RUNNING HEAD: ATTACHMENT AND EFFORTFUL CONTROL

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Attachment and maladjustment:

The role of effortful control development during middle childhood

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Abstract

Background: Latent growth curve modeling was used to investigate the longitudinal link between attachment, effortful control (EC), and maladaptive development during middle childhood. **Methods:** In a community sample, children (Time 1: n = 157; M_{age} = 10.91) and their mothers were examined three times over a two-year period. Attachment was operationalized at a more strategic (self-reported trust in maternal support) and more automatic level (secure base script knowledge). Mothers reported about children's EC and maladjustment. **Results:** Secure attachment was associated with higher EC, but EC development was only linked with baseline self-reported trust. Also, EC indirectly linked baseline self-reported trust with change in externalizing and internalizing problems over time. In addition, self-reported trust was indirectly linked with change in externalizing problems over time through EC development. **Conclusion:** EC, and, less robustly, EC development were linked with attachment and change in emotional and behavioral problems.

Keywords: attachment, self-control, behavior problems

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Children's secure attachment or ability to rely on parents during distress is a protective factor in children's development of internalizing and externalizing problems (Madigan et al., 2016). However, much less is known about the factors that explain the association between attachment and these problems (e.g., Brumariu & Kerns, 2010). While a rising number of studies point at emotion regulation as an explanatory mechanism, research mainly focused on the role of strategies to cope with dominant emotional responses to distress (e.g., Brumariu, 2015). However, emotion regulation depends also on children's capacity for effortful control (EC; e.g., Carver et al., 2008). EC refers to the self-regulatory capacity to override a dominant emotional response in order to perform a more adaptive subdominant response (Rothbart, 1989) through shifting and focusing attention when needed, and inhibiting and activating behavior as appropriate (Posner & Rothbart, 2000). It has been demonstrated that EC is negatively associated with externalizing and internalizing problems (e.g., Eisenberg et al., 2009). In the current study, we tested whether EC and its development throughout middle childhood explain the link between attachment and changes in internalizing and externalizing problems.

EC is considered a facet of temperament, and as such is thought to have a hereditary basis (Gagne et al., 2011; Posner et al., 2007). However, environmental factors further shape children's EC development from infancy onwards (Posner & Rothbart, 2000). One factor linked to the development of EC is the quality of children's attachment relationships (Bowlby, 1969). When children recurrently experience caregiver support during distress, they are likely to become more securely attached (Bowlby, 1969). This means that they report to have more trust in the caregiver's support, and that they develop a cognitive script about their caregiver as a support figure (named a "secure base") during distress. Such a secure base script reflects the expectation that a care-related interaction follows a scenario that starts with exposure to distress. Distress gets signaled by the child, which the parent notices and which elicits

emotional support and practical help that eventually helps the child getting back on track (Waters & Waters, 2006). More securely attached children's knowledge about the secure base script is more consolidated, complete and easily accessible which helps children to interpret their future interpersonal experiences and to plan their interpersonal coping behavior (Waters & Waters, 2006).

Attachment theory assumes that trust and secure base script knowledge stimulate EC development because these children more easily seek caregiver support during distress (Cassidy, 1994). As a result, the caregiver can act as a co-regulator and role model. This promotes children's EC (Kopp, 1982). Additionally, trust and secure base script knowledge facilitate children's exploration (Cassidy, 1994; Heylen et al., 2019). During exploration they can practice and strengthen their EC skills. Lastly, experiencing consistent care promotes children's regulation of negative thought and emotional states which has also been found to strengthen EC development (Lewis & Carpendale, 2009).

In line with the assumption that attachment is linked with EC, a recent meta-analysis found a small but significant association showing that more securely attached children display better effortful self-regulation (Pallini et al., 2018). However, this meta-analysis was limited because the authors only looked at the association between EC and attachment and did not investigate to what extent attachment is linked to changes in EC over time. Moreover, the meta-analysis did not investigate the relevance of attachment-related EC for the development of externalizing and internalizing behavior problems. Finally, the large majority of the studies in the meta-analysis consisted of samples focusing on young children and a minority on older adolescents, while information was missing on middle childhood. Because a longitudinal study of King et al. (2013) showed that significant EC development occurs during middle childhood, the lack of research on attachment and EC development in middle childhood reflects an important gap in the literature.

Specifically, King et al. (2013) found increases and decreases in respectively effortful control and impulsivity in a sample of 8-12 year old children that were followed during a three year period. These

observations could reflect changes in the executive attention neural network which consists of frontal brain regions including the anterior cingulate cortex and the lateral prefrontal cortex (Posner & Rothbart, 2009). This network is already functional in early childhood (Berger et al., 2006) but at that point lacks the connectivity to other brain regions to form a coherent neural network (Posner & Rothbart, 2009). In middle childhood, connectivity of the network increases and more longer range connections are formed (Posner & Rothbart, 2009) which are thought to increase the efficiency of the system (Rueda, 2008) and in turn lead to improvements in EC on a behavioral level (e.g., Jonkman, 2006).

