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The effect of taxing situations on preschool children's responses to peer conflict

Jessica S. Caporaso *, Stuart Marcovitch

University of North Carolina at Greensboro, United States

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ABSTRACT

Preschool children are often faced with situations that could tax their cognitive resources and consequently affect their abilities to navigate subsequent social problems. Following taxing situations, children may be more likely to enact impulsive, aggressive responses instead of competent responses during peer conflict episodes. We exposed 114 5-year-old children to either a brief taxing procedure or one of two control procedures, followed by a social problem solving task. Children in the Taxing condition were more likely to endorse physically aggressive responses and less likely to endorse prosocial responses to peer social situations compared to the control conditions. The results suggest that taxing situations can negatively impact children's social problem solving skills. We discuss the possibility that the observed taxing effect provides preliminary evidence for a causal link between executive function and social competence.

1. Introduction

Preschool children are often required to complete tasks that are not enjoyable and may require considerable amounts of behavioral control (e.g., sitting still while listening to their teacher or waiting for dessert after dinner). At the same time, children's executive function (EF)— the control of thoughts, behaviors, and emotions—is rapidly developing and they become increasingly able to complete these tasks with relative ease (e.g., Carlson, 2005; Zelazo et al., 2013). Based on a large body of research, we know that children can wait longer and have less difficulty following directions, and can better focus their attention, control emotional expressions, and inhibit undesirable behaviors as EF abilities develop from early to middle childhood (Blair, 2002; Carlson & Wang, 2007; Carlson, 2005; Denham, Way, Kalb, Warren-Khot, & Bassett, 2013; McClelland, Morrison, & Holmes, 2000; McClelland, Acock, & Morrison, 2006; Willoughby, Wirth, Blair, & Family Life Project Investigators, 2012). Nevertheless, the everyday situations that require children to use these abilities (i.e., *taxing situations*) may tax their cognitive capacities and make them more susceptible to near-future lapses in control.

Previous research suggests that taxing situations can elicit cognitive fatigue or depletion in children and that these situations affect later performance on cognitive tasks (Gunzenhauser & von Suchodoletz, 2014; Oeri & Roebers, 2020; Peverill, Garon, Brown, & Moore, 2017; Pnevmatikos & Trikkaliotis, 2013). Similar results have also been found with children in the social domain. For example, Powell and Carey (2017) found that preschool children who completed a cognitive control task subsequently had worse performance on measures of theory of mind, primarily children's understanding of false beliefs, a skill that has a robust association with EF (e.g., Carlson & Moses, 2001; Hughes & Ensor, 2007; Marcovitch et al., 2015; Sabbagh, Xu, Carlson, Moses, & Lee, 2006; for review, see

* Corresponding author at: Department of Psychology, UNCG, Greensboro, NC 27402, United States.
E-mail address: jlstark@uncg.edu (J.S. Caporaso).

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Devine & Hughes, 2014). In a study on altruistic sharing behavior, Steinbeis (2018) found that 6- to 9-year-old children shared significantly fewer stickers following the completion of a taxing cognitive control task than children in the control condition. Steinbeis reasoned that taxing control resources makes it harder for children to engage in the effortful coordination of costs and benefits needed to facilitate altruistic sharing. However, no studies have examined the taxing effect in regard to children's social competence, another social behavior that has long been associated with EF (e.g., Alduncin, Huffman, Feldman, & Loe, 2014; Caporaso, Boseovski, & Marcovitch, 2019; Denham et al., 2014; Hughes, White, Sharpen, & Dunn, 2000; Kochanska & Knaack, 2003; Razza & Blair, 2009; Rhoades, Greenberg, & Domitrovich, 2009).

