

Chapter 6

PREDICTING CHILDREN’S ANGRY, AGGRESSIVE BEHAVIOR FROM COGNITIVE AND EMOTIONAL SELF-REGULATION

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ABSTRACT

While self-regulation is believed to include both cognitive and emotional aspects, researchers often focus on children’s emotional regulation as a predictor of their angry, aggressive behavior without also considering the role that children’s cognitive regulation may play. The purpose of this study was to investigate how both cognitive and emotional regulation longitudinally predicted children’s aggressive behavior. Children ($N = 92$) and their mothers participated in a study when children were in preschool (T1) and middle childhood (T2). At T1, mothers completed the Childhood Behavior Questionnaire – Short Form (Putnam & Rothbart, 2006) as a measure of effortful control. Preschoolers were observed completing a locked box frustration task during which children’s social speech to mothers and private speech was transcribed. Private speech was categorized as one of five mutually exclusive categories: vocalizations, inaudible muttering, task-irrelevant, negatively valenced task-relevant, and facilitative task-relevant. Approximately four years later, mothers completed the Childhood Behavior Checklist for Ages 6-8 (Achenbach, 1991) and teachers completed the Teacher Report Form for Ages 6-8 (Achenbach, 1991) as a measure of children’s aggressive behavior. Preschoolers with greater effortful control had lower levels of aggressive behavior four years later. In addition, children who spoke more social speech had higher levels of aggressive behavior, which was predicted above and beyond their effortful control. While children’s private speech did not directly predict their aggressive behavior, a significant interaction was found in that children who had more effortful control and used more inaudible

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muttering had lower levels of aggression. These findings support the importance of developing optimal patterns of both cognitive and emotional regulation early in life.

INTRODUCTION

Anger in childhood often coincides with aggressive behavior (Vitaro & Brendgen, 2005), and children with aggressive behaviors are at risk for later problems such as lower academic achievement and reading ability as well as higher rates of school dropout and physical violence (Barrera et al., 2002; Barriga et al., 2002; Kokko, Tremblay, Lacourse, Nagin, & Vitaro, 2006). While it has been found that children's self-regulation is related to their aggressive behavior (e.g., Eisenberg et al., 2004; Eisenberg, Zhou, et al., 2005), little research has investigated how multiple aspects of self-regulation relate to aggressive behavior. The goal of the current study was to examine two facets of self-regulation, specifically effortful control and private speech, as predictors of children's aggressive behavior.

Effortful control is the ability to initiate, stop, or modulate attention and behavior and is seen as a core component in emotion regulation (Eisenberg, Smith, & Spinrad, 2011). It is believed that lower levels of effortful control affects maladjustment by affecting how information relevant to adaptive functioning is processed and the control of emotional experience and behavior (Eisenberg, Spinrad, & Eggum, 2010). Researchers have found that effortful control is part of children's regulatory system because greater effortful control has been related to less displayed anger (Eisenberg et al., 2007; Zhou, Eisenberg, Wang, Reiser, 2004) and externalizing behaviors (Eisenberg et al., 2004; Eisenberg, Zhou, et al., 2005; Spinrad et al., 2007). Therefore, we expected that children with higher levels of effortful control would have less aggressive behavior.

Because children's self-regulation is multifaceted (Sokol & Müller, 2007), emotional aspects of self-regulation, such as effortful control, and cognitive aspects, such as children's social and private speech, need to be examined together to fully understand how children learn to regulate aggression. Private speech is externalized speech directed to the self (Winsler, 2009). When working through a difficult situation, children may talk to other people in the room, which is labeled social speech, or they may talk to themselves, which is private speech. It has been recommended that teachers and parents support their children's use of private speech because it can support their cognitive regulation (Winsler, Carlton, & Barry, 2000; Winsler & Diaz, 1995; Winsler, Diaz, Atencio, McCarthy, & Chabay, 2000; Winsler, Manfra, & Diaz, 2007). Even though private speech is typically examined during cognitive tasks, it has also been found to support children's regulation during emotional contexts (Day & Smith, 2013). Therefore, this study builds on these findings by examining how private speech related to children's regulation of aggression.

