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Maternal Influences on Effortful Control in Adolescence: Developmental Pathways to Externalizing Behaviors

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Abstract

Adolescents' effortful control is subject to numerous maternal influences. Specifically, a mother's own effortful control is associated with her child's effortful control. However, maternal substance use, psychopathology, and stress within the parenting role may also lead to poor effortful control for their child. Poor effortful control during adolescence can subsequently contribute to a variety of negative outcomes, including externalizing behaviors. A sample of 460 adolescents (47% female, 59.3% Non-Hispanic Caucasian) was selected from a longitudinal, multigenerational study. The goal was to examine maternal effortful control, substance use, psychopathology, and stress in their offspring's childhood ($M_{age} = 6.27$) and their influence on their children's effortful control in early adolescence ($M_{age} = 12.21$) and the subsequent effect of effortful control on adolescents' externalizing behavior ($M_{age} = 13.53$). Maternal effortful control (measured via conscientiousness) and psychopathology were associated with adolescent effortful control, which was associated with externalizing behavior a year later. Additionally, there was a significant indirect association between maternal effortful control and adolescent externalizing behaviors via adolescent effortful control. Thus, adolescent effortful control is associated with maternal effortful control but also subject to specific maternal risk factors in childhood. These results inform potential maternal strategies for promoting positive developmental outcomes in adolescents.

Keywords

Effortful Control; Externalizing; Maternal Influence; Early Adversity

Effortful control is “the ability to suppress a dominant response in order to perform a subdominant response” (Rothbart, Ellis, Rosario Rueda, & Posner, 2003, p. 1154). Low levels of effortful control in childhood are linked to poor developmental outcomes including

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low academic achievement, internalizing behavior, peer problems, and externalizing behavior (Eisenberg et al., 2009; Gardner, Dishion, & Connell, 2008; Nigg, 2006). Research has shown that parent's effortful control is linked to their children's effortful control (Bridgett, Burt, Edwards, & Deater-Deckard, 2015). The quality of the home environment is also associated with children's effortful control, with adverse environments characterized by parent substance use disorders (i.e., lifetime diagnoses of alcohol use disorder and/or various drug use disorders, such as marijuana, cocaine, methamphetamines, etc.) and psychopathology related to lower child effortful control (Eiden, Colder, Edwards, & Leonard, 2009; Lemery-Chalfant, Kao, Swann, & Goldsmith, 2013). Stress related to the parenting role has also been associated with reduced parental effortful control and therefore may be related to lower effortful control in children (Gartstein, Bridgett, Young, Panksepp, & Power, 2013). However, this association has not been examined in adolescence. Moreover, little research has considered the association between parent and child effortful control across childhood to adolescence in the context of adverse maternal characteristics. Thus, the goal of the present study is to examine the influence of maternal effortful control, substance use, psychopathology, and parental stress in their offspring's childhood on their child's effortful control in adolescence and the subsequent influence of their child's effortful control on externalizing behavior later in adolescence.

Effortful Control

The extent to which an individual can exhibit self-control, specifically known as effortful control, is important because higher levels of effortful control are related to better academic and social outcomes (Liew, 2012; Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008), whereas low levels of effortful control are associated with greater externalizing behavior and other behavior problems (Eisenberg et al., 2009). Effortful control represents a combination of attentional control, or ability to appropriately maintain or shift one's focus, inhibitory control, the control one has over inhibiting behavior, and activation control, the propensity to activate or engage in behavior based on environmental stimuli. Effortful Control has been found to be present beginning in infancy and endures throughout the lifespan (Rothbart, Ahadi, Hershey, & Fisher, 2001). Further, an individual's effortful control is not static, but is considered adaptive and dependent upon the contextual demands within which control is exerted (Eisenberg, Spinrad, & Morris, 2002). Moreover, effortful control is influenced by a number of individual and familial factors, which contribute to long-term functioning.