Furthermore, middle childhood is a period of substantial attachment development (Kerns & Brumariu, 2016; Waters et al., 2021). Specifically, in comparison to early childhood, children in middle childhood are less in need of proximity to the primary caregiver as long as they can count on their availability and accessibility. Additionally, children's secure base contact evolves to a supervisory partnership (Koehn & Kerns, 2015; Koehn & Kerns, 2022). Specifically, children start using the primary caregiver as a resource rather than only counting on the caregiver to solve their problems. During the subsequent autonomous problem solving, children might further train their EC skills. Thus, this can potentially result in increasing EC capacities during middle childhood. Together, this suggests that middle childhood might be an important period to investigate the link between attachment and EC and EC development.

Research on attachment and EC in middle childhood is sparse. In one study, Muris and Dietvorst (2006) found that children's self-reported secure attachment to peers was positively related to self-reported EC. Heylen et al. (2017) focused on the attachment relationship with mother, as research showed that even at this age mother is most likely to be the child's primary attachment figure (Kerns, 2008). In two independent samples they demonstrated a significant positive association between self-reported attachment security to mother and both self- and mother-reported EC. Moreover, Heylen et al.

(2017) found that EC indirectly linked attachment to mother-reported externalizing and internalizing problems. Notwithstanding these studies' clear results, both studies had significant limitations.

First, the studies' cross-sectional design did not allow to draw conclusions about how the association between attachment and EC develops over time. Furthermore, to determine the extent to which attachment-related deviations in the development of EC relate to maladaptive functioning later in life, it is key to examine growth trajectories of EC throughout middle childhood. That way, it can be strategically tested whether individual differences in growth trajectories of EC explain the link between attachment and children's maladjustment. Hence, in the current study a longitudinal design was used to establish how the interrelations between attachment, EC, and maladjustment would develop throughout middle childhood.

Second, so far, middle childhood attachment-EC research was limited to the study of self-reported attachment. Bosmans and Kerns (2015) distinguished between an automatic and strategic component of attachment which refers to dual process theories (Gawronski & Creighton, 2013). They suggested that attachment questionnaires cover only one component of the attachment construct, namely the aspect children are aware of, captured in evaluations of their trust in the caregiver's support (i.e., the strategic component of the attachment construct). To obtain a more nuanced view of how attachment and EC are interrelated, it is important to also study the more automatic component of attachment (Steele, 2015). This refers to an individual's processing of attachment information that occurs outside of one's awareness and that cannot be strategically manipulated. More automatic processing of attachment information is typically observed when children narrate attachment stories (Waters and Waters, 2006). Therefore, we tested the robustness of the links between attachment, EC and maladjustment over measurements that tap into different components of the attachment construct using an attachment self-report questionnaire and a narrative measure of secure base script knowledge that reflect respectively a more strategic and automatic component of attachment.

In sum, the current study aimed to replicate the findings of Heylen et al. (2017) using a longitudinal design and both a more strategic and automatic attachment measure. On the one hand we investigated the association between attachment to mother and developmental trajectories of EC in middle childhood. On the other hand, we examined whether developmental changes in EC indirectly linked attachment to maladjustment. More specifically, we hypothesized that: (a) secure attachment would be related to higher initial levels of, and to more growth in EC, and that (b) attachment and maladjustment would be indirectly linked via EC development. To avoid inflation of the associations between attachment and EC due to reporter bias, EC and maladjustment were reported by mother.

Method

Participants

Participants were 157 children (76 boys) with ages ranging from 9 to 12 years old at time 1 (T1) (*M* = 10.91, *SD* = 0.87). In this Belgian urban community sample, a majority, 76.4% of the children were from intact families, 21.7% children had divorced parents, 1.3% children had a deceased father, and 0.6% child lived in yet another family structure. Mother was a primary caregiver in the first three years of life for most, 96.8% of the children, except for four (2.5%) children who were primarily raised by their father (information on the primary caregiver in the first years of life was missing for one participant). Furthermore, 98.7% children reported attachment towards their biological mother, while two (1.3%) children reported attachment towards their adoption mother. With regard to maternal education, 21.0% mothers had an elementary school or high school degree, 36.3% mothers had a post-high school technical training or a bachelor's degree, and 42.7% mothers had a university master's degree.

Children were assessed annually over a two-year period. Attrition was low over time, with 146 (93%) children participating at time 2 (T2), and 133 (85%) children participating at time 3 (T3). The effect of drop-out on the study variables was tested with a multivariate analysis of variance with age and the

key variables under study as dependent variables revealed no dropout effect, $F(9,110) = 1.69$, $p = .100$. Moreover, no significant drop-out related demographic differences were found ($\chi^{2s} < 1.57$, *ps* > .407).

