that both insecure attachment in general and the specific anxious and avoidant attachment styles are associated with

lower levels of EC. Moreover, the data suggest that insecure attachment is indirectly linked to both internalizing and externalizing problems by way of its association with lower levels of EC. When children report less secure attachment and more attachment anxiety or avoidance, they tend to have less EC, which, in turn, is related to their mothers' impression that they have more internalizing and externalizing problems. Although interpretation of the findings warrants caution because of the cross-sectional research design and the potential inflation of effects due to reporter bias or shared method variance, the results provide the first evidence that mother-child attachment in early adolescence is linked with EC. Furthermore, the findings call for further research focusing on EC, as this can lead to a better understanding of why less securely attached children are at risk to develop maladjustment.

Attachment and Effortful Control

In line with theoretical predictions (Cassidy, 1994; Fonagy & Target, 2002) and preliminary attachment research (e.g., Muris & Dietvorst, 2006), the current study supports the hypothesis that insecure attachment is related to decreased EC in early adolescence. In both samples clear links were found between insecure attachment and low levels of EC. While previous research in early adolescence only focused on peer attachment, the present study adds to the literature by suggesting that EC is also related to early adolescent attachment to mother. Consequently, this study provides the first direct evidence in support of Cassidy's (1994) theoretical assumptions about the link between EC and attachment towards mother in early adolescence.

For several reasons the data suggest that decreased EC is related to insecure attachment in general rather than to only one of the insecure attachment styles specifically. First, the analyses with self-reported EC showed that both attachment anxiety and avoidance were independently linked with EC. Also, for the analyses with mother-reported EC, an association between both insecure attachment styles with EC was found. However, when controlling for attachment anxiety, the link between attachment avoidance and EC disappeared, indicating that the effect of attachment avoidance on EC might be explained by the degree to which avoidantly attached children are

anxiously attached as well. This again reflects a general insecure attachment effect, but it also suggests that the effect might be driven by attachment anxiety-related dynamics. Nonetheless, also trust in maternal support was associated with mother-reported EC. As lack of trust in maternal support is what anxious and avoidant children have in common, this further supports the idea that decreased EC is related to insecure attachment in general rather than to only one of the insecure attachment styles specifically. However, more thorough research is needed to test whether these findings replicate in prospective studies and with different measurement strategies.

Attachment, Effortful Control, and Child Maladjustment

The current study supports the hypothesis that EC indirectly links insecure attachment with maladjustment. Both self- and mother-reported EC mediated the link between attachment anxiety and both externalizing and internalizing problems. Similarly, self-reported EC mediated the link between attachment avoidance and both externalizing and internalizing problems. However, no indirect effects of attachment avoidance through mother-reported EC were found. Nevertheless, the indirect effects with mother-reported EC were replicated when investigating the link between externalizing and internalizing problems and trust in maternal support, the general measure of secure versus insecure attachment. Furthermore, the robustness of these effects was supported by the fact that adding gender, age, and race as control variables did not significantly alter the results. However, when adding maternal level of education in Sample 1, the indirect effects of attachment with externalizing problems through EC seemed to be more robust than the indirect effects with internalizing problems. This finding is in line with previous research suggesting that maternal level of education is not only a predictor of maladaptive development (e.g., Bradley & Corwyn, 2002), but of EC as well (e.g., Eisenberg, Vidmar, et al., 2010), suggesting that maternal level of education might be an important third variable to take into account when studying the interrelations between attachment and EC in explaining maladjustment. Nevertheless, controlling for maternal level of education did not significantly alter the results in Sample 2, suggesting that the effect size of maternal education is not as robust as the attachment-EC indirect effect on internalizing problems.

Surprisingly, the current study failed to reveal strong evidence in favor of a direct association between child-reported attachment and the mother-reported maladjustment measures. This might have been due to the multi-informant design of the study. Attachment refers to non-observable cognitions (Bowlby, 1969), while EC is reflected in observable behavior (Verstraeten et al., 2010). Moreover, despite the lack of a direct effect several meaningful indirect effects of EC on the link between attachment and maladjustment were found. This is consistent with accumulating evidence suggesting that total effects are not a necessary requirement for indirect effects to occur (e.g., Rucker, Preacher, Tormola, & Petty, 2011; Eisenberg, Chang, Ma, & Huang, 2009).

Interestingly, after taking into account the indirect effect of EC, one significant direct association emerged, suggesting that more avoidantly attached children show less internalizing problems. The emergence of a protective effect of attachment avoidance after controlling for the maladaptive effect of associated lower EC can be understood in light of Hinde's claim (1982) that insecure attachment may be an evolutionary adaptive strategy in a maladaptive context. However, because this is a suppression effect and the interpretation of such effects warrants caution (Maassen & Bakker, 2001), more research is needed to see whether this effect replicates.