There are many forms of private speech, but not all of them support adaptive self-regulation. Children who used more inaudible muttering (so quiet that it cannot be understood) and facilitative task-relevant private speech (related to the task but not focused on negative feelings or aspects of the task) have been found to have better regulation because they displayed greater focus (Berk, 1986), performed better at cognitive tasks (Berk & Spuhl, 1995; Bivens & Berk, 1990; Fernyhough & Fradley, 2005; Winsler, Diaz, et al., 2000; Winsler, Diaz, & Montero, 1997), and displayed more self-regulatory behaviors (Winsler, Ducenne, & Koury, 2011). In addition, children who used more of these types of speech were

found to have less externalizing behavior problems and better social skills (Winsler, de León, Wallace, Carlton, Willson-Quayle, 2003) and less anger in a frustration task (Day & Smith, 2013). These findings support that inaudible muttering and facilitative task-relevant private speech may support children's cognitive and emotional self-regulation because children who used more of these types of private speech performed better cognitively and were able to regulate their emotion. Therefore, in the current study, inaudible muttering and facilitative private speech were expected to be related to lower levels of aggressive behavior because these types of private speech are related to higher levels of self-regulation.

In contrast, children who used more vocalizations (audible noises that were not words), task-irrelevant private speech (unrelated to the task at hand), and negatively valenced task-relevant private speech (related to the task but focused on task difficulty) have been found to perform poorer on cognitive tasks (Berk & Spuhl, 1995; Winsler et al., 2003) and on a self-regulatory battery (Winsler et al., 2011) and were rated as having greater externalizing problem behaviors and poorer social skills (Winsler et al., 1997). In addition, these children were rated as poorer at regulating their emotion (Broderick, 2001) and were found to display more anger and sadness in a frustration task (Day & Smith, 2013). Therefore, vocalizations, task-irrelevant, and negatively valenced private speech were expected to be related to higher levels of aggressive behavior because they have been related to less optimal self-regulation.

While some categories of private speech may support children's regulation, the use of social speech may interfere with their regulation skills. For example, Winsler et al. (2011) found that children who tried to speak to an experimenter through a closed door had poorer performance on a self-regulation battery, while Day and Smith (2013) found that children who tried to speak to their mothers during a frustrating situation displayed more sadness. In both of these situations, children were attempting to elicit help from people who were instructed to not offer any guidance; therefore, the social speech did not prove to be an effective regulation strategy. Children who use higher levels of social speech during regulatory tasks may be doing so because they are less capable of regulating their behavior independently and are using social speech to elicit help in regulating their behaviors. The current study seeks to investigate whether children's social speech during a frustration task predicts their angry, aggressive behavior. If children use more social speech as a means of supporting their regulation, it may reflect their lack of self-regulation; thus, we would expect children who use more social speech would also be higher on aggressive behaviors.

This study is the first in which the combined contributions of both emotional and cognitive self-regulation were examined as predictors of aggressive behavior. Language supports children's early self-regulatory abilities to make it easier for them to use outside regulatory influences by communicating needs, controlling their emotions, and understanding situations (Cole, Armstrong, & Pemberton, 2010; Thompson, 1990). Even though effortful control has been related to less aggression (Eisenberg et al., 2004; Eisenberg, Zhou, et al., 2005), we predicted that private and social speech would explain a unique amount of variance above and beyond children's effortful control. How children speak to themselves or to others during a task may either enhance or diminish their regulatory abilities; therefore, because of the important role of language in supporting children's self-regulatory abilities, we expected it to have an additional unique contribution in understanding children's aggression.

It was also expected that private speech would interact with effortful control to predict aggressive behavior because self-regulation includes both emotional and cognitive aspects (Grolnick & Farkas, 2002). Private speech is often seen as a tool of cognitive self-regulation

(e.g., Winsler, 2009), and effortful control is typically viewed as a tool of emotional self-regulation (e.g., Eisenberg et al., 2011). Tasks that require self-regulatory skills typically tap into both cognitive and emotional skills. Because cognitive and emotional regulation are both required during regulatory tasks, we expected that children who use both tools effectively will have less aggressive behavior. Examining how cognitive self-regulation in the form of private speech and emotional self-regulation in the form of effortful control interact to predict children's aggressive behavior will provide a better picture of the development of aggression. If children's private speech is an additional means of self-regulation along with their effortful control, we would expect that children who used higher levels of the more beneficial forms of private speech (inaudible muttering and facilitative task-relevant) and who had higher levels of effortful control would have lower levels of aggressive behavior.

CURRENT STUDY

The focus of this study was on how children's regulation during the preschool years predicted later aggressive behavior. The preschool years are an important time period in the development of private speech because private speech usage peaks during this time as a way for children to regulate their own behavior before this speech is internalized (Berk & Winsler, 1995). In addition, children are learning to regulate independently and should become less dependent on their parents (Denham, 1998), and, thus, children who are better at self-regulation in preschool would be expected to have less aggression at later developmental periods.

