

SES and Effortful Control: Mediating Effects of Negative Affect and Parental Rejection

Master thesis

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Abstract

Self-regulation skills, like effortful control, predict health and wealth outcomes. Developing self-regulation skills evolve during adolescence by the ability to control behavior and emotions. Having a low socioeconomic status (SES) might play an important role in the development of effortful control. Because of a low SES, adolescents (and their parents) could have higher stress levels, which induced pathways to self-regulative functions in the brain. Individual factors (i.e., negative affect) as well as environmental factors (i.e., parental rejection) might clarify individual differences in how SES affects the level of effortful control among adolescents. This study examined whether the level of effortful control among adolescents was influenced by coming from a low SES and whether this relationship was mediated by negative affect and parental rejection. Data came from the TRAILS-study, where 2230 participants completed surveys. SES, effortful control, negative affect, parental rejection, and age were included in hierarchical regression analysis. Results showed significant cross-sectional findings for SES and effortful control, and for the indirect association with parental rejection. Furthermore, parental rejection was a predictor for effortful control. This study revealed that in particular environmental factors like parental rejection have strong influence on self-regulative functions among adolescents from low SES families.

Key words: SES, self-regulative functions, effortful control, parental behavior, parental rejection, temperament, and negative affect

Samenvatting

Zelf-regulatieve vaardigheden, zoals effortful control, zijn belangrijke voorspellers voor gezondheid en welzijn in de toekomst. Tijdens de adolescentie worden zelf-regulatieve vaardigheden ontwikkeld. Een lage sociale economische status (SES) kan een belangrijke rol spelen in de ontwikkeling van effortful control. Dit, omdat ouders en adolescenten door een lage SES veel stress kunnen ervaren wat ervoor zorgt dat wegen naar zelf-regulatieve functies in het brein worden geblokkeerd. Zowel individuele factoren (i.e., negatieve emoties) als omgevingsfactoren (i.e., ouderlijke afwijzing) zouden kunnen verklaren hoe een lage SES de effortful control onder adolescenten aantast. De huidige studie onderzocht of de effortful control onder adolescenten is beïnvloed door een lage SES en of deze relatie is gemedieerd bij negatieve emoties en ouderlijke afwijzing. De data kwam van de TRAILS-studie, waar 2230 participanten vragenlijsten invulden. SES, effortful control, negatieve emoties, ouderlijke afwijzing en leeftijd werden meegenomen in een hiërarchische regressie analyse. De resultaten lieten significante cross-sectionele bevindingen zien voor SES en effortful control, en voor de indirecte associatie met ouderlijke afwijzing. Daarnaast bleek ouderlijke afwijzing een voorspeller te zijn voor effortful control. Deze studie onthulde dat vooral omgevingsfactoren, zoals ouderlijke afwijzing, een sterke invloed hadden op zelf-regulatieve functies onder adolescenten van lage SES families.

Trefwoorden: *SES, zelf-regulatieve functies, effortful control, ouderlijk gedrag, ouderlijke afwijzing, temperament en negatieve emoties*

SES and Effortful Control: Mediating Effects of Negative Affect and Parental Rejection

Research shows that less self-regulation skills lead to negative health and wealth outcomes as well as involvement in crime later in life (Moffitt et al., 2011). The development of self-regulation skills starts during childhood and ends in adolescence. It includes the ability to control behavior and inhibit negative impulses like the urge for risk behavior (Steinberg, 2005).

Effortful control, the focus of this study, is a core component of self-regulation and consists of executive functions like working memory, inhibition, and attention (Eisenberg, Smith, Sadovsky, & Spinrad, 2004). Neurologically, parts of the brain where effortful control is located, could be negatively affected due to (exposure to) chronic stress (Evans, 2003; McEwen, 1998). For example, the stress hormone 'cortisol' hinders pathways to the prefrontal cortex, where tasks of effortful control are based (Chetty et al., 2014). The chance of having chronic stress might be increased for adolescents coming from a family with low socioeconomic status (SES). Stress might occur among these adolescents as their parents feel stressed, because of having financial difficulties and not being able to buy necessary supplies (Mackenbach, 2012). As such, low SES might affect the level of effortful control among adolescents.

More research is needed on whether SES affects the level of effortful control among adolescents, because most studies only focused on (preschool) children. As the development of effortful control proceeds in adolescence, it is needed to increase research among this population.

It is assumed that SES might affect the level of effortful control via individual and environmental factors, such as negative affect (i.e., fear and frustration) and parental rejection (Duncan, Magnuson, & Votruba-Drzal, 2017; Lengua, 2008; Rothbart, & Rueda, 2005; Sameroff, 2010). Therefore, in this study, the effect of SES on effortful control, and whether this relationship is mediated by parental rejection and negative affect, will be investigated.

Theoretical evidence

A theoretical explanation for the relationship between SES and the level of effortful control, and for the mediating effect of negative affect and parental rejection, comes from the ecological model from Bronfenbrenner and the Family Stress Model (Bronfenbrenner, 1986; Masarik, & Conger, 2017). Bronfenbrenner argued in his ecological model that change in individuals is provoked by an interaction between the individual and its environment (Bronfenbrenner, 1986). In this case, adolescents experiencing high levels of stress can be a consequence of parents who feel stressed. Parents from low SES often experience stress as

they have financial strains (Barnett, 2008). High levels of stress might lead towards lower functioning of effortful control (Blair, 2010).