Procedure

A flyer was distributed in the classrooms of the fourth, fifth, and sixth grade of 16 elementary schools to invite children to participate in a longitudinal study on attachment, emotion and self-regulation, and maladjustment. Children and mothers who were interested to participate were contacted by a researcher or research assistant who personally informed them about the content and procedure of the study, and about their right to refuse participation. At all three time points (Time 1 or T1 – Time 2 or T2 – Time 3 or T3), data were collected while mother and child visited one of two research locations. Upon arrival, active informed consent was obtained from both mother and child. Assessment at each time point involved the administration in counterbalanced order of several measurement instruments (see measure section below) completed by the child and mother seated in two different rooms. In this study, we measured attachment, EC, and externalizing and internalizing problems at each time point. Of relevance for the current study was also a self-report measure of attachment anxiety and avoidance and a middle childhood attachment interview. More information about results with these measures can be found in supplementary file 1 since they were more distant from our theoretical concept that focuses on trust in a secure base as measure of attachment security. At each assessment wave, mother and child received two movie theatre tickets and could win an mp3-player as compensation for participating in the study. Approval of the university's ethical committee was obtained for the entire study procedure.

Measures

Trust in maternal support was assessed with the trust subscale of the People in My Life Questionnaire (PIML; Ridenour et al., 2006). Previous research revealed that this questionnaire is a valid instrument to measure attachment in middle childhood and shows convergent validity with other

attachment measures (Ridenour et al., 2006; Jewell et al., 2019). In the current study, only the 10 questions of the trust subscale focusing on the relationship with mother were used (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). Higher mean scores reflected more trust in maternal support. The trust scale predicts support seeking behavior in distressed children (e.g., Dujardin et al., 2016). For internal consistency, see Table 1.

Secure Base Script knowledge was assessed using the Middle Childhood Attachment Script Assessment (MC ASA; Waters et al., 2015). The MC ASA is a narrative procedure to investigate secure base script knowledge in children from 9 to 12 years old. Children are presented with three prompt word outlines consisting of a title and 12 prompt words (Scary dog in the yard, At the beach, Soccer game), grouped into four columns in large font on a single sheet of paper (Table 2A). Each prompt word outline is constructed in such a way that it could elicit secure base script content in children with secure base script knowledge. Children have to tell the story in first person, as if the story is really happening to themselves. The narratives are scored according to a 7-point secure base script scale, ranging from 1 (content inconsistent with secure base script) to 7 (rich secure base script content). Mean secure base knowledge scores are calculated for each child, with higher scores reflecting more secure base script knowledge. Table 2B (adapted from Waters et al., 2019) shows an example of a high, moderate and low scoring story when children are presented with the "Scary dog in the yard" prompt words.

Three trained coders rated an equal amount of MC ASA's. All MC ASA's were blind coded. Twenty MC ASA's were triple coded to establish interrater reliability. The intraclass correlation coefficients (ICC's) for secure base knowledge in the three attachment stories was calculated using a two-way mixed model and absolute agreement for single measures. The final ICC's for the three coders were respectable to very good, with an overall ICC of .79 for Scary Dog in the Yard, .91 for At the Beach, and .85 for Soccer Game.

Effortful Control was assessed with the parent-report version of the Early Adolescent Temperament Questionnaire – Revised (EATQ-R; Ellis & Rothbart, 2001). Only the 18 items of the EC factor were used (e.g., ‘‘If my child has a hard assignment to do, he gets started right away.”). Mothers reported how true each statement was for their child on a 5-point Likert-scale ranging from 1 (almost never true) to 5 (almost always true). Higher scores indicate more EC. Reliability and construct validity of the EC scale has been evidenced in several studies (Ellis & Rothbart, 2001; Verstraeten et al., 2010).

Maladjustment was measured with the Child Behavior Checklist for Ages 6 to 18 (CBCL 6-18; Achenbach & Rescorla, 2001) administered to mother. Only the items of the externalizing (35 items, e.g., “Hits others.”) and internalizing (32 items, e.g., “Cries a lot.”) behavior problem scales were used. For each item, mothers were asked to indicate on a 3 point scale ranging from 0 (not true) to 2 (very true or often true) how often their child showed a certain problem behavior. Higher mean scores reflect more behavior problems.

Covariates included in analyses were children’s sex (1 = boy, 2 = girl), age, and the highest degree that the mother obtained (i.e., maternal level of education: 1 = elementary school or high school degree, 2 = post-high school technical training or a bachelor’s degree 3 = university master’s degree). Additionally, in the analysis of the MC ASA we accounted for verbal ability by adding the number of words children used during a practice trial of the task as a covariate.

Results

Preliminary Analyses

Descriptive statistics of and correlations between the key variables under study are shown in Table 1. Trust T1 and Secure Base Script Knowledge T1 were related to EC T1, T2 and T3. Furthermore, trust T1 correlated with externalizing and internalizing problems at both T1 and T3. Also, EC T1, T2 and T3 were associated with externalizing and internalizing problems at both T1 and T3.