A major milestone of social competence development is the ability to resolve peer conflicts in an appropriate manner (Raikes, Virmani, Thompson, & Hatton, 2013). In fact, Rubin and Rose and Asher (1999) argued that interpersonal problem solving is the very definition of social competence in children. Social competence in an interpersonal problem solving context is a spectrum of responses that range from prosocial responses that directly address the conflict on one end to maladaptive aggressive responses on the other end. Aggressive episodes are not uncommon and may even be normative during the preschool years for typically developing children (Hay et al., 2011; Tremblay et al., 2004), particularly as children learn how to navigate the ubiquitous instances of peer conflict in preschool classrooms (Chen, Fein, Killen, & Tam, 2001; Raikes et al., 2013). Yet, aggression in response to provocation, referred to as *reactive aggression* (Ostrov, Kamper, Hart, Godleski, & Blakely-McClure, 2014), is associated with peer rejection (Dodge et al., 2003) and can lead to adjustment difficulties in the transition to kindergarten (Denham & Bassett, 2018; Denham et al., 2013; Ziv, 2013). Thus, it is important to understand when children may be more susceptible to instances of reactive aggression as well as the underlying mechanisms of social competence in peer conflict.

Research has identified that social competence, and particularly reactive aggression, is associated with numerous cognitive control abilities subsumed under EF (for discussion of these abilities, see Garon, Bryson, & Smith, 2008; Lehto, Juujaervi, Kooistra, & Pulkkinen, 2003). Reactive aggression is negatively associated with the ability to inhibit prepotent or dominant behavioral responses (Denham et al., 2014; Poland, Monks, & Tsermentseli, 2016), switch from one response set to another (Granvald & Marciszko, 2016), and hold and manipulate information in conscious mind (Caporaso et al., 2019). EF is likely associated with social competence because aggressive responses to conflict are often characterized as impulsive and driven by the experience of frustration and anger. The Response Evaluation and Decision (RED) model (Fontaine & Dodge, 2006) postulates that evaluative processes precede a behavioral response to conflict and that the quality of children's evaluation of different response options may determine their behavioral outcome. However, the RED model suggests that aggressive reactions are not always preceded by an evaluative process, which may be skipped altogether in favor of an impulsive response. Research on the RED model has found modest correlations between kindergarten children's response evaluation patterns and teacher and parent reported aggressive behavior (Fontaine, Yang., Dodge, Pettit, & Bates, 2009). Furthermore, Fontaine et al. (2009) suggest that impulsive responses to conflict might be particularly characteristic in the kindergarten years because of limitations in the ability to engage fully in reflective thought. EF, then, may allow children to temper emotional responses and inhibit the impulsive response in favor of reflective processes before the enactment of a response.

Although less explored, EF is also positively associated with choosing prosocial solutions to conflict (Denham et al., 2014). It is possible that similar reflective mechanisms may support children's prosocial, cooperative responses to peer conflict. Compared to other competent responses to conflict, such as removing oneself from the situation or telling an authority figure, prosocial responses are not script-based responses that could be applied to any conflict situation. Rather, prosocial responses must be tailored to the specific situation so that the conflict is adequately resolved for both of the involved parties or is directly addressed by the victim of the provocation. For example, if the conflict situation is centered around a desired toy, the prosocial response would be to take turns sharing the toy or to play with the toy together. Other prosocial responses would include directly addressing the transgressor to resolve the conflict without the assistance of others, such as telling a transgressor to stop making fun of their drawing. Because of the need to construct a situation-specific response, prosocial responses may be more effortful than simply avoiding the situation or relying on the help of an authority figure to resolve the situation. Even if the prosocial response choices are provided for children (e.g., Denham et al., 2014), there may still be a need for reflective thought to overcome choosing an easier, script-based response and respond in a way that resolves the conflict.

Reflective thought is considered a primary mechanism of EF (Marcovitch & Zelazo, 2009; Zelazo, Müller, Frye, & Marcovitch, 2003; Zelazo, 2004, 2015). The levels of consciousness theory (Zelazo, 2004) postulates that as children develop, they are better able to exert cognitive control as they develop the skills to reflect on the contents of their conscious mind. Yet, the model also states that even adults often operate at lower levels of consciousness due to the effortful nature of reflective thinking. In addition, the presence of negative emotions may interfere with children's ability to reflect on the current situation (Blair, 2014; Calkins & Marcovitch, 2010). Applied to social competence, preschool children may have the capability to engage in the necessary reflective processes to abstain from aggressive responses and enact prosocial responses to conflict, but because reflection is effortful, they may be unable to do so in states of cognitive fatigue or negative moods.