Besides environmental influences, individual differences in temperament impact the way adolescents are affected by parental stress (Sameroff, 1998). Adolescents with negative affect might be more vulnerable for parental stress (Sameroff, 1998). In turn, adolescents with negative affect might have more difficulties with regulating and inhibiting their behavior (i.e., lower effortful control functioning) as Rothbart (1989) theorized that temperaments like negative affect could influence self-regulative functions.

It also might be that adolescents experience stress due to exposure to parental rejection (Masarik, & Conger, 2017). According to the Family Stress Model, stress among adolescents could occur because of parental stress. Here, a low SES might give parental stress (i.e., financial strains), which might lead towards inadequate parental behavior, such as parental rejection (Masarik, & Conger, 2017). In that way, a low SES might be related to parental rejection (Marshman et al., 2012). Parental rejection can negatively influence adolescents' well-being and might even interfere with the development of cognitive functions, such as lower levels of effortful control (Bronfenbrenner, 1986; Masarik, & Conger, 2017).

In summary, lower SES might influence the level of effortful control. Higher levels of stress because of lower SES could interrupt pathways to self-regulative functions in the brain (Blair, 2010). Furthermore, vulnerabilities in temperament, such as negative affect, could be more pronounced in adolescents coming from lower SES (Sameroff, 1998). Also, adolescents from low SES, the experiences of parental rejection possibly resulting from parental stress, might be more pronounced (Masarik, & Conger, 2017). In turn, both negative affect and parental rejection might influence the level of effortful control (Masarik, & Conger, 2017; Rothbart, 1989).

SES and the level of effortful control

Recent studies found support for the relationship between low SES and the level of effortful control. In one systematic review, Fry, Langley, and Shelton (2016) found a significant association between SES and the level of effortful control, illustrating that adolescents from lower SES families had lower levels of effortful control (Fry et al., 2016). Two cross-sectional studies among (pre-)adolescents also found a negative relationship between SES and the level of effortful control (Farah et al., 2006; Sarsour et al., 2011). The studies focused on executive functions, which is a part of effortful control, and found that low SES was associated with poorer executive functioning. Significance remained even after controlling for non-executive functions, indicating the strength of the influence of low SES on

executive functions (Farah et al., 2006; Sarsour et al., 2011). Other cross-sectional results are found from the neurological perspective, where the influence of SES on functioning of the brain is studied (Noble et al., 2015). The influence of low SES was strongest for parts in the brain where executive functions exist. This demonstrates the impact of solely low SES on executive functions (Noble et al., 2015). The previous mentioned cross-sectional studies show that a low SES has a contribution in having lower levels of effortful control functioning. Longitudinal studies are needed to identify whether a low level of effortful control is affected by coming from a low SES.

Longitudinal findings measuring the level of effortful control among preschool children revealed that demographic factors, such as low SES, negatively predicted effortful control (Taylor et al., 2013; Zalewski et al., 2012). Taylors' et al. (2013) study found that low SES was a predictor for lower levels of effortful control after a 30-month follow-up. Furthermore, Zalewski et al. (2012) found that low SES is associated with lower levels of effortful control among children and that this was significant after a 6-month follow-up. Effortful control was measured by an indication of the level of cortisol, which is a stress hormone. This study identified that by higher experiences of stress, the stress hormone 'cortisol' affects the part in the brain where effortful control is active (Zalewski et al., 2012).

In addition, Boelema et al. (2014) focused in their longitudinal study on how the development of self-regulative functions during adolescence differed for adolescents from high and low SES. A direct effect was found, whereby the overall self-regulative functions were lower in low SES adolescents, seven years later. Furthermore, they found significant results for the development of several self-regulative functions for adolescents from high or low SES. For both SES groups, the development was the same for working memory and speed of processing. In contrast, adolescents from low SES families showed faster maturation on attention, but slower maturation on inhibition than adolescents from high SES families. These results indicate that low SES could probably cause a disruption in the development of some of the self-regulative functions. For example, inhibition seems the most underdeveloped for adolescents from low SES families. It marks that probably not all functions of self-regulation are disadvantaged by coming from a low SES family (Boelema et al., 2014).

In summary, the previous mentioned cross-sectional studies support that low SES contributes to a lower level of effortful control among adolescents. In particular, cross-sectional studies (Farah et al., 2006; Sarsour et al., 2011; Noble et al., 2015) found strong evidence for the executive functions, the cognitive part of effortful control, which might be related to lower levels of effortful control. Moreover, longitudinal findings show that low SES

probably is causing lower levels of effortful control among adolescents (Boelema et al., 2014; Taylor et al., 2013; Zalewski et al., 2012). However, other findings show that only some of the self-regulative functions (i.e., inhibition, but not attention) are lower among adolescents from low SES families (Boelema et al., 2014). These inconsistent results demand for more research on how the level of effortful control affects adolescents, especially those from low SES families.

SES and the level of effortful control via negative affect

From an individual perspective, negative affect might influence the level of effortful control among adolescents from a low SES. An annual review by Duncan et al. (2017) showed that low SES could increase the adolescents' negative affect, because adolescents have more severe reactions on negative consequences of low SES like financial strains (Duncan et al., 2017). In addition, cross-sectional support is found by Jansen et al. (2008), who found that low SES contributed to more negative affect among infants. To define whether SES predicts negative affect, Lengua (2006) did a longitudinal study. She found that low SES affected the negative affect among adolescents three years later (Lengua, 2006). Cross-sectional studies among adolescents on the relationship between SES and negative affect are rare, and therefore, more research is needed.