Secure Base Script Knowledge T1, $t(149.80) = 2.76$, $p = .007$, differed by sex. Girls showed more Secure Base Script Knowledge, $M = 4.05$, $SD = 0.79$, than boys, $M = 3.74$, $SD = 0.64$. Child sex was also associated with EC on both T2, $t(141) = -2.02$, $p = .045$, and T3, $t(127) = -2.31$, $p = .023$. Mothers reported lower EC for boys at T2, $M = 3.30$, $SD = 0.62$, and T3, $M = 3.28$, $SD = 0.66$, than for girls, $M = 3.51$, $SD = 0.58$, and $M = 3.54$, $SD = 0.61$, respectively. Finally, sex was also related to externalizing problems at T3, $t(125) = 2.09$, $p = .038$. At T3 mothers reported more externalizing problems for boys, $M = 0.19$, $SD = 0.19$, than for girls, $M = 0.12$, $SD = 0.13$.

Age was correlated with Secure Base Script Knowledge T1, $r = .22$, $p = .008$. Older children demonstrated more Secure Base Script Knowledge. Furthermore, at T1, mothers reported less externalizing problems in older children, $r = -.16$, $p = .050$. Maternal level of education was only associated with EC at T1, $F(2, 149) = 4.69$, $p = .011$, T2, $F(2, 140) = 3.89$, $p = .023$, and T3, $F(2, 126) = 4.18$, $p = .017$. Post hoc analyses revealed that mothers with a lower level of education reported significantly lower levels of EC in their children than did mothers with a higher level of education.

Unconditional Growth Model: Change over Time in Effortful Control

A latent growth curve (LGC) modeling approach was used to examine the patterns of growth in EC in middle childhood, (a) to test whether variation in levels and change over time in EC would depend on the quality of children's attachment relationship with mother, and (b) to investigate whether levels of, and growth in EC would mediate the prospective association between attachment and maladjustment. These analyses were conducted in MPlus version 7.31. To adjust for potential statistical biases resulting from non-normality of the data the Maximum Likelihood with Robust Standard Errors (MLR) Estimator was used (Muthén & Muthén, 1998-2012), accounting for missing data in the LGC analyses with Full Information Maximum Likelihood Estimation (FIML; Little & Rubin, 2002). Model fit was assessed with Chi-Square as an indicator of exact fit, and the comparative fit index (CFI) and the

root-mean-square error of approximation (RMSEA) as relative fit indices. Following Hu and Bentler (1999) we regarded CFI $\geq$ .95, and RMSEA $\leq$ .05 as acceptable model fit.

An unconditional growth model of EC was tested with the intercept set to T1, thus representing individual differences in the level of EC at the first wave, and a linear growth factor from T1 to T3. This model fitted the data well, χ^2 (3) = 2.08, p = .556; CFI = 1.00; RMSEA = 0.00. The intercept had a significant mean ($mean_{intercept}$ = 3.43, SE = 0.05, p < .001). Also, the variance of the intercept was significant ($variance_{intercept}$ = 0.31, SE = 0.04, p < .001), indicating that participants varied in their initial level of EC. The mean slope factor was not significant ($mean_{slope}$ = 0.016, SE = 0.019, p = .394). However, it significantly differed across participants ($variance_{slope}$ = 0.02, SE = 0.01; p = .007). This suggests that although EC did not change from T1 to T3 on average, individual differences in growth trajectories were present: some children maintained an equal level of EC, some children exhibited increases in EC, and others exhibited decreases over time. Finally, the intercept and slope were uncorrelated ($covariance_{intercept\text{-}slope}$ = -.01, SE = .01, p = .604). Thus children's initial level of EC did not predict their EC growth trajectories from T1 to T3.

Conditional Growth Models

Predicting the development of effortful control from attachment. Table 3 presents the model fit indices, growth parameters of EC conditioned on the different indicators of the quality of the children's attachment relationship with mother while controlling sex, age and maternal level of education as covariates. Model improvement was considered by performing an adjusted χ^2 difference test for MLR (Yuan & Bentler, 2000) comparing the baseline model in which the links between the indicator of attachment and the covariates, and both the intercept and slope of EC were fixed, with the model in which both the intercept and slope could vary as a function of the attachment indicator, and the covariates.

As a function of trust in maternal support, model fit significantly improved when parameters in the model were allowed to vary, $\Delta\chi^2(8) = 31.87$, $p < .001$. Trust in maternal support was significantly related to both higher initial level of EC and to greater positive change in EC. That is, children with more trust in maternal support at T1 not only had more EC at T1, but their level of EC grew more rapidly across time as well. As a function of Secure Base Script Knowledge T1, model fit improvement for the LGC of EC was not significant, $\Delta\chi^2(8) = 13$, $p = .11$. The association of Secure Base Script Knowledge with initial level of EC was marginally significant (because the covariates suppressed links between Secure Base Script Knowledge and EC[1]) and we found no association with growth in EC. That is, children with more Secure Base Script Knowledge at T1 started with higher levels of EC at T1, however their EC did not grow more or less compared to children with less Secure Base Script Knowledge. Adding verbal ability as additional covariate to the analysis, the association of Secure Base Script Knowledge with the intercept of EC further decreased, $b = 0.12$, $SE = 0.10$, $p = .24$.