Children's private speech may reflect greater internalization of their parents' assistance during frustrating situations versus children who primarily use social speech and continually seek help from their parents. It was expected that higher levels of social speech, reflecting poorer self-regulation, would predict higher levels of aggression above and beyond their effortful control. In addition, less beneficial private speech (vocalizations, task-irrelevant, and negatively valenced) and more beneficial private speech (inaudible muttering and facilitative task-relevant) in the preschool years were expected to predict lower levels of children's aggression above and beyond children's effortful control. It was also expected that private speech would moderate the relation of effortful control to aggressive behavior in that children who spoke more beneficial private speech and had higher effortful control would have lower aggression.

METHOD

Participants

Mothers and their children ($N = 92$, 51 boys) took part in a longitudinal study during preschool (T1, $M = 4.91$ years, $SD = 0.27$ years) and middle childhood (T2, $M = 8.80$ years, $SD = 0.39$ years). Only children with complete data were used in analyses. Mothers were initially recruited when their children were toddlers through local childcare centers and a developmental sciences database, which included local families with young children. Families

in the database were from direct mail companies or had previously participated in research and were interested in future research. The T1 assessment took place approximately two years after initial recruitment, and the T2 assessment was approximately four years later.

At the T1 assessment, the majority (93.5%) of the mothers were married, and the average family income was nearest to the range of \$60,000 to \$75,000 ($M = 5.0$ where 1 = less than \$15,000, 2 = \$15,000-\$30,000, 3 = \$30,000-\$45,000, 4 = \$45,000-\$65,000, 5 = \$60,000-\$75,000, 6 = \$75,000-\$100,000, 7 = over \$100,000). The ethnicity of the mothers was 95.6% white/Caucasian, 2.2% Hispanic/white, 1.1% Native American, and 1.1% other. For maternal education, 3.3% of the mothers had a high school degree or less education, 19.6% had some college or a 2-year degree, 41.3% had a 4-year college degree, and 35.8% had an advanced degree. The demographics of the sample match the demographics of the recruitment area.

Attrition analyses were completed to compare those who participated at T1 with those who did not participate at T2 on demographic and study variables. Mothers who did not participate at T2 were less likely to be married compared to those who did, $X^2(2, N = 116) = 16.33, p < .01$. There were no other demographic differences between those who did and did not participate at T2. Children who participated at T2 used more negatively valenced task-relevant private speech than those who did not participate, $t(114) = -3.22, p < .01$. There were no other differences on study variables between those who did and did not participate.

Procedure

Preschool assessment (T1). After initial recruitment, mothers were contacted about participating in a laboratory visit when their children were preschool-aged. After agreeing to participate, mothers completed questionnaires during the laboratory visit including the Childhood Behavior Questionnaire – Short Form (CBQ; Putnam & Rothbart, 2006). Mothers were given a \$20 gift card and children were given two small toys to thank them for their participation.

During the laboratory assessment, children completed many tasks, including a locked box frustration task (PS Lab-TAB; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1993). The task included a clear plastic box, a practice lock and key, a lock, a ring of keys, and two sets of attractive toys (two superheroes or a prince and princess). With children seated at a child-sized table, the experimenter demonstrated how to open the practice lock with the key. After children understood how to open the lock, the experimenter had them choose the two toys they liked the best. The preferred toys were placed in the clear box, the lock was placed on the outside, and children were given the ring of keys. Children were told that the experimenter had to do some work outside of the room, but that they could use the keys to open the box and once they did they could play with the toys inside. The correct key was not on the given ring of keys. Children were then left with the locked box while mothers sat approximately eight feet away within the room. After four minutes, the experimenter came back into the room, apologized for not including the correct key, and helped the children open the box. Children were then allowed to play with the toys. The first four minutes from the time the experimenter left the room were used for coding purposes.

At the beginning of the visit and right before the locked box task began, mothers were quietly asked to not assist their children with the task. Mothers were instructed that if their children asked for help to tell them that they were working on something and would help

them when they were done. Mothers also had a list of instructions for each task with them during the entire visit which also reinforced our request not to help their children with the frustration task.