Negative affect among adolescents might be related with effortful control. In a review, Rothbart, Ahadi, and Evans (2000) argued that adolescents with more negative affect might have lower levels of effortful control. They explain that adolescents with negative affect could have problems regulating their behavior (Rothbart et al., 2000). Further support comes from several cross-sectional studies, which illustrate that more negative affect was associated with lower levels of effortful control (Gulley, Hankin, & Young, 2016; Mayer, Abelson, & Lopez-Duran, 2014). Whether negative affect causes lower levels of effortful control among adolescents is not researched yet. This study could shed light on this gap in the literature.

The previous mentioned studies support that SES influences the level of effortful control via negative affect. The negative consequences of low SES (e.g., financial strains) might contribute to more negative affect in adolescents (Duncan et al., 2017). Negative affect might lower the level of effortful control, because adolescents with negative affect could have more difficulties in regulating their behavior (Rothbart et al., 2000). More (longitudinal) research is needed to increase the studies on negative affect among adolescents.

SES and the level of effortful control via parental rejection

From environmental perspective, SES might influence the level of effortful control via parental rejection. Barnett (2008) argues in a systematic review that parents could experience

stress because of negative consequence of low SES such as financial strains. Parental stress could lead towards inadequate parenting like parental rejection. Perceiving parental rejection could affect the level of effortful control among adolescents. This, because adolescents who are rejected by parents are maybe less likely to regulate their behavior (Belsky, & Beaver, 2011). Further support comes from a cross-sectional study, whereby Marshman et al. (2012) found that a low SES was associated with more parental rejection. To identify whether SES also caused parental rejection, Lengua (2006) conducted a longitudinal study. Results were that low SES was a significant predictor for more parental rejection one year later (Lengua, 2006). Inconsistent longitudinal findings are found by Barbot, Crossman, Hunter, Grigorenko, and Luthar (2014), who found that there was an association between maternal distress and maternal rejection, but no predictive results five years later. Inconsistency might be due to using different measurement of parental rejection in both studies.

A cross-sectional study by Crossley and Buckner (2012) found that more maternal rejection was associated with lower executive functioning. Moreover, one longitudinal study by Moilanen, Shaw, and Fitzpatrick (2010) found that parental rejection was also a significant predictor for the level of effortful control. They found that more parental rejection led towards lower levels of effortful control among adolescents (Moilanen et al., 2010). By experiencing parental rejection, adolescents might have less capability to regulate their behavior (Belsky, & Beaver, 2011). As such, parental rejection might influence the level of effortful control among adolescents.

The previous mentioned studies give support for the relationship between SES and effortful control via parental rejection. Low SES was associated with more parental rejection (Marshman, 2012), and other researchers found that a low SES was also predicting more parental rejection over time (Lengua, 2006). Furthermore, parental rejection was contributing to lower levels of effortful control (Crossley, & Buckner, 2012). Moreover, a longitudinal effect was also found, where more parental rejection predicted lower levels of effortful control (Moilanen, Shaw, & Fitzpatrick, 2010).

Current study and hypotheses

The current study aims to answer the research question whether SES predicts the level of effortful control and whether it is mediated by parental rejection and/or negative affect. Based upon previous research, it is assumed that adolescents from low SES have poorer effortful control functioning. Results show that there is support that low SES might cause poorer functioning of effortful control (Taylor et al., 2013; Zalewski et al., 2012). Furthermore, it is assumed that the level of effortful control among adolescents from low SES

is reduced because these adolescents could have more negative affect and could experience parental rejection. Studies reveal significant associations, where low SES is linked to more negative affect and parental rejection, which both in turn could lower the level of effortful control among adolescents (Crossley, & Buckner, 2012; Gulley et al., 2016; Lengua, 2006; Mayer et al., 2014; Moilanen et al., 2010). More research on this topic is needed as (longitudinal) studies among adolescents are scarce and some inconsistent results are found.

In this study, three hypotheses are expected. First, it is expected that SES will predict the level of effortful control (*hypothesis 1*). Second, it is expected that negative affect will mediate the relationship between low SES and effortful control (*hypothesis 2*). Lastly, it is hypothesized that the relationship between low SES and effortful control is explained by parental rejection (*hypothesis 3*).

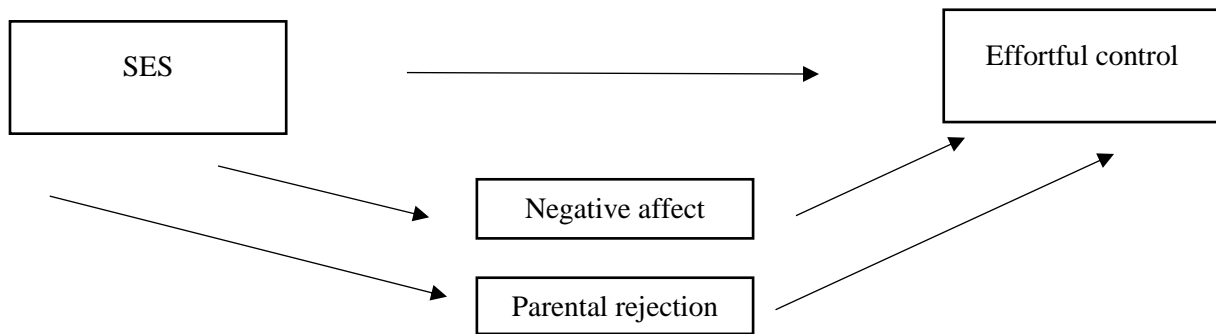


Figure 1. *Research Model for the Mediating Effects of Negative Affect and Parental Rejection on the Relationship between SES and Effortful Control*