Parental Influence on Effortful Control

Research suggests that child effortful control results in part from parental effortful control, such that it is passed intergenerationally from parent to child. Such transmission may be genetic in nature (Gagne & Saudino, 2016; Lemery-Chalfant et al., 2013), but evidence also supports environmental mechanisms. A recent review of the literature supports both biological and environmental parental influences on child self-regulation, a component of effortful control, in an integrative developmental framework (Bridgett et. al, 2015). In this framework, parent self-regulation contributes to child self-regulation early in life through genetic influences and prenatal programming. As the child develops, parent effortful control contributes environmentally to child effortful control through parenting, in which parents

with high levels of effortful control may model, directly teach, and reinforce self-regulatory behaviors in their children. Research supports these early and continued links between parent and child effortful control. For instance, maternal effortful control has been related to infant regulation as well as later toddler effortful control, representing early biological and environmental effects (Bridgett et al., 2011). Consistent with this, studies have shown that effortful control in parents has been positively associated with effortful control in childhood and early adolescence (Jester et al., 2009; Valiente, Lemery-Chalfant, & Reiser, 2007). However, no study to date has examined maternal influence on their children's effortful control longitudinally from childhood to adolescence. Given the known association between maternal and child effortful control, it is possible that parental personality traits related to effortful control, specifically conscientiousness, would also predict their child's effortful control. This relation between effortful control and conscientiousness has been empirically supported in several studies including Ahadi, Rothbart, and Ye (1993), Ahadi and Rothbart (1994), as well as Caspi and Shiner (2006). Conscientiousness is the dimension of personality that is related to self-discipline or control and taking action for oneself. Since effortful control is indexed by activation and inhibitory control, conscientiousness can be considered similar to effortful control and a relevant measure of parent effortful control as it relates to Rothbart's (1987) definition. In addition, recent research has supported this association in that early self-regulation, specifically effortful control, in childhood fosters later conscientiousness and therefore that self-regulation is the central developmental component of conscientiousness (Eisenberg, Duckworth, Spinrad, & Valiente, 2014). The current study aims to identify the role of maternal effortful control, measured via mother conscientiousness, in the development of child effortful control in early adolescence.

Early Adversity and Effortful Control

It has been suggested that ongoing exposure to adverse life events negatively influences a child's ability to regulate themselves due to the continuous strain placed on the neuroendocrine system in the body (Bridgett et al., 2015; Ng-Knight & Schoon, 2016). A culmination of adverse life circumstances, particularly those that are introduced by parents, can create excessive stress in the child's environment, reducing the child's ability to control their behaviors and attention via the effect of the adverse environment on the neuroendocrine system (Lengua et al., 2015; Ng-Knight & Schoon, 2016). Such stress can contribute to reduced attentional and inhibitory control subsequently leading to behavior problems, and most notably externalizing problems (Gartstein & Fagot, 2003). However, few studies have looked at individual maternal factors that convey risk for early adversity in relation to effortful control in adolescence.

Parent substance use disorder and psychopathology.

Parent-level factors can be related to their own effortful control, reducing the parent's ability to provide a positive environment, and contributing to reduced child effortful control through both direct and indirect routes. For example, a parent diagnosed with a substance use disorder may both have lowered effortful control and pass the risk for low effortful control to their child. In addition, the presence of a substance use disorder may also lower a parent's ability to provide the important positive influences a child needs in order to be well-

regulated. Specifically, research has found lower effortful control and greater externalizing problems in children of fathers diagnosed with alcohol use disorder in the preschool years (Eiden, Edwards, & Leonard, 2007) and in adolescence (Adkison et al., 2013). To our knowledge, no study to date has examined the specific influences of maternal substance use disorder in childhood on children's effortful control in adolescence. However, it is well-established that parent substance use has a strong relation with adolescent externalizing outcomes (Bountress & Chassin, 2015; Hussong, Huang, Curran, Chassin, & Zucker, 2008).

In addition, the presence of other parent psychopathology, including depression, anxiety, and antisocial personality disorder, may also be related to reduced parent effortful control, resulting in reduced child effortful control and increased risk for externalizing problems throughout early adolescence. Although limited, preliminary research has examined the relation between parent psychopathology and components of effortful control, including attentional control and inhibitory control. One study found that paternal psychopathology was associated with reduced effortful control in early childhood (Babadagi et al., 2018). Another study found that parents with antisocial personality disorder had sons with high levels of behavioral under-control and greater risk for disruptive behaviors in preschool (Loukas, Zucker, Fitzgerald, & Krull, 2003). As previously stated, the research on parent substance use disorder and psychopathology thus far has focused mainly on paternal pathways, with less attention given to maternal pathways to reduced effortful control in adolescence. The current study extends previous literature by examining the role that maternal substance use disorder and psychopathology play in the influence of maternal effortful control on adolescent effortful control and subsequent externalizing behaviors.