Research with adults provides some support for the importance of reflection for abstaining from aggression and the detrimental effect of taxing situations on these processes. Stucke and Baumeister (2006) found that adults who were asked to engage in a task that required cognitive control were more likely to respond aggressively in reaction to negative feedback. They concluded that the ability of adults to inhibit aggression was a limited resource because of its reliance on cognitive control. Osgood and Muraven (2016) also found that adults in a lowered self-regulation state (i.e., ego-depletion) responded to an insult more aggressively. In addition, these participants took less time to respond to the insult, and rates of aggression diminshed when a 30-second delay was imposed before they could respond and they were encouraged to think about the consequences of an aggressive response. These results are in line with the RED model, which suggests that perhaps taxing situations may have a similar effect on children.

However, there is still a need to conduct empirical research on this issue in children to explore whether children's aggressive

responses have the same underlying mechanisms as adults and if these mechanisms are also implicated in prosocial responses to conflict. Because taxing situations have been previously shown to affect social behavior associated with EF (e.g., Powell & Carey, 2017; Steinbeis, 2018), it stands to reason that taxing situations may also have a detrimental effect on children's subsequent ability to resolve peer conflicts. Thus, the use of taxing situations will not only provide novel empirical contributions on the effect of taxing situations on children's social problem solving abilities but may also provide valuable insight into the underlying mechanism of social competence during the preschool period.

1.1. The current study

The current study was designed to examine the impact that taxing situations could have on preschool children's responses to peer provocation. We employed a taxing situation that was a modified version of mindfulness procedures previously used with preschool children. In the mindfulness procedures, children are given prompts that focus attention to encourage both the mindful consideration of the current moment and relaxation. Yet many of these procedures are comprised of short tasks that resemble the waiting, listening, and delay of behavior tasks that preschool children often encounter in their everyday lives and have been found to rely on cognitive control abilities, particularly those used in the Preschool Self-Regulatory Assessment (Smith-Donald, Raver, Hayes, & Richardson, 2007). For example, one of the mindful tasks used in the current study requires children to wait five minutes to eat a desired snack, including having to wait to eat the snack when it is in their mouth while they contemplate the perceptual characteristics of the snack (e.g., how the snack feels and what the snack looks like; Boguszewski & Lillard, 2015). Without the mindfulness prompts (i.e., the questions about the perceptual characteristics), this task greatly resembles cognitive control measures in children that are cognitively taxing (e.g., delayed snack or delayed gift, Kochanska & Knaack, 2003; Kochanska, Murray, Jacques, Koenig, & Vandegeest, 1996; tongue task, Smith-Donald et al., 2007; delay of gratification tasks; Garon, Longard, Bryson, & Moore, 2012; Mischel, Shoda, & Rodriguez, 1989).

When children are presented with a desirable item (e.g., snack or toy), but are not able to enjoy the item immediately, they may have difficulty with inhibiting approach behaviors towards that item. Consequently, delay measures, as well as measures that ask children to inhibit motor functions, correlate with other validated measures of cognitive control (Smith-Donald et al., 2007). In fact, neural research shows that the prefrontal cortex is activated during delay of gratification tasks in preschool children, particularly for children who struggle to delay gratification (Moriguchi, Shinohara, & Yanaoka, 2018). The authors interpret these findings as evidence that preschool children engage cognitive control mechanisms during delay tasks, even if they ultimately fail the task. Paired with previous findings that cognitive control tasks negatively affect performance on subsequent cognitive and social tasks (e.g., Peverill et al., 2017; Powell & Carey, 2017; Steinbeis, 2018), the taxing procedure used in the current study is expected to have a similar effect on children's aggression.