Method

Participants

Data used in this study came from the TRacking Adolescents' Individual Lives Survey (TRAILS), a dataset consisting of Dutch adolescents. For this study, the first (T1) and third wave (T3) was used. Inclusion criteria and selection procedures were described in detail by De Winter et al. (2005) and Huisman et al. (2008). At T1, the participation rate were 2230 adolescents and their parents. There was a dropout of 18,57%, which meant that 1816 adolescents and parents were still participating in the study at T3. Mean age of the adolescents was 11.09 ($SD_{age} = 0.55$, 49,2% boys) at T1, and 16.13 ($SD_{age} = 0.73$, 47,7% boys) at T3 (Peeters, Oldehinkel, & Vollebergh, 2017). Regarding ethnicity, during T1, 10,3% of the

adolescents had one or both parents born in a non-Western country (Veenstra, Lindenberg, Tinga, & Ormel, 2010).

Procedure and design

Data collection at T1 and T3 was done by trained interviewers who visited the adolescents' parent or guardian (95.6% mothers). Parents or guardians were interviewed on a wide range of topics including the development of the child and parenting skills. In addition, parents and guardians filled in self-report questionnaires. In supervision of a TRAILS assistant, children filled in questionnaires during school-time, whereas some cognitive capacities (i.e., neurocognitive tasks) and some biological measures were measured individually in school.

Measurements

SES. SES was determined at T1 as a combined measure, using a split-variable including three categories: educational level, occupational level, and family income. The educational level of the parents was measured on a 5-point Likert scale (0 = elementary school and 5 = university). Furthermore, occupational level was determined by providing nine professions, ranging from the highest profession (e.g., managers) to the lowest (e.g., elementary occupations). SES also included the family income by indicating whether their monthly salary was low (less than 3000 euros), medium (between 3000-5999 euros), or high (more than 6000 euros). For SES, a factors analysis showed strong internal validity ($\alpha = .84$).

Effortful control. Effortful control was measured at T1 and T3 using the Early Adolescent Temperament Questionnaire (Capaldi, & Rothbart, 1992). The scale consisted of 11 items ($\alpha=.86$) using a 5-point Likert scale (0 = not true and 5 = true). Examples of items included in the scale were: *'It is easy for my child to keep concentrated on a task'*, and, *'My child is focused on someone who is explaining how to fulfill a task he/she has to do'*.

Negative affect. Negative affect was measured at T1 using the Early Adolescent Temperament Questionnaire (Capaldi, & Rothbart, 1992). The scale for measuring negative affect included 12 items using a 5-point Likert scale (0 = not true and 5 = true). The scale showed good internal validity ($\alpha=.80$). One item included in the scale was: *'I am worried about my family when I am not with them'* and, *'I am frustrated when I have to stop with activities I do enjoy'*.

Parental rejection. The Dutch version of the Egna Minnen Beträffande Uppfostran for Children (EMBU-C) was used to measure parental rejection (Markus, Lindhout, Boer, Hoogendijk, & Arrindell, 2003). The scale consisted of 17 items using a 4-point Likert scale (0= never and 4 = always), which showed internal validity for both the father and the mother

($\alpha=.84$ father, and $\alpha=.84$ mother). Examples of items included questions as: ‘*Do your parents blame you for everything*’, and, ‘*Do your parents provide things to your siblings and not to you?*’

Data analysis

Data analysis was done by using SPSS Statistics version 24. Using an independent t-test, an attrition analysis revealed that the dropout between T1 and T3 on effortful control was significantly different ($t = 8.365, p < .001$). This indicated that the dropout might have biased the results. Because of the large dropout, a pairwise deletion was applied. Several assumptions were checked to determine whether further analyses could be executed (Field, 2013). Some outliers were found by parental rejection and effortful control at T1. These outliers might have biased results in further analyses, but it was decided to include them in the analysis as a big dataset was used and these outliers could provide important information on how adolescents and parents scored on these variables. Furthermore, homogeneity of variances and no multicollinearity was found. In addition, descriptive statistics were requested to get more insight in the study variables. To determine whether study variables were correlated, a Pearson test was executed.

Hierarchical regression analyses were requested to find both cross-sectional and longitudinal results, according to the steps indicated by Baron and Kenny (1986). First, for the cross-sectional results, the direct association between SES and effortful control was analyzed. The first step included age, and in the second step SES was included. Effortful control was the dependent variable. In addition, the association between SES and the mediator was measured. In the first step, age was included, and in the second step SES was added. Either negative affect or parental rejection was the dependent variable. Then, the relationship between the mediator and effortful control was analyzed. In the first step, age was included, and in the second step either negative affect or parental rejection was added. Effortful control was the dependent variable. Lastly, the mediation effect was measured. In the first step, age was included, and in the second step SES and either negative affect or parental rejection was added. Effortful control was included as the dependent variable.