Parenting stress.

There are well-established associations between parenting quality and child effortful control (Bridgett et al., 2015; Bridgett et al., 2011; Valiente et al., 2007). However, as previously noted, the presence of adverse parent-level factors independent of parenting may also affect child effortful control. Thus, the current study focuses on the specific role that parent-level factors, rather than parenting per se, play in influencing children's effortful control. Presumably, if the parent is experiencing high levels of stress from their role as a parent, this will have a negative impact on their child's effortful control through exposure to examples of dysregulated parenting and poor effortful control during a time when children are learning how to regulate themselves both emotionally and behaviorally. Previously, the association between parent stress and reduced effortful control has only been examined in toddlerhood (Gartstein et al., 2013). However, there has been research relating parent temperament to parental stress (McQuillan & Bates, 2017), though no study to our knowledge has looked at the specific role of parental stress in influencing either parent or adolescent effortful control. Research does suggest that parental stress is associated with children's externalizing behaviors. One such study found that higher levels of parental stress were associated with higher levels of externalizing problems in adolescence (Buodo et al., 2003). Additionally, higher levels of aggression were found to be present in children (Lee, Altschul, & Gershoff, 2013) and adolescents (Krahe, Bondu, Hose, & Esser, 2014) of parents who reported high parenting stress longitudinally. Thus, parents who are stressed from their role as a parent could have difficulty modeling well-regulated behaviors for their child because their own

ability to self-regulate could be compromised. The current study aims to further evaluate the role that parental stress can have within the influence of maternal effortful control on adolescent effortful control and subsequent externalizing outcomes.

Current Study

Research has found that parent effortful control is associated with child effortful control (Bridgett et al., 2015) and that adverse parent-level factors in childhood contribute to effortful control and externalizing behavior in adolescence (Adkison et al., 2013; Hussong et al., 2008). However, in their review Bridgett and colleagues (2015) state that the parental transmission of effortful control has not yet been examined in the context of various adverse maternal characteristics, and that research has not looked at how parent-to-child effortful control may contribute to externalizing outcomes for the child in adolescence. Thus, the goal of the current study is to longitudinally examine the influence of maternal effortful control, substance use disorder, psychopathology, and parenting stress in childhood on child effortful control in adolescence, and the subsequent influence of adolescent effortful control on externalizing a year later. Therefore, we tested the following hypotheses:

1. Higher levels of maternal effortful control during their offsprings' childhood, measured via maternal conscientiousness, will be associated with higher levels of the child's effortful control during adolescence
2. Higher levels of mother's substance use disorder, psychopathology, and parenting stress in their offspring's childhood will be associated with lower levels of the child's effortful control in adolescence.
3. Lower levels of child effortful control during adolescence will be associated with higher levels of subsequent externalizing behavior.
4. Adolescent effortful control will mediate the relation between maternal effortful control during childhood and their child's externalizing behavior in adolescence.

These hypotheses are illustrated in a conceptual model shown in Figure 1.

Methods

Participants

This study included participants from the second and third generations of a larger longitudinal and multigenerational study of families with parents with alcohol use disorder and matched controls. The sample is described in detail in Chassin, Barrera, Bech, & Kossak-Fuller, 1992. The participants in this study are 460 children from the third generation (child) and their parents (parent) who participated in data collection at three waves (Wave 5, Wave 6 and Wave 6 follow-up, hereafter referred to as Time 1, Time 2, and Time 3, respectively; see Table 1). Selection criteria for this subsample were that children had to be between the ages of 11 and 15 at Time 2 to focus on effortful control and externalizing specifically during early adolescence. The average total household income at Time 2 was approximately \$68,250. The average age for children at Time 1 was 6.27, at Time 2 was 12.21, and at Time 3 was 13.53. Nearly half the sample was female as well as

predominantly Non-Hispanic Caucasian (59.3%). Additionally, at Time 1, the average age for mothers was 28.65 and 17.1% of mothers reported having a lifetime diagnosis of a substance use disorder. Demographic information on this sample is displayed in Table 1.