It is important to keep in mind that what distinguishes mindfulness tasks from cognitive control tasks is the inclusion of mindfulness prompts that focus on the perceptual characteristics of the current moment paired with activities that promote relaxation (e.g., mindful breathing). The guided instructions are meant to equip children with the skills to handle later instances of cognitive load more efficiently while relaxation techniques assist children with the regulation of the negative emotions that stem from difficult tasks (e.g., Zelazo & Lyons, 2012). Keng, Tan, Eisenlohr-Moul, and Smoski (2017) even describe mindfulness training as being a "cognitively efficient" (p. 98) training compared to other cognitive-based treatments for adults with mood disorders, and it has been used in experimental designs with children to reverse the effects of depletion activities (Leyland, Emerson, & Rowse, 2018). Therefore, the taxing procedure used in the current study removed the prompts that encourage attention to perceptual characteristics and the prompts that promote relaxation, with the idea that the mindfulness tasks without the guided directions should induce cognitive fatigue.

Our original intention was to compare mindfulness training to the taxing situation but it was discovered early in testing that the brief, one-time mindfulness training procedure used in the current study (Boguszewski & Lillard, 2015) did not produce the intended mindfulness effects. Previous studies that have used brief, one-time mindfulness training procedures have found an immediate increase in preschool children's EF abilities (e.g., Boguszewski & Lillard, 2015; Lim & Qu, 2017; see also Leyland, Rowse, & Emerson, 2019 for review). Other studies that have used longer, multi-session mindfulness training procedures have found similar increases in EF, but also increases in prosocial behavior and decreases in antisocial behavior (e.g., Black & Fernando, 2014; Flook, Goldberg, Pinger, & Davidson, 2015; Schonert-Reichl et al., 2015). Because aggressive behavior is associated with EF and brief mindfulness trainings have been shown to produce a change in EF, we believed that a brief training period could also produce a change in aggressive behavior. However, as it was made clear during the early testing phase, the mindfulness training procedure in the current study did not produce the expected effect on EF, as measured by a flanker task.[1] When we also considered that the previous research that observed social behavior change utilized multi-session training designs, we decided to use the mindfulness task as a control (i.e., Mindful-Control condition) to the taxing procedure, rather than a meaningful experimental condition. Notably, the Taxing and Mindful-Control conditions were identical except for the guided instructions in the latter condition. We also decided to include a non-taxing control to counter the effects of the mindfulness procedure that contained the components of the other two conditions but with modified activities so to not promote focused attention or tax the participants (i.e., Non-Taxing Control condition).

[1] After $n = 20$ participants, there was no evidence of replicating the effect of mindfulness on cognitive control, and children reported negative emotions following the mindfulness training condition. In addition, because of ceiling effects and its role as a secondary measure, the flanker task was dropped from further analysis.

We were primarily interested in the effect of the Taxing condition on responses to the peer social situations presented by an adapted version of the Challenging Situations Task (Denham et al., 2013). In this task, participants are faced with a social conflict and given four forced-choice response options: physical aggression, verbal aggression, avoidant, and prosocial. We hypothesized that participants in the Taxing condition will be more likely to endorse physical and verbal aggressive responses and less likely to endorse prosocial responses to peer conflict compared to participants in the Mindful-Control and Non-Taxing Control conditions because taxing situations may interfere with children's abilities to engage in reflective processing.

We also considered participant gender[2] in all primary analyses in an exploratory fashion. Previous research has found that boys tend to show greater displays of reactive direct aggression (i.e., physical and verbal aggression; Crick et al., 2006; McEarchern & Snyder, 2012; Ostrov et al., 2014; Ostrov & Keating, 2004; Poland et al., 2016). On the one hand, gender differences in aggression rates may not interact with the hypothesized main effects because it is unclear if boys and girls would differentially react to the taxing procedure used in the current study. In fact, previous taxing situation research has failed to find differences based on gender (e.g., Gunzenhauser & von Suchodoletz, 2014; Powell & Carey, 2017; Steinbeis, 2018). On the other hand, the noted gender difference in overt aggression may indicate that boys are more prone to immediate aggressive solutions to conflict and consequently have higher cognitive control demands to inhibit such responses. Therefore, they may be more susceptible to the taxing procedure and provide more aggressive responses in the Taxing condition than girls.