For studying longitudinal effects, the direct effect between SES and effortful control at T3 was measured at first. The first step included age and effortful control at T1, and in the second step SES was added. Effortful control at T3 was the dependent variable. In addition, the effect between SES and the mediator was analyzed. In the first step, age was added, and the second step existed of SES. Either negative affect or parental rejection was the dependent variable. Then, the effect between the mediator and effortful control was measured. In the first

step, age and effortful control at T1 were included, and the second step contained either negative affect or parental rejection. Effortful control at T3 was the dependent variable. Lastly, the mediation effect was measured. The first step included age and effortful control at T1, and the second step consisted of SES and either negative affect or parental rejection. Effortful control at T3 was the dependent variable.

Regarding mediation, an indirect association existed when all variables in mediation were associated and when the unstandardized coefficient of the direct relation disappeared. A partial indirect association occurred when both direct and indirect relations were significant. A Sobel test (Sobel, 1982) expressed whether an indirect relation was significant.

Results

Descriptive results and correlations

Table 1 presents the descriptive statistics including *n*, mean, *SD*, and the minimum and maximum range. Pearson correlations between study variables are shown in Table 2. SES is correlated with both effortful control at T1 ($r = .138, p < .001$), and effortful control at T3 ($r = .065, p < .05$). No significant correlation is found for SES and negative affect. Negative affect is only associated with effortful control at T1 ($r = -.051, p < .05$). SES is significant correlated with parental rejection ($r = -.50, p < .05$). Parental rejection is significant strongly correlated with both effortful control at T1 ($r = -.176, p < .001$) and T3 ($r = -.170, p < .001$).

Table 1. *Descriptive Statistics*

| Variable | <i>N</i> | <i>M</i> | <i>SD</i> | Minimum | Maximum |
|----------------------|----------|----------|-----------|---------|---------|
| Sex | 2230 | .49 | .50 | 0.00 | 1.00 |
| Age T1 | 2230 | 10.60 | .65 | 10.00 | 12.00 |
| Age T3 | 1819 | 15.78 | .77 | 14.00 | 18.00 |
| Income | 2008 | 4.44 | 1.88 | 1.00 | 9.00 |
| SES | 2188 | 2.00 | .71 | 1.00 | 3.00 |
| Negative Affect | 2047 | 2.65 | .66 | 1.00 | 4.92 |
| Parental Rejection | 2206 | 1.48 | .31 | 1.00 | 3.47 |
| Effortful Control T1 | 1985 | 3.23 | .68 | 1.09 | 5.00 |
| Effortful Control T3 | 1510 | 3.20 | .66 | 1.27 | 5.00 |

Table 2. *Correlations among Study Variables*

| Variables | 1 | 2 | 3 | 4 | 5 |
|-------------------------|--------|--------|---------|--------|---|
| 1. SES | 1 | - | - | - | - |
| 2. Negative Affect | -.028 | 1 | - | - | - |
| 3. Parental Rejection | -.050* | .283** | 1 | - | - |
| 4. Effortful Control T1 | .138** | -.051* | -.176** | 1 | - |
| 5. Effortful Control T3 | .065* | -.022 | -.170** | .550** | 1 |

Notes: * $p < .05$, ** $p < .001$

Cross-sectional results

Cross-sectional results in Table 3 show a direct relationship between SES and effortful control when controlling for age ($B = .134, p < .001$). It also shows that negative affect is not a significant mediator as there was no association between SES and negative affect. Negative affect and effortful control are, however, associated ($B = -.052, p < .05$). In addition, Table 3 reveals that parental rejection is a significant mediator ($B = -.385, p < .001$) in the relationship between SES and effortful control. A Sobel test (Sobel, 1982) reveals that the indirect relationship is significant ($z = 2.34, p = .019$). Furthermore, Table 3 shows that a significant part of variance in effortful control is explained by SES ($R^2 = .022, F(2, 1980) = 21.93, p < .001$). Also, including parental rejection in the model, accounted for significant variance ($R^2 = .050, F(3, 1960) = 34.40, p < .001$). Figure 2 gives an illustration of the found results for mediation.

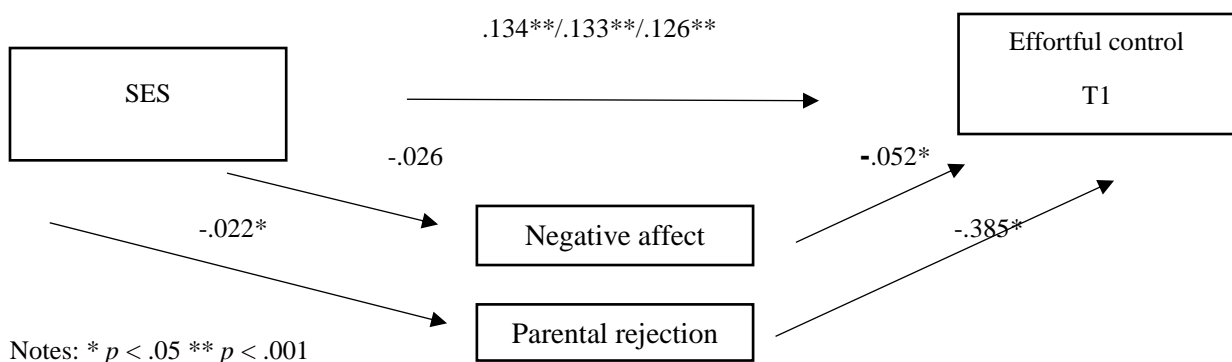


Figure 2. *Cross-Sectional Results for the Mediation Model Controlling for Age*

Table 3. *Cross-Sectional Results for Negative Affect and Parental Rejection Mediating the Relationship between SES and Effortful Control*