Although the findings support the current study's mediation hypothesis, it is also possible that EC moderates the link between attachment and maladjustment. Previous research suggests that early adolescence is a transitional developmental period in which vulnerability for later psychopathology develops, but increasingly crystallizes into a moderator. Therefore, it is possible to find evidence for both mediation and moderation models when studying the links between vulnerability factors, such as EC, and adjustment at this age (e.g., Cole & Turner, 1993). To test this post-hoc hypothesis, moderation analyses were performed in both samples. Evidence for a moderation effect was found only in one out of ten analyses, which may argue against moderation by EC of the link between attachment and maladjustment in early adolescence. However, the effect was consistent with predictions. Only when children had less EC, attachment anxiety was linked to maladjustment. Moreover, since the statistical power for moderation analyses in the current samples

was too small to conduct reliable tests, future sufficiently powered studies should further investigate whether in early adolescence EC can moderate the effect of insecure attachment on maladjustment.

Limitations

Although this study adds to the literature by demonstrating in two independent samples a link between attachment to mother and EC, and that link's involvement in mediating the association between attachment and maladjustment, these findings should also be interpreted with caution. More specifically, the study's cross-sectional design does not allow us to investigate causality in the interplay between attachment and EC in the associations with maladjustment. Therefore, future longitudinal research is needed to establish how the interrelationships between attachment, EC, and maladjustment develop, and to determine whether EC plays a causal role in these associations.

Additionally, self-report measures of attachment were used. It has been argued that self-report is a less valid approach to measure attachment as it over identifies secure attachment (Ainsworth, 1985). Nevertheless, in the same paper, Ainsworth argued that self-reported insecure attachment could be considered valid and reliable. Moreover, instruments to measure attachment in early adolescence have long been lacking (e.g., Dwyer, 2005). In recent years, it has become widely acceptable to measure early adolescent attachment using questionnaires (e.g., the Security Scale, Kerns, Klepac, & Cole, 1996), specifically when expectations regarding parental support are the more proximal variable under study. Furthermore, several recent psychometric studies (e.g., Psouni & Apetroaia, 2014) indicate that self-reported attachment security is associated with narrative and interview measures of attachment representations in early adolescence. Consequently, in spite of the use of a self-report measure to index attachment, the current findings remain important, revealing a novel perspective on the link between attachment and adjustment. Nevertheless, future research should also investigate links with narrative and interview measures of attachment.

Finally, because all variables were measured with questionnaires, our results could have been affected by shared method variance (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Yet the validity of EC questionnaires has been established in studies demonstrating clear correlations

between child and parent reports of EC (e.g., Verstraeten et al., 2010) and between those reports and teacher reports of ADHD symptoms (Samyn, Roeyers, & Bijttebier, 2011). The multi-informant approach at least partly reduced the potential inflation of effects due to reporter bias. As the indirect effects were found with both self-and parent-reported EC, it is less likely that the current results only reflect a research methodology effect. Nonetheless, replicating the current findings with a performance-based measure of self-regulation is needed to corroborate the importance of the current study's theoretical and clinical implications.

Theoretical and Clinical Implications

Theoretically, studying EC in relation to attachment processes might be of particular importance as recent studies increasingly acknowledge that (attentional) information processing plays a central role in the attachment system. Studies show that children's attachment appraisals guide the attentional processing of both emotional information (Dykas & Cassidy, 2011) and attachment-related stimuli (e.g., Bosmans et al., 2009). As Lonigan and Vasey (2009) argue that EC is an important factor to take into account when studying attentional biases, a better understanding of the interplay between attachment and EC might prove crucial to understand the different effects in different samples in this growing domain of attachment research.

Clinically, these findings are important to further shape adequate treatment of attachment-related psychopathology. For example, in our clinical practice we apply Attachment-Based Family Therapy (ABFT; Diamond et al., 2010). ABFT aims at restoring the breach in confidence in the parent-child attachment relationship and appears to be a highly successful strategy to reduce adolescent depression and suicidal ideation (Diamond et al., 2010). However, we have also experienced that for some clients it is difficult to overcome the ongoing negative parent-adolescent interaction. The current study suggests that this could at least partly be due to insecurity-related deficits in EC. Thus, it would be worthwhile to investigate whether deficits in EC predict poorer ABFT outcomes. If so, insofar as successful strategies have been developed to train EC (Eisenberg, Spinrad et al., 2010), it may prove possible to enhance response to ABFT by first increasing children's EC through training.