Recruitment

For the original study, children with parents diagnosed with alcohol use disorder and their families were recruited through court records, community telephone screenings and health maintenance organization (HMO) questionnaires. Structured diagnostic interviews using DSM-III criteria were used to diagnose first generation parents (DIS-III: Robins, Helzer, Croughan, & Ratcliff, 1981). A matched group was created using families with parents not diagnosed with alcohol use disorder with similar demographic characteristics (neighborhood, socioeconomic status, child's age, ethnicity, and family composition). These families were recruited using telephone surveys. The current study involved the third generation, i.e., the children of the original adolescents. In order to participate in this longitudinal study, adults gave their consent and children gave their assent. Arizona State University's Institutional Review Board authorized all protocols and procedures used in this study.

Measures

Demographics.—Parents reported on their children's age, ethnicity, and gender at Time 1. These variables at Time 1 were covariates for this study. Past research has identified each of these variables as related to effortful control in children (Bridgett et al., 2011; Eisenberg et al., 2005; Lengua, Honorado & Bush, 2007).

Maternal substance use disorder.—Maternal diagnoses of DSM-IV alcohol or drug (including cannabis, amphetamines, cocaine, sedatives, prescription drugs, heroin, opioids, PCP, hallucinogens, and inhalants) dependence and abuse were assessed with the Diagnostic Interview Schedule (C-DIS; Robins et al., 1981) or other parent report using Family History-Research Diagnostic Criteria (FH-RDC; Andreason, Endicott, Spitzer, & Winokur, 1977) at Time 1. Maternal substance use disorder was a dichotomous variable reflecting mothers having a lifetime diagnosis of abuse or dependence on any substance listed above.

Maternal psychopathology.—Maternal anxiety, depression, and antisociality were measured at Time 1 as dichotomous (yes/no) variables assessed with the C-DIS (Robins et al., 1981). Maternal psychopathology was a dichotomous variable reflecting mothers having a lifetime diagnosis of anxiety, depression, or antisociality disorder at Time 1.

Parenting stress.—At Time 1, mothers reported on their stress associated with their role as a parent over the past year. These items were adapted from a role stress scale (Todd et al., 1996). They first reported on the degree to which being a parent was stressful on a scale of 1 = Not at all stressful to 5 = Very stressful. They then reported on a series of items related to potential stressors resulting from the parent role, such as "I feel overwhelmed by day to day parenting chores." These subsequent items were rated on a scale of 1 = Never to 5 = Very often. Higher scores related to greater stress associated with the parenting role. Internal consistency was good ($\alpha = .72$).

Maternal effortful control.—Mothers reported on their own conscientiousness at Time 1 as measured by the NEO Five Factor Inventory- Form S (Costa & McCrae 1992) as a proxy measure for maternal effortful control. Items used a five-point Likert scale from 1 = Strongly disagree to 5 = Strongly agree. A sample item of this measure is “I am a productive person who always gets the job done.” Maternal effortful control was the average score on these items. Internal consistency was good ($\alpha = .85$).

Adolescent effortful control.—To assess effortful control at Time 2, the Early Adolescent Temperament Questionnaire - Short Form (Capaldi & Rothbart, 1992) was used. Mothers, fathers, and adolescents reported on the adolescent’s own effortful control using this measure. The three subscales used for this study were activation control (five questions), inhibition control (5 questions), and attention (6 questions). The three subscales were correlated within mother report, $r_s = .55$ to $.79$, $p_s < .001$, father report $r_s = .56$ to $.77$, $p_s < .001$, as well as child report, $r_s = .46$ to $.57$, $p_s < .001$, so were averaged together within reporter to form a mean composite by reporter of effortful control at Time 2. The response choices for these subscales ranged from 1 = Almost always untrue to 5 = Almost always true. An example of a question on the activation subscale was “If I have a hard assignment to do, I get started right away.” An example of a question on the inhibition subscale was “When someone tells me to stop doing something, it is easy for me to stop.” An example of a question on the attention subscale was “I am good at keeping track of several different things that are happening around me.” Internal consistency was good for mother report ($\alpha = .92$), father report ($\alpha = .93$), and adolescent report ($\alpha = .99$).