| <i>Pathway</i> | <i>B</i> | <i>SE B</i> | β | R | R Δ |
|---------------------------------|----------|-------------|---------|--------|------------|
| Model SES | | | | | |
| <i>Pathway c</i> | | | | | |
| Step 1 | | | | | |
| Age | .051* | .024 | .048 | | |
| Step 2 | | | | | |
| SES | .134** | .021 | .139 | .147** | .021 |
| Model Negative Affect | | | | | |
| <i>Pathway a</i> | | | | | |
| Step 1 | | | | | |
| Age | -.013 | .023 | -.013 | | |
| Step 2 | | | | | |
| SES | -.026 | .021 | -.028 | .031 | .000 |
| <i>Pathway b</i> | | | | | |
| Step 1 | | | | | |
| Age | .051* | .025 | .048 | | |
| Step 2 | | | | | |
| Negative Affect | -.052* | .024 | -.050 | .069* | .004 |
| <i>Pathway c'</i> | | | | | |
| Step 1 | | | | | |
| Age | .051* | .025 | .048 | | |
| Step 2 | | | | | |
| SES | .133** | .022 | .138 | | |
| Negative Affect | -.048* | .024 | -.046 | .154** | .022 |
| Model Parental Rejection | | | | | |
| <i>Pathway a</i> | | | | | |
| Step 1 | | | | | |
| Age | -.005 | .010 | -.011 | | |
| Step 2 | | | | | |
| SES | -.022* | .009 | -.051 | .052* | .002 |
| <i>Pathway b</i> | | | | | |
| Step 1 | | | | | |
| Age | .051* | .024 | .048 | | |
| Step 2 | | | | | |
| Parental Rejection | -.385** | .049 | -.175 | .182** | .033 |
| <i>Pathway c'</i> | | | | | |
| Step 1 | | | | | |
| Age | .051* | .024 | .048 | | |
| Step 2 | | | | | |
| SES | .126** | .021 | .131 | | |
| Parental Rejection | -.370** | .048 | -.169 | .224** | .049 |

Notes: * $p < .05$, ** $p < .001$.

Longitudinal results

Longitudinal results in Table 4 reveal that there is no direct effect between SES and effortful control at T3, when controlling for age and effortful control at T1. It also shows that negative affect is not a significant predictor for effortful control at T3. However, parental rejection is a predictor for effortful control at T3 ($B = -.164$, $p < .05$). A significant proportion of variance in effortful control T3 is explained by parental rejection ($R^2 = .309$, $F(4, 1396) =$

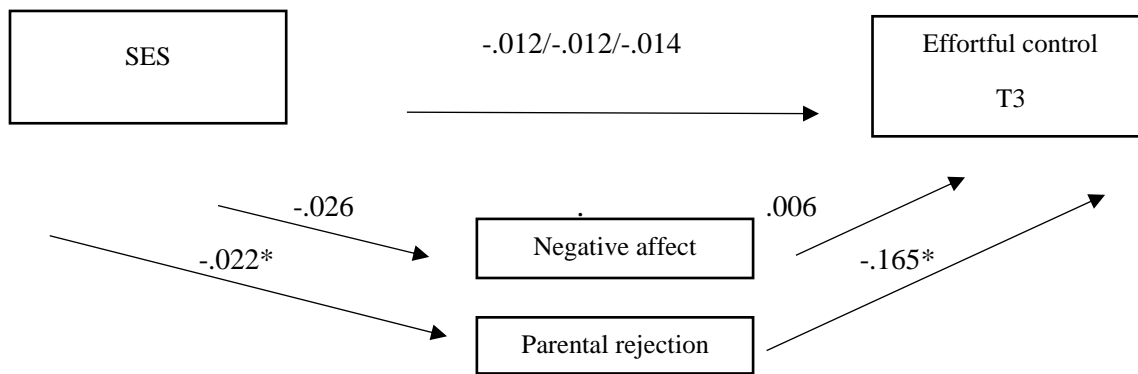
SES AND EFFORTFUL CONTROL MEDIATED BY NEGATIVE AFFECT AND PARENTAL REJECTION

155,91, $p < .001$). Because of the absence of significant effects, no mediating effect is found, which is displayed in Figure 3.