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Table 1

Correlations, Means, Standard Deviations, and Cronbach's α s Sample 1 and Sample 2^a

Measure	1	2	3	4	5	6	M	SD	α
1. Trust		-.46***	-.53***	.20**	-.22**	-.10	36.05	4.00	.86
2. Anxiety	-		.53***	-.34***	.24**	.14 [†]	2.05	0.79	.83
3. Avoidance	-			-.25***	.25***	.11	2.47	0.82	.83
4. EC	-				-.42***	-.35***	3.45	0.56	.68
5. Externalizing	-					.42***	5.71	6.02	.89
6. Internalizing	-						6.84	6.11	.86
<i>M</i>	-	1.99	2.48	86.86	5.73	6.75			
<i>SD</i>	-	0.71	0.83	9.48	6.17	6.27			
α	-	.80	.84	.74	.90	.86			

Note. Trust = Trust in maternal support; Anxiety = attachment anxiety; Avoidance = attachment avoidance; EC = effortful control; Externalizing = externalizing problems; Internalizing = internalizing problems; In Sample 1 effortful control was reported by the child with the Effortful Control Scale. In Sample 2 effortful control was reported by the mother with the Early Adolescent Temperament Questionnaire-Revised.

^aThe correlation coefficients, means, standard deviations, and Cronbach's α s of Sample 1 are below and the correlation coefficients, means, standard deviations, and Cronbach's α s of Sample 2 are above the diagonal.

[†] $p < .1$; ** $p < .01$; *** $p < .001$.

Table 2

Unstandardized Regression Coefficients (with Standard Error in Parentheses) and Proportion of Explained Variance in the Mediation Analyses for Sample 1 with Attachment as Independent Variable (IV), Effortful Control as Mediating Variable (M), and Maladjustment as Dependent Variable (DV) (10,000 Bootstrap Samples)

IV	Effect of IV on M (a)	Effect of M on DV (b)	Total effect (c)	Direct effect (c')	Indirect effect (a*b)	Bias corrected 95% CI of indirect effect	R ² mediation model
Externalizing problems							
Anxiety	-1.78 [†] (0.90)	-0.18*** (0.04)	0.61 (0.63)	0.29 (0.62)	0.32 ^a (0.19)	0.01 < < 0.80	0.08***
Avoidance	-3.44*** (0.77)	-0.18*** (0.04)	0.42 (0.54)	-0.20 (0.55)	0.62 ^a (0.21)	0.30 < < 1.11	0.08***
Internalizing problems							
Anxiety	-1.78 [†] (0.90)	-0.10* (0.05)	0.81 (0.64)	0.62 (0.64)	0.18 ^a (0.14)	0.00 < < 0.61	0.03*
Avoidance	-3.44*** (0.77)	-0.10* (0.05)	-0.98 [†] (0.55)	-1.34* (0.57)	0.35 ^a (0.20)	0.04 < < 0.86	0.03*

Note. CI = confidence interval; Anxiety = attachment anxiety; Avoidance = attachment avoidance; Trust = trust in maternal support. Analyses for attachment anxiety were conducted controlling for attachment avoidance and vice versa. Effortful control was reported by the child.

^aSignificant point estimate of the indirect effect at the 95% CI

[†] $p < .10$; * $p < .05$; *** $p < .001$

Table 3

Unstandardized Regression Coefficients (with Standard Error in Parentheses) and Proportion of Explained Variance in the Mediation Analyses for Sample 2 with Attachment as Independent Variable (IV), Effortful Control as Mediating Variable (M), and Maladjustment as dependent variable (DV) (10,000 Bootstrap Samples)

IV	Effect of IV on M (a)	Effect of M on DV (b)	Total effect (c)	Direct effect (c')	Indirect effect (a*b)	Bias Corrected 95% CI of Indirect effect	R ² mediation model
Externalizing problems							
Trust	0.03** (0.01)	-4.25*** (0.10)	-0.33** (0.11)	-0.21* (0.10)	-0.12 ^a (0.05)	-0.23 < < -0.03	0.20***
Anxiety	-0.20*** (0.06)	-4.04*** (0.78)	1.10 [†] (0.66)	0.28 (0.63)	0.82 ^a (0.28)	0.33 < < 1.42	0.20***
Avoidance	-0.07 (0.06)	-4.04*** (0.78)	1.27* (0.63)	1.00 [†] (0.59)	0.27 (0.28)	-0.26 < < 0.88	0.20***
Internalizing problems							
Trust	0.03** (0.01)	-3.78*** (0.79)	-0.15 (0.11)	-0.04 (0.11)	-0.10 ^a (0.04)	-0.21 < < -0.03	0.12***
Anxiety	-0.20*** (0.06)	-3.75*** (0.83)	0.83 (0.69)	0.07 (0.67)	0.76 ^a (0.27)	0.31 < < 1.38	0.12***
Avoidance	-0.07 (0.06)	-3.75*** (0.83)	0.41 (0.66)	0.16 (0.63)	0.25 (0.26)	-0.24 < < 0.79	0.12***

Note. CI = confidence interval; Anxiety = attachment anxiety; Avoidance = attachment avoidance; Trust = trust in maternal support. Analyses for attachment anxiety were conducted controlling for attachment avoidance and vice versa. Effortful control was reported by the mother.

^aSignificant point estimate of the indirect effect at the 95% CI

[†] $p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$

Figure 1. Mediation model with attachment as independent variable, maladjustment as dependent variable and effortful control as mediator