2. Method

2.1. Participants

One hundred and fourteen 5-year-old children, 50 % girls, participated in this study (range: 5;0–6;0 years, $M = 5;5$, $SD = 0;4$). Of the families who reported their racial and/or ethnic identity ($n = 102$), 61 % identified as White, 21 % African American, 6 % Hispanic, 6 % Multi-Racial, and <1 % Asian. Of the families who reported annual household income ($n = 97$), 27 % reported earning less than $40,000 a year, 37 % reported earning $40,000-$90,000 a year, and 36 % reported earning over $90,000 a year. Participants were recruited through a participant database for which parents in a midsized Southeastern United States city voluntarily sign-up their children for participation in research studies. The study was approved by University of North Carolina at Greensboro's Institutional Review Board.

2.2. Materials and procedure

Testing was done at local preschools or in a lab space at the university. Following parental consent for testing and video recording, participants were randomly assigned to one of three conditions: Taxing, Mindful-Control, and Non-Taxing Control. There was an equal number of participants in each condition ($n = 38$). Each condition was matched in length of time it took participants to complete each task. In addition, the materials that were present during each of the tasks and the amount of verbal instruction provided to the participants remained constant across the three conditions (see Table 1). Following their participation in one of the conditions, all participants completed a modified version of the Challenging Situations Task (Denham et al., 2013), the Virtual School Game.

2.2.1. Taxing condition

The Taxing condition was closely modeled after the mindfulness tasks used by Boguszewski and Lillard (2015) but did not include the mindfulness prompts. Participants began the Taxing condition with the line walking task, in which they were instructed to walk around the outlined circle for 2 min and were told not to walk too fast so they would not get dizzy. This task is quite similar to the "walk the line" or "balance beam" tasks used in previous studies to assess children's behavioral control (e.g., Kochanska & Knaack, 2003; Smith-Donald et al., 2007). Participants were then instructed to lie down on their backs for 2 min on the yoga mat and hold the stuffed animal "for rest time". For the third task, participants were told to sit quietly while a meditation bell sound played for 2 min. Finally, participants completed the gummy bear task, in which participants were instructed to look at a gummy bear on a napkin for 1.5 min, hold the gummy bear in their hand for 1.5 min, put the gummy bear in their mouth but not chew for 1 min, and then chew the gummy bear but not swallow it for 1 min. During each of the tasks, the experimenter repeated the directions but did not include the verbal prompts present in the original mindfulness procedure that directed attention (see Mindful-Control condition below). These tasks should tax participants because without appropriate motivation to complete the tasks (e.g., a goal to focus on the perceptual characteristics of the stimuli), children may find these tasks to be tedious and require behavioral control to complete appropriately.

The gummy bear task, in particular, is isomorphic to other delay paradigms (e.g., gift delay and snack delay, Kochanska et al., 1996; tongue task, Smith-Donald et al., 2007) and thus may have elicited the need for control more than the other activities. Because of this, we changed the order of when the participants completed the gummy bear task from the original mindfulness procedure, which presented the gummy bear task first. We believed that the gummy bear task should be last in the Taxing condition because it may be the most difficult for the participants and therefore increase the likelihood that participants in this condition would be sufficiently taxed prior to beginning the social problem solving task. Possible implications for changing the order are discussed in the limitations section.

[2] We use the term *gender* because the observed differences in aggression are thought, in part, to stem from socialization differences (e.g., Keenan & Shaw, 1997). The term *sex* suggests that these differences solely stem from biological processes, which could be misleading.

Table 1
Example Directions for Each Condition.