To create a composite of effortful control, confirmatory factor analysis using a latent variable model was used with mother, father, and adolescent report of effortful control as indicators. This model had good fit (RMSEA = 0.00, CFI/TLI = 1.0), with standardized loadings ranging from .51 to .88. Factor scores from the latent variable were extracted and used in the final model, with higher scores representing greater effortful control.

Externalizing behavior.—At Time 2 and Time 3, adolescents reported on their own externalizing symptomatology using items from the Achenbach Youth Self-Report (Achenbach & Rescorla, 2001). The externalizing score was composed of ratings on the Rule-Breaking and Aggressive Behavior subscales. Response choices for each of these scales was 1 = Not true, 2 = Somewhat true, and 3 = Very true/often true. Items from the Rule-breaking subscale included “lies/cheats” and “steals at home” ($\alpha = .85$). Items from the Aggressive subscale included “destroys others’ things” and “threatens others” ($\alpha = .78$). The two subscales were correlated within Time 2, $r = .75$, $p < .001$, and within Time 3, $r = .82$, $p < .001$, and were averaged together within time to form composites in which higher scores indicated greater externalizing behavior.

Data Analytic Plan

Descriptive statistics, including means, standard deviations, minimums, and maximums were used to examine distributional properties. Bivariate correlations were examined to assess possible multicollinearity. All models were tested in Mplus (Muthen & Muthen, 2007). All models used FIML to account for missing data. As part of the (*Sample Name Blinded for*

Review) sample, multiple members were assessed from the same family at both the parent level (siblings) and at the child level (siblings, cousins). To account for this interdependence, clustering at the family level was included in Mplus, which adjusts standard errors for multilevel data.

The following conceptual model was tested (see Figure 1). Maternal effortful control, psychopathology, substance use diagnosis, and parenting stress were included as correlated predictors at Time 1. All Time 1 variables were included as predictors of the factor score of adolescent effortful control at Time 2. Effortful control and externalizing behavior at Time 2 were included as predictors of adolescent externalizing behavior at Time 3. Child age, ethnicity, and gender were included as covariates. Nonsignificant covariates were removed from the final analysis. Indirect effects were tested using Rmediation (Tofighi & Mackinnon, 2011) and differences in associations based on child gender were examined using multigroup model in Mplus by comparing model chi-square estimates with paths of interests freed vs. constrained by gender.

Results

Descriptive Statistics and Correlations

Descriptive statistics for all variables are shown in Table 1. The scores for adolescent effortful control, adolescent externalizing, maternal effortful control, and parenting stress did not show any floor or ceiling effects. Consistent with this high-risk sample, 17.1% of mothers were diagnosed with a substance use disorder and 38.4% of mothers were diagnosed with at least one form of psychopathology.

Correlations among variables can be found in Table 2. Maternal substance use disorder was related to greater maternal psychopathology at Time 1. Maternal psychopathology at Time 1 was related to lower maternal effortful control at Time 1, lower adolescent effortful control at Time 2, and greater adolescent externalizing problems at Time 2 and at Time 3. Higher levels of parenting stress at Time 1 was related to greater adolescent externalizing problems at Time 2 and Time 3. Greater levels of maternal effortful control at Time 1 was related to greater adolescent effortful control at Time 2 and lower adolescent externalizing problems at Time 2. Lower adolescent effortful control at Time 2 was related to greater adolescent externalizing problems at Time 2 and Time 3. Boys had significantly lower effortful control at Time 2 than did girls. Older age at all three time points was related to greater externalizing problems at both Time 2 and Time 3. These correlations were generally consistent with previous literature and our hypotheses.

Full Theoretical Model

Standardized estimates from the final structural equation model predicting effortful control and externalizing at Time 2 and externalizing at Time 3 can be found in Figure 2. Covariates significantly associated with variables of interest were retained, including child gender and age at Time 1. As shown in Figure 2, at Time 1 maternal substance use disorder and greater parenting stress were both associated with more maternal psychopathology. Higher maternal parenting stress was also associated with lower maternal effortful control. From Time 1 to

Time 2, maternal psychopathology was significantly related to reduced adolescent effortful control and greater adolescent externalizing problems. Higher levels of maternal effortful control at Time 1 were significantly related to greater adolescent effortful control at Time 2. However, maternal substance use disorder and parenting stress were not significantly associated with adolescent effortful control or externalizing problems at Time 2. Within Time 2, lower adolescent externalizing problems were associated with better effortful control. Additionally, higher levels of adolescent effortful control at Time 2 were significantly related to lower adolescent externalizing problems at Time 3. Finally, adolescent externalizing at Time 2 significantly predicted greater adolescent externalizing problems at Time 3. Gender was significantly associated with adolescent effortful control, such that females had higher levels of effortful control than males at Time 2. Older adolescents had significantly greater externalizing problems at Time 2 than did younger adolescents.