Four participants in our sample reported primarily being raised by their father during the first years of life. Since both trust and Secure Base Script Knowledge reflect the quality of children's attachment relationship with their mother, we assessed whether our result changed when excluding these four participants. However, results revealed no changes compared to the results of the whole sample analyses.

Although not the focus of our main research questions, we post-hoc wondered whether the opposite effect could be true: whether EC at T1 was linked to the intercept and slope of attachment over time. Because attachment data was available on all waves, we could assess whether mother-reported EC linked to the intercept and slope of children's attachment to their mother (see supplementary file for the full details). Results suggested that EC linked to the attachment intercepts (less robustly for Secure Base Script knowledge), but not to the attachment slopes.

Indirect effect of attachment on maladjustment through effortful control development.

As the above described LGC model only showed robust associations between EC and self-reported trust, we only tested the indirect effect hypothesis for the latter attachment variable. In a first step, we examined whether the latent growth parameters of EC predicted change in externalizing and internalizing problems from T1 to T3. Change in externalizing problems was significantly predicted by both the intercept, b = -0.03, SE = 0.02, p = .020, and the slope of EC, b = -0.21, SE = 0.08, p = .013. Furthermore, the intercept, b = -0.07, SE = 0.02, p = .001, but not the slope of EC, b = -0.14, SE = .10, p = .154, significantly predicted change in internalizing problems.

In a next step, we tested the indirect effect of the intercept and slope of the LGC of EC in the association between trust in maternal support and maladjustment while controlling for sex, age and maternal level of education as covariates (see Figure 1). Table 4 summarizes the findings from these indirect effect analyses. There was a significant indirect effect of trust T1, on change in externalizing problems through the intercept of EC and a marginally significant indirect effect of trust T1 on change in externalizing problems through the slope of EC. For internalizing problems, there was only an indirect effect of the intercept of EC in the association between trust and change in internalizing problems.

Discussion

The current study tested the longitudinal relation between middle childhood attachment, the development of EC, and the role EC plays in children's maladaptive development. As hypothesized, secure attachment was associated with higher EC throughout middle childhood independent of whether attachment was strategically or automatically measured. However, when looking at the more complex latent growth curve models, only children's self-reported trust in maternal support (strategic attachment) was linked to children's growth in mother-reported EC over time. When focusing on the hypothesized indirect effect of EC on the association between attachment and children's behavior problems, initial level of EC indirectly linked self-reported trust in maternal support (strategic

attachment) to changes in externalizing and internalizing problems over time. Finally, change in EC indirectly linked self-reported trust (strategic attachment) to change in children's externalizing, but not internalizing problems.

With regard to the link between attachment and EC and its development, the current study's bivariate correlations are largely in line with theory and prior research (Bowlby, 1973; Heylen et al., 2017; Pallini et al., 2018), showing that more secure attachment is associated with higher levels of EC. Adding to the literature, the present study is the first to demonstrate in middle childhood a link between attachment and EC with both a strategic and automatic measure of attachment even when both variables are measured with a time-lapse of one to two years. This suggests that in this particular age period EC is related to both the more deliberate (more strategic) and the less controlled (more automatic) aspects of the attachment construct. This observation is in line with the meta-analysis by Pallini et al. (2018). They showed in largely different age-groups that the attachment-effortful self-regulation link is robust over different attachment measures. Nevertheless, in the more complex LGC analyses the associations between EC and Secure Base Script Knowledge became weaker and got suppressed when covariates (and especially verbal ability) were added and only links with self-reported trust remained significant. This could indicate that when attachment is assessed using a narrative measure, ignoring cognitive competencies that might also link to EC and at the same time feed into the performance of such attachment measures can result in overestimation of the effect of attachment on EC. However, it is not unlikely that our current operationalization of verbal ability was inadequate as counting the number of words used in the practice stories does not necessarily reflect better narrative skills. It could be that using this as a covariate just removed relevant variance from the analyses, unnecessarily suppressing the associations. Thus, more research with a better validated measure of verbal ability is needed to draw firmer conclusions on the association between Secure Base Script knowledge and EC.

Further adding to the literature, we tested whether attachment is linked with changes in EC throughout middle childhood. This link was only supported for children's self-reported trust in maternal support (strategic attachment) and not for secure base script knowledge (automatic attachment). We found increases in mother-reported EC over time if children reported more trust in maternal support at baseline. The different results for the different attachment measures are noteworthy since the strength of the correlations between the different attachment measures and EC at each wave were comparable. Consequently, the current findings raise the question why the link with the developmental trajectories of EC seems less robust over attachment measures. As noted before, attachment is a multi-component construct in which self-reported trust and secure base script knowledge tap into respectively the more strategic and automatic aspect of the attachment construct. Although concerns have been raised regarding the validity of self-reported attachment (Ainsworth, 1985), children in middle childhood tend to be concrete thinkers and consequently may be more accurate when self-reporting actual experiences compared to adolescents (Bosmans & Kerns, 2015). Additionally, in comparison to preschoolers, they have an increased ability to compare their experiences with others which suggest that their view on their relationships could be more realistic compared to self-reported attachment in other developmental periods (Stipek & Mac Iver, 1989). This might offer a possible explanation of why the link with the developmental trajectories of EC was not found for both attachment measures since self-reported trust (strategic attachment) might have been a more valid representation of children's attachment relationship. Furthermore, it might also be that the results for secure base script knowledge (automatic attachment) were suppressed by task-related demands. Narrating a secure base script might require more EC capacity (see Erskine, 2010), so this measure might have been more conflated with the developmental outcome variable compared to self-reported trust. Such measurement overlap might have made it harder to find links between developmental trajectories and secure base script knowledge. In such a case, the effects for trust might prove highly relevant to understand the link between