Table 4. Longitudinal Results for Negative Affect and Parenting Rejection Mediating the Effect between SES and Effortful Control

| Pathway | B | SE B | β | R | R Δ |
|---------------------------------|---------|------|---------|-------|------------|
| Model SES | | | | | |
| <i>Pathway c</i> | | | | | |
| Step 1 | | | | | |
| Age | -.021 | .019 | -.024 | | |
| Effortful Control T1 | .535** | .022 | .550 | | |
| Step 2 | | | | | |
| SES | -.012 | .021 | -.013 | .550 | .302 |
| Model Negative Affect | | | | | |
| <i>Pathway a</i> | | | | | |
| Step 1 | | | | | |
| Age | -.013 | .023 | -.013 | | |
| Step 2 | | | | | |
| SES | -.026 | .021 | -.028 | .031 | .000 |
| <i>Pathway b</i> | | | | | |
| Step 1 | | | | | |
| Age | -.021 | .019 | -.024 | | |
| Effortful Control T1 | .535** | .022 | .550 | | |
| Step 2 | | | | | |
| Negative Affect | .006 | .023 | .006 | .550 | .301 |
| <i>Pathway c'</i> | | | | | |
| Step 1 | | | | | |
| Age | -.021 | .019 | -.024 | | |
| Effortful Control T1 | .535** | .022 | .550 | | |
| Step 2 | | | | | |
| SES | -.012 | .021 | -.012 | | |
| Negative Affect | .006 | .023 | .006 | .551 | .301 |
| Model Parental Rejection | | | | | |
| <i>Pathway a</i> | | | | | |
| Step 1 | | | | | |
| Age | -.005 | .010 | -.011 | | |
| Step 2 | | | | | |
| SES | -.022* | .009 | -.051 | .052* | .002 |
| <i>Pathway b</i> | | | | | |
| Step 1 | | | | | |
| Age | -.021 | .019 | -.024 | | |
| Effortful Control T1 | .535** | .022 | .550 | | |
| Step 2 | | | | | |
| Parental Rejection | -.164* | .048 | -.077 | .555* | .307 |
| <i>Pathway c'</i> | | | | | |
| Step 1 | | | | | |
| Age | -.021 | .019 | -.024 | | |
| Effortful Control T1 | .535** | .022 | .550 | | |
| Step 2 | | | | | |
| SES | -.014 | .021 | -.015 | | |
| Parental Rejection | -.165** | .048 | -.077 | .556* | .307 |

Notes: * $p < .05$, ** $p < .001$.



Notes: * $p < .05$

Figure 3. *Longitudinal Results for Mediation Model Controlling for Age and Effortful Control at T1*

Discussion

The aim of the current study was to identify whether there was a relationship between SES and the level of effortful control, and whether this relationship was mediated by parental rejection and negative affect. Cross-sectional results were found, and showed that there was a direct relationship between low SES and lower levels of effortful control among adolescents. Furthermore, cross-sectional results demonstrated that parental rejection partially mediated the relationship between SES and the level of effortful control. Longitudinal results were that parental rejection was a predictor for the level of effortful control, but no mediating effects were found.

Direct Relationship Between SES and the Level of Effortful Control

Cross-sectional findings were that there was a direct relationship between low SES and lower levels of effortful control among adolescents. However, in contrast with the hypothesis, no longitudinal results were found for the direct relationship. These results indicate that adolescents from low SES families are more likely to have lower levels of effortful control, but that SES does not predict change in effortful control functioning. This is inconsistent with earlier findings from Backer-Grøndahl and Nærde (2015), who found that a low SES was a significant predictor for the level of effortful control among preschool children after two years.

The finding that a low SES is associated with lower levels of effortful control could be explained by the *ecological theory of Bronfenbrenner* (1986). Bronfenbrenner argues that an individual interacts with its environment, whereby the environment could provide change in

the individual (Bronfenbrenner, 1986). In the current study, adolescents are affected by a low SES environment. The finding is in line with results coming from the study from Fry et al. (2012), who found that a low SES was associated with poorer effortful control functioning.

One explanation for not finding longitudinal results in the current study is that the effect of low SES on effortful control might be higher in childhood than in adolescence. Support for this explanation comes from the *cognitive theory of development* (Inhelder, & Piaget, 1958; Galotti, 2017). Piaget invented five stages of cognitive development, whereby the first stage starts during infancy and the fifth stage finishes at the end of adolescence (Galotti, 2017). As such, the greatest development of cognition happens during infancy to the end of childhood. Besides, adolescents are more independent from parents than children as they are working towards more autonomy (Sameroff, 2010). This shows the probability that the effects of low SES on effortful control functioning are weaker in adolescence than in childhood, as adolescents have greater cognitive capability than children. For example, in comparison with children, adolescents can understand abstract concepts and reflect on their thinking, which makes them capable of comprehending the (adult) social world (Inhelder, & Piaget, 1958). This explanation is supported by a longitudinal study from Ursache, Noble, and Blair., (2015) who found differences in the effect of low SES on self-regulative functions. Younger children had higher levels of stress because of low SES than older children had (Ursache et al., 2015). Further research should focus on how the level of effortful control, especially among adolescents, is affected by the environment like low SES.

Another explanation for not finding causal associations comes from a *neurological perspective*. Thompson (2014) explained that chronic stress could occur among individuals when they are exposed to a stressful environment, such as a low SES. By repeated exposure to stress, overproduction of stress hormones disrupts parts in the brain where self-regulative functions (e.g., effortful control) are active (Thompson, 2014). In the current study, only SES, and not stress was included as a variable in the analysis. It could be assumed that non-significant longitudinal results were found, because adolescents react on a stressful environment rather than directly on a low SES. In this way, stressful life events, which are more commonly observed in lower SES (Thompson, 2014), cause a change in effortful control and not lower SES itself. Several studies presumed that stress might be an important mediator in the relationship between SES and the level of effortful control (Blair, & Raver, 2016; Hackman, Gallop, Evans, & Farah, 2015; Ursache et al., 2015). In further research it should be considered to include chronic stress of adolescents in the analyses.