Middle childhood assessment (T2). Approximately four years later, mothers were contacted again to complete questionnaires. Mothers completed the questionnaires at home and either mailed them back or brought them if they decided to also complete a laboratory visit. Included in the questionnaire packets was the Childhood Behavior Checklist for Ages 6-8 (CBCL; Achenbach, 1991). Mothers were also asked for permission to contact their children's teachers. Once maternal consent was obtained, teachers were contacted about completing a packet of questionnaires. If they agreed, teachers were mailed a packet of questionnaires, including the Teacher Report Form for Ages 6-8 (TRF; Achenbach, 1991). Mothers and teachers were each given a \$20 gift card to thank them for their participation.

Measures

Children's speech (T1). Children's speech during the locked box task was transcribed according to Winsler, Fernyhough, McClaren, and Way (2005) and was first separated into utterances. An utterance was a clause with intentional markers of termination, a sentence fragment, a conversational turn, a complete sentence, or any speech that was separated by another by at least two seconds. Utterances could not include any semantic discontinuities, such as a significant change of content. The transcriptions were checked during the subsequent coding process, which occurred while watching recordings of the task. Speech was coded as either social speech or one of the mutually exclusive private speech categories, based off previous research (Chiu & Alexander, 2000; Krafft & Berk, 1998; Manning, White, & Daugherty, 1994; Winsler et al., 2005), and the frequency of each category of speech during the entire task was coded.

Children's *social speech* included any speech toward the mothers, which could be indicated by looking at mothers, using a pronoun reference, and conversation turn-taking (e.g., "Mommy, can you help me with this?"). Private speech coding classified each utterance into one of five categories: *Vocalizations* (noises that were not actual words, e.g., "Uhh", "Bo do do", "Ohumph"); *task-irrelevant private speech* (unrelated to the task at hand, e.g., "Is it raining outside?"); *inaudible muttering* (appeared to be words, but were not understandable); *negatively valenced task-relevant private speech* (related to the task at hand but was focused on task difficulty or children's inability to complete the task, e.g., "I can't do this."); and *facilitative task-relevant private speech* (related to the task at hand, but not seen as inhibiting progress or focusing on the negative, e.g., "First I'll try this key."). The total number of utterances for each category was used in analyses. Two individuals both coded 20-percent of the transcripts to establish reliability. Interrater reliability (κ) was .90, reflecting agreement between coders among all speech categories.

Effortful control (T1). Maternal report of effortful control was measured using two scales of the CBQ (Putnam & Rothbart, 2006): inhibitory control (6 items, $\alpha = .68$, e.g., "Can easily stop an activity when s/he is told 'no.'") and attention shifting (6 items, $\alpha = .70$, e.g., "When drawing or coloring in a book, shows strong concentration."). Mothers used a 7-point scale (1 = never, 4 = about half of the time, 7 = always) to rate the items. The scales were chosen based on theoretical conceptualizations of effortful control (Eisenberg et al., 2011).

The inhibitory control and attention shifting scales of the CBQ were significantly correlated, $r(90) = .30$, $p < .01$; therefore, they were combined by averaging the subscales to create an effortful control scale.

Aggressive behavior (T2). The CBCL and TRF (Achenbach, 1991) consisted of 112 items that described the children within the last two months. Mothers and teachers rated these items on a 3-point scale (0 = not true, 1 = somewhat or sometimes true, 2 = very true or often true). The CBCL and TRF were scored using the Assessment Data Manager (ADM) program (Achenbach, 1991). The raw score from the aggressive behavior scale was used. Mother-reported and teacher-reported aggressive behavior were significantly correlated, $r(90) = .36$, $p < .01$, so a composite variable was created by averaging the two scales.

RESULTS

Descriptive statistics for all variables are presented in Table 1. Task-irrelevant private speech had to be dropped from analyses because it was too low occurring. Aggressive behavior and inaudible muttering were skewed, so a square root transformation was performed on each variable (Tabachnick & Fidell, 2006). The transformed variables were used in analyses.

Table 1. Descriptive Statistics of Variables

	<i>M</i>	<i>SD</i>	Minimum	Maximum
Aggressive behavior*	1.50	1.00	0.00	4.90
Effortful control	4.87	0.63	3.25	6.42
Social speech	11.51	7.67	0.00	44.00
Vocalizations	7.63	5.49	0.00	30.00
Inaudible muttering*	0.34	0.59	0.00	2.00
Negatively valenced task-relevant	1.24	1.56	0.00	7.00
Facilitative task-relevant	8.54	8.75	0.00	42.00

Notes. The social and private speech scores were frequencies of utterances during the entire task. *A square root transformation was performed to correct for skew.