attachment and EC development. More research and replication is needed to further evaluate the value of the findings with self-reported trust.

With regard to the indirect effect of EC and its development in the association between middle childhood attachment and maladaptive development, results showed that higher levels of baseline trust (strategic attachment) were linked with more EC which subsequently indirectly linked trust with lower levels of externalizing and internalizing problems. This finding provides the first longitudinal support for the previously found cross-sectional indirect effects of EC between middle childhood attachment and psychopathology (Heylen et al., 2017). However, it should be noted that the sample in the current study consisted of children from a healthy population who displayed low levels of externalizing and internalizing behavior (see Table 1). Consequently, we cannot claim that the current findings generalize to clinical groups. Nevertheless, a recent review of longitudinal developmental psychopathology studies show that those children scoring higher on psychopathology measures in general population childhood samples like ours are more at risk to develop psychiatric disorders later in life (Oldenhinkel & Ormel, 2022). The latter review supports the relevance of our findings even though the sample was relatively healthy.

Furthermore, with regard to the indirect effect of change in EC over time, we found only support for our hypothesis when explaining externalizing problems. Specifically, analyses showed that higher levels of self-reported baseline trust (strategic attachment) were linked with lower externalizing problems through growth in EC over time. A possible explanation for this discrepancy in results is reporter bias. Parents more validly report on externalizing problems compared to internalizing problems (Achenbach et al., 2008). This could have decreased the likelihood to detect indirect effects of change in EC over time.

Finally, exploratory analyses revealed that initial level of EC was associated with secure attachment throughout middle childhood but not with changes in secure attachment. Higher initial

levels of EC were related to more, but not to changes in, secure attachment throughout middle childhood. Hence, it does not seem that at the end of middle childhood, there is a strong bidirectional link between attachment and EC development. It is premature to fully exclude such bidirectional links because other research does show that biological dysregulations in the stress response system does moderate the effect of parenting on attachment development (e.g., Houbrechts et al., 2021) and because such associations are expected according to the Learning Theory of Attachment (Bosmans et al., 2020). Testing similar effects in a more heterogeneous sample or in larger samples could still reveal such effects. Nevertheless, it is also not unlikely that such bidirectional effects are stronger early in life when EC is less mature and attachment development is in its earliest stages. Thus, more research is needed in younger samples to evaluate whether EC predicts attachment development.

Despite the strengths of the current study in terms of the multi-method assessment of attachment, the multi-informant and longitudinal design, and the latent growth curve analysis approach, interpretation and broader generalization of the results warrants accounting for some limitations. First, in the current study, mothers reported on both EC and adjustment of their child. Although using mother-reported EC and adjustment helped avoiding inflation of some of the associations due to reporter bias, the current results should be expanded in future research using both self-reported and third person-reported (e.g., parents, teacher) EC and adjustment so further convergence across informants can be assessed. Additionally, including observational measures of EC and adjustment problems might further increase the reliability of the results. Second, the current study used a relatively small sample. This limits the extrapolation of the findings to the broader population. Furthermore, smaller samples limit the conclusions about null findings. Research with larger samples is indispensable to draw more robust conclusions about the longitudinal associations between attachment, EC and maladjustment. Finally, the current study focused solely on attachment towards mother. Attachment researchers are increasingly aware of the importance of attachment to father and that attachment to

father could add important insights to the study of the associations between attachment and children's developmental outcomes (e.g., Deneault et al., 2021; Dagan & Sagi-Schwartz, 2018). The current study's focus on attachment towards mother makes sense as maternal attachment appears a stronger predictor of children's mental health than paternal attachment (e.g., ZImmermann et al., 2022), but other research suggests that the conjoint inclusion of attachment to both parents does provide a more nuanced understanding of links between attachment and mental health outcomes (Rivers et al., 2022). So, including attachment towards father in attachment -EC research could be a valuable avenue for future research.