Following this, we examined indirect effects. There was a significant indirect effect from maternal effortful control at Time 1 to externalizing at Time 3 via adolescent effortful control at Time 2 ($B = -.02$, S.E. = .01, 95%CI $[-.03, -.001]$) but there was not a significant indirect effect from maternal psychopathology at Time 1 to externalizing at Time 3 via adolescent effortful control at Time 2 ($B = .009$, S.E. = .006, 95%CI $[-.0002, .024]$). Given the significant effect of gender on effortful control, we examined whether the association between effortful control at Time 2 and externalizing at Time 3 differed by child gender but found no difference (X^2 difference (1) = 0.49, $p = .48$).

Discussion

The overall goal of the current study was to examine the role of maternal effortful control, substance use, psychopathology, and parenting stress in offspring's childhood and the influence of these factors on children's effortful control in early adolescence as well as its subsequent effect on their adolescent's externalizing behavior. It was hypothesized that greater maternal effortful control would predict greater adolescent effortful control. This hypothesis was supported in the full theoretical model. A small to medium effect was detected such that higher levels of maternal effortful control, measured via maternal conscientiousness at Time 1, were related to greater adolescent effortful control at Time 2. This finding is consistent with previous literature, which suggests that parents with high levels of self-control influence their children's effortful control likely through both genetically influenced pathways and environmental pathways including modeling, teaching, and reinforcing (Ahadi et al., 1993; Gartstein et al., 2013). This is supported by an adoption study examining passive gene-environment correlations by Bridgett and colleagues (2018), which noted that aspects of the child's environment, specifically adoptive parent caregiving behavior, influences their adopted children's effortful control. This finding is also consistent with Bridgett's (2015) integrative framework in which parents may influence their children's biologically based self-regulation as early as in infancy and continue to foster the development of this effortful control throughout early childhood and adolescence. Although links between parent effortful control and child effortful control have been established in early childhood (Jester et al., 2009) and in adolescence (Valiente et al., 2007), the current

study is the first to examine the association between parent and child effortful control longitudinally from childhood to early adolescence.

We next hypothesized that there would be a negative influence of mother's substance use disorder, psychopathology, and parenting stress on adolescent's effortful control and adolescent externalizing behaviors. This hypothesis was partially supported in that a small effect was detected in which greater levels of maternal psychopathology at Time 1 predicted lower levels of adolescent effortful control at Time 2. Our results follow the same pattern as previous literature for fathers, in that paternal psychopathology predicted reduced effortful control in children, which predicted greater externalizing problems in sons (Babadagi et al., 2018; Loukas et al., 2003). This relation between parent psychopathology and child externalizing problems could be genetically driven, in which psychopathological risk is biologically passed on from parent to child (Jaffee, Moffitt, Caspi, & Taylor, 2003), or this relation could be environmentally driven, such that parents with psychopathology exhibit poor parenting skills or provide lower quality family environments, which subsequently reinforces externalizing problems in their children as they develop (Breux, Harvey, & Lugo-Candelas, 2014; Eiden et al., 2007).

In contrast, there were no significant associations between maternal substance use disorder or parenting stress and child effortful control or externalizing behaviors. Previous research has found associations between reduced effortful control in the child and greater externalizing problems in early childhood (Eiden et al., 2007) and adolescence (Adkison et al., 2013) in children of parents with substance use disorders. The lack of these associations may be due to a number of reasons. In the current study because we only looked at the maternal pathway and therefore we are not able to draw any conclusions about how both parents are influencing their children in this sample. Also, statistically, shared variance among maternal characteristics may reduce or eliminate their effects on adolescent outcomes. The lack of association between maternal substance use with the adolescent outcomes may also be because we measured substance use as a lifetime diagnosis. This raises the potential for temporal dissociation among these constructs, such that maternal substance use may have occurred prior to having a child, attenuating these relationships, whereas a diagnosis of current substance use disorder could have a stronger relationship with these constructs. Maternal psychopathology was also measured as a lifetime diagnosis and showed an effect on adolescent effortful control, albeit small, which may have been attenuated by measurement via lifetime diagnosis. Future research should consider testing the associations between current substance use disorder and psychopathology with adolescent outcomes.