Table 2. Regression Analysis Predicting Aggressive Behavior from Effortful Control and Social Speech

	Aggressive Behavior		
	β	R^2	ΔR^2
1. Age	.06	.03	.03
2. Effortful control	-.30*	.11	.08*
3. Social speech	.30*	.20	.09*
<i>F</i> for model	7.25**		

Notes. * $p < .05$, ** $p < .01$, *** $p < .001$. The betas reported are the standardized betas from the last step.

The first regression analysis examined preschool effortful control and social speech as predictors of school-aged aggression (see Table 2). Child age was entered on the first step as a control variable because of the wide age range of the children, effortful control was entered

on the second step, and social speech was entered on the third step. Children who had higher levels of effortful control had lower levels of aggression. Children’s social speech also predicted aggression above and beyond effortful control. Children who spoke less social speech had lower levels of aggression, even after controlling for their levels of effortful control.

Table 3. Regression Analysis Predicting Aggressive Behavior from Effortful Control and Private Speech

	Aggressive Behavior		
	β	R^2	ΔR^2
1. Age	-.07	.03	.03
2. Effortful control	-.27**	.11	.08**
3. Vocalizations	-.04	.12	.02
Inaudible muttering	.04		
Negatively valenced task-relevant	-.02		
Facilitative task-relevant	-.06		
4. Vocalizations x Effortful control	-.21*	.16	.04*
<i>F</i> for model	2.36*		

Notes. * $p < .05$, ** $p < .01$. The betas reported are the standardized betas from the last step.

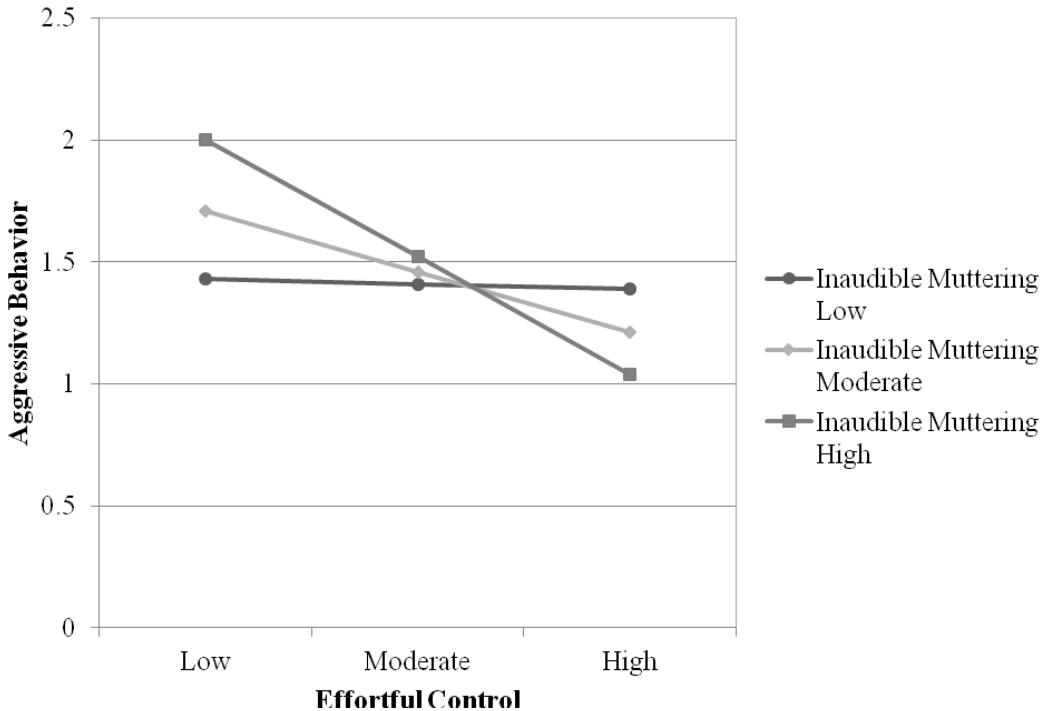


Figure 1. Simple slopes displaying the relation of effortful control to aggressive behavior are shown at three different levels of inaudible muttering. The relation of effortful control to aggressive behavior was significant for children who used moderate and high, but not low, levels of inaudible muttering.