Conclusion and Implications

To summarize, the current findings support the association between attachment and EC, and the role of EC in the association between the strategic component of attachment and maladaptive development throughout middle childhood. These observations provide further, and convincing support to the broadly accepted theory that individual differences in EC capacity develop in the context of secure versus insecure attachment relationships (Eisenberg, 2012). We found less robust support for the hypothesis that middle childhood attachment is linked with changes in EC capacity as children transition from middle childhood to adolescence. It might be that the impact of attachment on EC development occurs earlier in life. However, our data do suggest that these associations can still be found towards the end of middle childhood, so more research is needed before we draw too strong conclusions about attachment and EC development later in life. If more research finds that these longitudinal effects still occur, enhancing or repairing trust in maternal support could be a valuable intervention in middle childhood. This could stimulate children's EC development and reduce their risk to develop externalizing problems. Although evidence-based practices to improve the quality of attachment in this age-group are largely missing, there is an increased interest and investment to develop such interventions based on

the observation in other age-groups that improving the quality of attachment is an effective transdiagnostic intervention (Bosmans, 2016).

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Footnotes

[1]Running this analysis without covariates yielded the following results: model fit improvement was significant ($\Delta \chi^2(2) = 7.63$, $p = .022$). Secure Base Script knowledge was significantly related to EC ($b = 0.18$, $SE = 0.07$, $p = .006$), but unrelated to growth in EC ($b = -0.00$, $SE = 0.03$, $p = .96$).

Table 1

Correlations, Means, Standard Deviations, and Cronbach α's of the Key Variables

Measure	1	2	3	4	5	6	7	8	9
1. Trust T1	1								
2. SBS T1	.10	1							
3. EC T1	.20*	.23**	1						
4. EC T2	.50**	.20*	.84***	1					
5. EC T3	.31**	.20*	.75***	.82***	1				
6. Externalizing T1	-.25**	-.03	-.40***	-.47***	-.43***	1			
7. Externalizing T3	-.25**	-.04	-.43***	-.50***	-.51***	.89***	1		
8. Internalizing T1	-.23**	.04	-.16†	-.27***	-.21*	.46***	.39***	1	
9. Internalizing T3	-.22*	.10	-.28**	-.42***	-.37***	.51***	.56***	0.72***	1
M	3.58	3.90	3.44	3.40	3.42	0.17	0.15	0.21	0.18
SD	0.35	0.74	0.60	0.61	0.65	0.17	0.17	0.19	0.18
α	.80	.70	.88	.88	.90	.90	.90	.85	.86

Note. Trust = trust in maternal support; SBS = secure base script knowledge; EC = effortful control. ***$p < .001$, ** $p < .01$, *$p < .05$, $^{\dagger}p < .10$

Table 2A

Prompt Words Scary Dog in the Yard

outside	sniff	mom	dog gone
play	bark	broom	go inside
big dog	I cry	chase	play

Table 2B

Example of a High, Moderate and Low Scoring Story when Children Are Presented with Scary Dog in the Yard Prompt Words

High scoring story – Effective secure base support, instrumental care helps child get back on track

I was outside playing and planting my vegetable garden. Then there was a big dog. I was super afraid and went running away really fast, crying. The dog was barking super loud, and then I stood still, and the dog started sniffing me. I thought, "Maybe I can get mommy and maybe she can chase it". And then I called my mom, and she came and took the broom and chased away the dog. I was relieved and went inside. I never dared to play outside again, but then my mom said, "It was only once, the next time it will not happen, that does not always happen". And then I thought, "Okay, maybe she's right. Let me continue with my vegetable garden."

Moderate scoring story – No secure base support seeking, focus on instrumental care/resolution

One day, my mom took me to watch my uncle's dog. At first, we were playing, and he was very happy to see us. He was barking and sniffing us. He was a very big dog. We started playing. When I turned back around, the dog was gone. I started looking for the dog. I found the dog, and the dog started running away from me, so I started chasing it. A couple minutes into me chasing the dog, it turned around and started chasing me. I cried because it bit me in the back of my ankle. My mom fixed up my cut and me and the dog played some more.

Low scoring story – No secure base content/support seeking, fear of abandonment, no emotional resolution (safer to play inside)

The other day, my mom and I were playing outside in the yard when this big dog with snarling teeth and wild fur started sniffing us. It began to bark loudly. It looked like the neighbor's dog. I kind of freaked out a little and began to cry. My mom ran inside. "Don't leave me out here" I thought. But she came back with the broom. In a strange stabbing motion, she chased the dog away. The dog, obviously aggravated, ran off, so we decided to go inside in case it came back. Maybe it's safer to play in here.

Note. Reprinted from "Taxometric Analysis of Secure Base Script Knowledge in Middle Childhood Reveals Categorical Latent Structure", by Waters, T. E. A., Facompré, C. R., Dujardin, A., Van De Walle, M., Verhees, M., Bodner, N., Boldt, L. J., and Bosmans, G., 2019, *Child Development*, *90*(3), p. 23.

Table 3

Model Fit Indices, Intercepts and Slopes for Effortful Control Latent Growth Curve Models Conditioned on Attachment Controlling for Sex, Age, Maternal Level of Education

Attachment Indicators	χ^2(df)	*p*	CFI	RMSEA	Intercept EC				Slope EC			
					b	*SE*	*p*	*95% CI*	*b*	*SE*	*p*	*95% CI*
Trust	6.32 (7)	.50	1.00	0.00	0.37	0.11	**.001**	[0.16, 0.58]	0.11	0.05	**.016**	[0.02, 0.20]
SBS	6.84 (7)	.45	1.00	0.00	0.12	0.07	**.085**	[-0.02, 0.26]	0.01	0.03	.79	[-0.05, 0.07]

Note. Trust = trust in maternal support; SBS = secure base script knowledge; EC = effortful control.