Additionally, previous literature has found that parents who reported higher levels of parenting stress had children with higher levels of aggressive behavior (Krahe et al., 2014; Lee et al., 2013). It is possible that we did not find this association in our sample because reports of parenting stress were not sufficiently elevated. Also, it is likely that having a child with problem behaviors could generate more parental stress, suggesting a bidirectional relation between parenting stress and child externalizing behaviors, such that parents and children are influencing one another simultaneously. Since we found correlations of maternal parenting stress and maternal substance use with maternal effortful control and

maternal psychopathology, the effects of parenting stress and substance use on adolescent effortful control and externalizing may affect mother's effortful control rather than their child's effortful control. Further research will need to be conducted to examine how parenting stress and effortful control and externalizing behaviors are influencing one another.

Finally, we hypothesized that there would be an association between the adolescent's effortful control and subsequent externalizing problems. This hypothesis was supported in that there was a medium size association between lower levels of adolescent effortful control at Time 2 and greater adolescent externalizing at Time 2 and a small effect on externalizing at Time 3. The relations between effortful control and externalizing behaviors have been well-established in both childhood and adolescence (Eisenberg et al., 2009; Gartstein, & Fagot, 2003; Nigg, 2006). It is not surprising that children with an inability to focus and shift their attention or inhibit negative behaviors would be more likely to exhibit externalizing behaviors in their everyday life. Consistent with previous research, a lack in self-control results in externalizing behaviors that continue throughout childhood and into adolescence (Eisenberg et al., 2009).

Overall, the findings from the current study indicate that there is longitudinal maternal transmission of effortful control, which is influenced by maternal psychopathology, in predicting adolescent externalizing problems. This is reflected by the small indirect effect detected between maternal effortful control and adolescent externalizing via effortful control. This reflects, in part, a developmental cascade, in which maternal effortful control influences effortful control in early adolescence, which is associated with subsequent externalizing problems (Masten & Cicchetti, 2010). This developmental cascade could have long-lasting negative effects on the child beyond adolescence. Although a significant indirect effect was not observed for maternal psychopathology on externalizing via effortful control, mother's psychopathology did have a small effect on adolescents' effortful control, which may have downstream effects on other child outcomes. Therefore, it will be important to consider various techniques to buffer maternal psychopathology and improve maternal effortful control to improve outcomes for adolescents.

Strengths, Limitations, and Future Directions

The current study has several noteworthy strengths. Unlike other studies that have examined adolescent effortful control and externalizing behaviors as outcomes of early adversity, the current study was longitudinal, prospectively predicting effortful control from adverse maternal characteristics five years earlier. The current study directly assessed maternal psychopathology and considered maternal psychopathology separately from substance use. This allowed a test of whether there was specificity in the influence of maternal substance use disorder.

However, the current study also had several limitations. First, the present study only examined the effect of mothers on child outcomes. Children's relationships with their fathers are important as past literature has shown (Adkison et al., 2013; Eiden et al., 2007). Fathers may have unique effects on children's effortful control or interactive effects with maternal characteristics, which should be investigated in future studies. Also, the current study

purposely used a sample with elevated rates of familial substance use, and likely psychopathology, so results may not generalize to more typical samples. This study used lifetime diagnoses for maternal substance use disorder and psychopathology. A future study may want to examine these measures as current diagnoses to assess these associations with adolescent effortful control and externalizing. In addition, although research has supported the use of conscientiousness as a similar measure to effortful control (Ahadi et al., 2003; Eisenberg et al., 2014), conscientiousness may be broader than effortful control and may explain why there was no relation between some of the expected associations. A more specific measure of effortful control in parents should be used in future studies. Finally, the influence of maternal effortful control on adolescent effortful control can be influenced by a number of other child, parent, and familial factors which were not measured in the current study (Bridgett et al., 2015).