The second regression analysis examined preschool effortful control and private speech as predictors of school-aged aggression (see Table 3). Following recommendations for testing interactions from Cohen, Cohen, West, and Aiken (2003), all predictor variables were centered. Child age was entered on the first step, effortful control was entered on the second step, and the speech variables were entered on the third step. To investigate how private speech moderated the relation of effortful control to aggression, interaction variables were entered on the final step. Interaction variables were created by multiplying the private speech variables by effortful control, and the interaction terms were allowed to enter in a stepwise method to preserve power. As in the previous analysis, effortful control was a significant predictor of aggression. The private speech variables did not predict children's aggression; however, a significant interaction was found between inaudible muttering and effortful control (see Figure 1). The significant interaction was probed following procedures described by Cohen et al. (2003). The negative relation of effortful control to aggression was significant for children who used moderate (slope = -0.41 , $p < .01$) and high levels (slope = -0.77 , $p < .01$) of inaudible muttering but not for children who used low levels (slope = -0.04 , ns). The negative relation between aggressive behavior and effortful control was significant for children who used high and moderate levels of inaudible muttering.

CONCLUSION

The results of this study demonstrate that children's speech during a frustration task longitudinally predicted their aggressive behavior after controlling for their effortful control. Even though more effortful control was associated with less aggressive behavior approximately four years later, preschoolers who used more social speech had higher levels of aggressive behavior, which was predicted above and beyond their effortful control. While preschoolers' private speech did not directly predict their aggressive behavior, an interaction was found between children's effortful control and their inaudible muttering. Children with higher levels of effortful control had lower levels of aggression when they also displayed more inaudible muttering. Finding that cognitive and emotional regulation interacted and together predicted later aggressive behavior supports the importance of investigating multiple measures of self-regulation, including cognitive and emotional components.

As expected, higher levels of effortful control predicted lower levels of aggression. This finding supports previous research that children who are higher in effortful control also display better regulation (e.g., Eisenberg et al., 2004; Eisenberg, Zhou, et al., 2005). Therefore, it is likely that children who had better regulation in preschool were able to control their behavior so that they did not have higher levels of angry, aggressive behavior four years later.

It was unexpected that private speech did not predict aggressive behavior above and beyond children's effortful control. Previous research has found that children's private speech predicted their externalizing behavior (Winsler et al., 2003), but this research occurred at one time point in the preschool years and private speech was measured during cognitive tasks. In contrast, longitudinal relations between private speech and aggressive behavior may be more complicated than what is examined at one point in time, and examining emotion regulation

along with cognitive regulation may be necessary, as private speech significantly interacted with effortful control.

Even though there was not a direct effect of private speech on aggression, significant moderation was found. Children who had higher levels of effortful control had lower levels of aggression when they also used more inaudible muttering. Inaudible muttering is believed to be the last step in the process of internalizing private speech and are words spoken so quietly that they cannot be understood (Krafft & Berk, 1998). Children who use more inaudible muttering may be more advanced with their self-regulation and were therefore able to control their aggressive behavior later in life. Therefore, it may be indicating that the combination of effortful control and inaudible muttering was the most beneficial for understanding later aggression. This research supports the importance of investigating both cognitive and emotional regulation together to more fully understand how private speech relates to later aggressive behavior.

As expected, children who spoke less social speech were reported to have less aggression, which was predicted above and beyond effortful control. It may be important for children to practice their regulatory skills independently rather than focusing on their mothers and attempting to seek help from their mothers when frustrated. In addition, children who did not seek help from their mothers through social speech may have been better at self-regulation in preschool. Previous research has also found that social speech may be related to poorer regulation (Day & Smith, 2013; Winsler et al., 2011). More independent regulation in preschool may be related to better regulation later as seen by lower levels of aggression. This research emphasizes the importance of encouraging children's independent self-regulation so that they are able to hone these regulation skills during the preschool years.

While the sample was primarily a homogenous and moderately affluent population, there were strengths to the study design. The study had a longitudinal design, and multiple reporters were used to measure aggressive behavior. Future research should include observational measures of children's effortful control and aggressive behavior. In addition, researchers should investigate these relations in a more diverse population to increase the generalizability of the findings.

Children's self-regulation is typically investigated as a cognitive or emotional ability. However, self-regulation is multifaceted (Sokol & Müller, 2007), and our findings support the need to view it as such. When children are faced with a situation that causes them to draw on their self-regulatory skills, they are most likely regulating both cognitive and emotional impulses. Previous researchers have found that emotional aspects of regulation are related to children's aggression (e.g., Eisenberg et al., 2004; Eisenberg, Zhou, et al., 2005), but little research has investigated both cognitive and emotional regulation together for how they predict aggressive behavior. This research illustrates that parents and teachers need to support children's independent cognitive and emotional regulation during early childhood because both are important to children's later development.

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