Indirect Relationship Between SES and the Level of Effortful Control via Negative Affect

No indirect association was found between SES and the level of effortful control via negative affect. However, on cross-sectional level, negative affect and effortful control were related. Because no longitudinal results were found, it was not possible to detect whether change in effortful control was predicted by SES via negative affect. The findings were in line with earlier results which indicated that SES from parents are not influencing temperament, such as negative affect (Ayoub, Gosling, Potter, Shanahan, & Roberts, 2017).

No indirect relationship was found between SES and the level of effortful control via negative affect as there was no association between SES and negative affect. This was inconsistent with the *diathesis-stress model*. This model states that individuals could biological be more vulnerable for environmental stress (Zuckerman, 1999). In the current study, negative affect is investigated as being a component of temperament. Results were that SES did not contribute to change in negative affect. It should be considered that not negative affect is influenced by low SES, but that probably other biologically mechanisms do. Further research should focus on other individual indicators, which might give more explanation on how SES affects the level of effortful control.

More negative affect was associated with lower levels of effortful control among adolescents on cross-sectional level. This was in line with the *temperament model* which stated that temperament could influence self-regulative functions within individuals (Rothbart, Ellis, & Posner, 2011). For example, individuals who are experiencing fear are less able to regulate their own behavior by for example identifying risky situations (Rothbart et al., 2011). One longitudinal study by Latzman, Shishido, Latzman, and Clark (2016) focused on (depressed) youth and found consistent findings with the current results. They found that negative temperament (i.e., fear) was associated with executive functions, but no longitudinal results were found (Latzman et al., 2016). Further research should focus on the way negative affect influences the level of effortful control among adolescents as those studies are scarce.

Indirect Relationship Between SES and the Level of Effortful Control via Parental Rejection

A partial indirect association was found for the relationship between SES and the level of effortful control via parental rejection. Furthermore, parental rejection turned out to be a significant predictor for the level of effortful control. However, no causal conclusions could be made as SES and parental rejection only were measured at T1. This meant that at T3, more variables could play a role in predicting the level of effortful control than solely parental

rejection. It should be considered that SES and parental rejection could co-occur, and that both influence the level of effortful control. Thus, in the current study, lower levels of effortful control did exist over time among adolescents from low SES, who were experiencing parental rejection. No further longitudinal results were found, which was in contrast with the hypothesis.

Parental rejection was a significant mediator in the relationship between low SES and lower levels of effortful control. This is in line with the *family stress theory*, which emphasized the role of parental stress and change in parental behavior (Barnett, 2008). The family stress theory stated that parents often experience stress because of having a low SES as they often have financial strains. Parental stress could change parental behavior and might result in parental rejection. Adolescents who are experiencing parental rejection might have difficulty with regulating their behavior (Barnett, 2008; Belsky, & Beaver, 2011). The results were in line with a cross-sectional study by Barbot et al. (2014), who found a significant association between more maternal stress and more parental rejection. Furthermore, a former cross-sectional study by Crossley and Buckner (2012) found an association between more maternal distress and lower levels of effortful control.

The only longitudinal finding in the current study was that parental rejection was a significant predictor for the level of effortful control. The longitudinal finding was in line with the study of Moilanen et al. (2010), who found that more parental rejection led towards lower levels of effortful control. A possible explanation of how parental rejection affected the level of effortful control among adolescents comes from the *attachment theory* (Bowlby, 1969). The attachment theory argues that by inadequate parenting, such as parental rejection, children can develop an insecure attachment with their parents (Bowlby, 1969). In a secure attachment, parents and children exist over a warm parent-child relationship, whereby parents could act as role models for the child in how to regulate behavior (Kopp, 1982). In case of parental rejection, adolescents with lower levels of effortful control might be missing out of such a warm parent-child relationship. This explanation is supported by Moilanen and Rambo-Hernandez (2015), who found that lower levels of parent-child relationship quality was predicting lower levels of self-regulation. Together with the results of the current study, this indicates that, even into late adolescence, parenting plays an important role in the development of self-regulative functions like effortful control.

Limitations

The current study existed of several limitations. First, parents and adolescents with lower SES were more likely to drop out. An attrition analysis showed that the dropout of

effortful control at T1 and T3 was significant, which meant that the results might be biased. Second, self-reports from adolescents were used to measure parental rejection and negative affect. A great disadvantage of using self-reports is that scores could be inaccurate, as individuals might underrate themselves (Paulhus, & Vazire, 2007). Lastly, because of the low diversity in ethnicity in the sample (Veenstra et al., 2010), generalizing the results to other samples should be done carefully.

Conclusions and implications

The current study identified that low SES and lower levels of effortful control among adolescents are related, and that this relationship is mediated by parental rejection. Longitudinal findings showed that parental rejection was a predictor for the level of effortful control. The results imply that parents might have substantial influence on self-regulative functions of adolescents. Thus, environmental factors, especially parental behavior, are important influencers of the level of self-regulation among adolescents from low SES families. Therefore, future research and policies should focus especially on environmental influences, such as parenting, when considering the role of SES in relation to self-regulative functions in adolescents.

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