Future studies should consider several factors when conducting research in this field, such as examining mother and father parental adversities longitudinally with effortful control and externalizing behavior. Furthermore, future research should consider a potential bidirectional relation between parenting stress and externalizing behaviors and test these associations longitudinally. Examination of a more specific measure of effortful control in parents, rather than the personality trait of conscientiousness, would also be useful in examining the influence of maternal effortful control on adolescent effortful control. This research could contribute to a more comprehensive understanding of parent influences on adolescent effortful control and externalizing problems.

The current results suggest that maternal psychopathology in particular can negatively impact a child's effortful control and lead to subsequent externalizing problems. This result could potentially inform intervention efforts by incorporating methods to reduce maternal psychopathology or reduce parenting stress to improve concurrent conscientiousness. Furthermore, results show that maternal factors have long spanning effects on adolescent effortful control, which suggests that potential interventions should consider promotion of effortful control early in life for both the mother and child. Results also indicate that maternal effortful control contributes to adolescent effortful control, which subsequently contributes to child's externalizing problems, suggesting that promoting effortful control in parents could improve child behavior. Overall, deeper understanding of the influences of effortful control in adolescence could elucidate methods for future clinical intervention strategies between parents and their children.

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Fig. 1.

Hypothesized model showing predicted pathways from maternal variables to adolescent effortful control and externalizing behavior and subsequent adolescent externalizing behavior one year later.

Fig. 2.

Estimated model showing statistically significant paths from maternal effortful control and psychopathology to adolescent effortful control and subsequent adolescent externalizing behavior one year later. Solid lines represent significant pathways, * $p < .05$, ** $p < .01$.

Table 1:

Descriptive Statistics for Study Variables.

	Time 1			Time 2			Time 3					
	Mean	SD	Min	Max	Mean	SD	Min	Max	Mean	SD	Min	Max
Child Age	6.27	1.26	4.59	10.41	12.21	1.23	11.00	15.00	13.53	1.41	12.01	18.25
Parent Age	28.65	3.44	20.82	39.61	.	.	.	.	.	.	.	.
Parent Income					68250	41428.82	0	225000				
Child EC					-.00	0.55	-1.80	1.28				
Mom EC	3.76	0.57	2.08	4.92								
Parenting Stress	2.31	0.81	1.00	5.00								
Child Externalizing					1.21	0.22	1.00	2.10	1.17	0.21	1.00	2.07
%												
Child Gender	47.0%	Female										
Child Ethnicity	59.3%	Non-Hispanic Caucasian										
Mom Psychopathology	61.6%	No Dx										
Mom SUD	82.9%	No Dx										

Note. N = 460; 0 = female and 1 = male; 1 = Non-Hispanic Caucasian, 0 = other; 0 = no dx and 1 = dx present; EC = Effortful Control; SUD = Substance Use Disorder.

Table 2:

Correlations Among Study Variables

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Mom SUD	1									
2. Mom Psych.	0.26 ^{**}	1								
3. Stress	-0.06	0.03	1							
4. Mom EC	-0.09	-0.15 [*]	0.11	1						
5. EC time 2	-0.07	-0.14 [*]	-0.04	0.23 ^{**}	1					
6. Ext. time 2	0.05	0.13 [*]	0.11 [*]	-0.14 [*]	-0.34 ^{**}	1				
7. Ext. time 3	0.12	0.21 ^{**}	0.12 [*]	-0.11	-0.23 ^{**}	0.62 ^{**}	1			
8. Ethnicity	0.03	-0.05	-0.06	0.05	0.01	-0.03	0.03	1		
9. Gender	-0.03	-0.16 ^{**}	-0.01	-0.02	-0.14 ^{**}	0.04	-0.01	0.05	1	
10. Age time 1	-0.04	-0.01	-0.01	0.03	0.04	0.17 ^{**}	0.19 ^{**}	0.06	-0.03	1

Note. N = 460;

* $p < 0.01$.

** $p < 0.001$.

SUD = Substance Use Disorder; Psych = Psychopathology; Stress = Parenting Stress; EC = Effortful Control; Ext. = Externalizing.