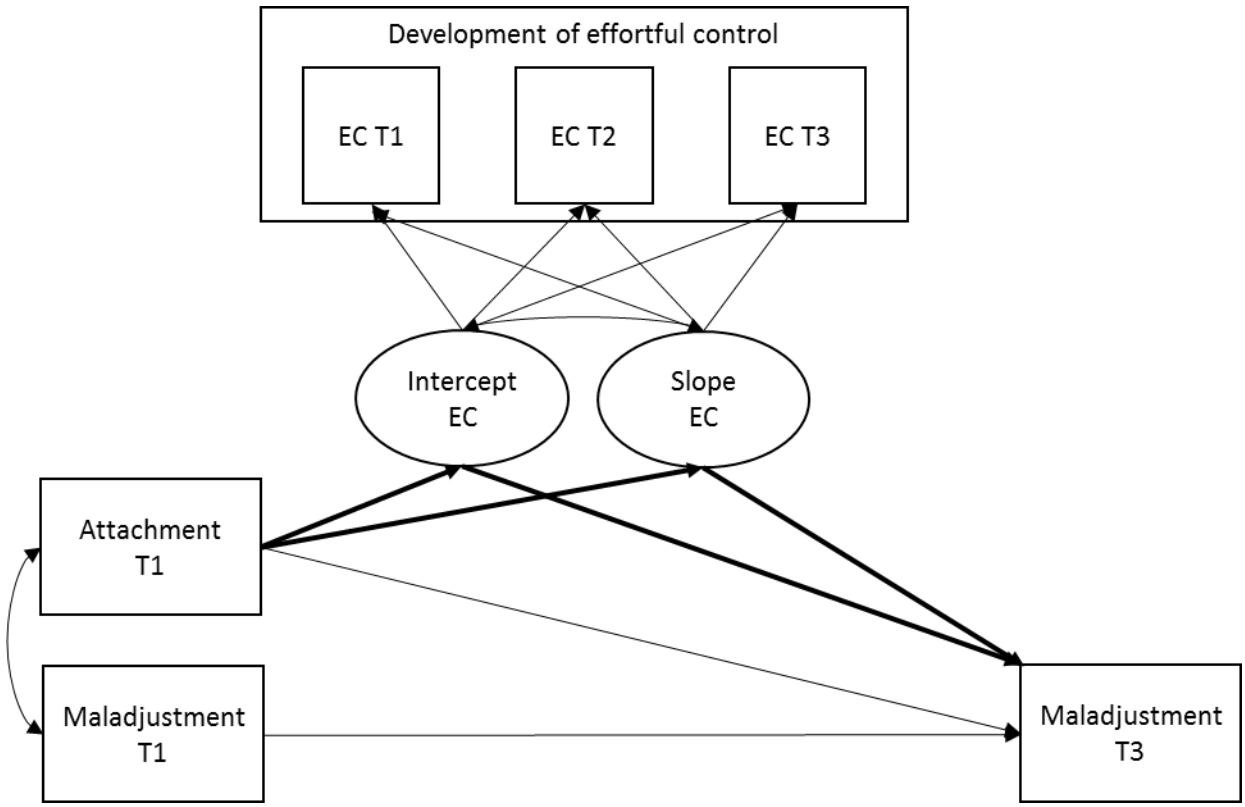
Table 4

Unstandardized Regression Coefficients, Standard Errors, and P-values of the Indirect Effects Between Attachment and Maladjustment Through the Intercept and Slope of Effortful Control Controlling for Sex, Age and Maternal Level of Education

Attachment	Externalizing								Internalizing							
	$Indirect_{intercept}$				$Indirect_{slope\ EC}$				$Indirect_{intercept\ EC}$				$Indirect_{slope\ EC}$			
	b	*SE*	*p*	*95% CI*	*b*	*SE*	*p*	*95% CI*	*b*	*SE*	*p*	*95% CI*	*b*	*SE*	*p*	*95% CI*
Trust	-0.01	0.01	**.035**	[-0.03, -0.00]	-0.02	0.01	**.052**	[-0.05, 0.00]	-0.03	0.01	**.02**	[-0.05, -0.00]	-0.02	0.01	.21	[-0.04, 0.01]

Note. Trust = trust in maternal support; EC = effortful control; Externalizing = externalizing problems; Internalizing = internalizing problems.

Figure 1. Model of the indirect pathways between attachment and maladjustment through the intercept and slope of effortful control (EC) (the bold lines reflect the indirect effects of interest).


Development of effortful control
EC T1
EC T2
EC T3
Intercept EC
Slope EC
Attachment T1
Maladjustment T1
Maladjustment T3