Tasks	Taxing	Mindful-Control	Non-Taxing Control
Gummy Bear	"Keep looking at the snack until I tell you to stop because we are going to take our time eating this snack."	"Let's think about what color the gummy is. Are there changes in color at different parts of the gummy?"	"Here is a quick snack you can eat while we continue to play games."
Line Walking	"I want you to walk around that circle for some exercise until I tell you to stop. I want you to walk very slowly around the circle so you don't get dizzy."	"Think about how it feels when you put weight on your foot during each step"	[Walking in the testing space] "We are walking around so we can stretch our legs so let's keep walking!"
Tummy Breath	"Can you hold Tabby [stuffed animal] while you lay still and take a short rest?"	"Keep breathing in and out slowly and notice how Tabby [stuffed animal] moves with each breath."	"You can play with Tabby [stuffed animal] or the toys in my toy box, but we are going to stay on the mat and play quietly during this time."
Meditation Bell	"Please sit here quietly while we listen to the sound. I will tell you when we are done with the sound."	"Close your eyes. When you can't hear the sound anymore raise your hand."	"We are going to listen to the sound three times. You can play with any of these toys while we listen to the sound."

2.2.2. *Mindful-control condition*

In the Mindful-Control condition, participants completed the same series of four tasks but with the contemplative mindfulness prompts (Boguszewski & Lillard, 2015). The participants first completed the gummy bear task. In this version of the task, participants were guided through a series of prompts and questions regarding the perceptual characteristics of a gummy bear as they looked at the gummy bear on the table for 1.5 min ("Explore the gummy with your eyes. What is the surface like— does it have wrinkles or is it smooth?"), held the gummy in their hand for 1.5 min ("Explore the gummy with your fingers. Is it soft or hard?"), held the gummy in their mouth for 1 min ("Think about how the gummy feels in your mouth. Does it feel different in different parts of your mouth?"), and then chewed the gummy without swallowing 1 min ("Notice how it feels. Notice the tastes. Does it feel different than before?"). The second task was the line walking task, during which participants were instructed to walk on the outlined circle on the floor for 2 min, concentrating on putting one foot directly in front of the other, and focusing on the feeling of their feet on the ground. The third task was the tummy breath task, during which participants were told to put a stuffed animal on their stomach while lying on their back on a mat for 2 min and were instructed to pay attention to the stuffed animal moving up and down while the participants were breathing. The final task was mindful listening, during which the experimenter played a meditation bell sound for 2 min. The participants were told to close their eyes, listen to the bell sound, and to raise their hand when they could no longer hear the sound.

2.2.3. *Non-taxing control condition*

Although we expected differences between the Taxing and Mindful-Control conditions based on the emphases of instruction, the possibility exists that the execution of the tasks given any form of instruction might affect social decision making. Thus, we included a

Table 2
Situations on the Virtual School Game (boy version) and response options for each situation.

Situation	Physical Aggression Response	Verbal Aggression Response	Avoidant Response	Prosocial Response
Conflict:				
During centers, Bobby knocked over your block tower.	Kick or hit Bobby	Yell at Bobby and call him names	Go find something else to play with	Ask Bobby to help you rebuild the tower
While outside, Bobby kicked you in the sandbox	Kick or hit Bobby	Yell at Bobby and call him names	Go play somewhere else	Tell Bobby that wasn't a very nice thing for him to do
You brought a doll to school for naptime. Bobby laughed at you and said "you're a baby"	Kick or hit Bobby	Yell at Bobby and say "No, you're a baby!"	Ignore Bobby and go nap somewhere else	Give Bobby a toy for him to sleep with
Bobby looked at your picture and said "That doesn't look like a dog, it looks like an ugly monster" and laughed	Kick or hit Bobby	Yell at Bobby and call him names	Stop drawing and go find something else to do	Tell Bobby "it's ok, I like my picture"
While outside, Bobby took the soccer ball you were playing with from you	Kick or hit Bobby	Yell at Bobby and call him names	Go play with something else	Ask Bobby to play with you
During free play, you asked Bobby to play with you. Bobby said "no, I don't want to play with you, I want to play with Tommy"	Kick or hit Bobby	Tell Bobby "You're not my friend!"	Go play with something else	Ask if you can play with them too
Benign:				
While drawing, Tommy offers you a pencil	Kick or hit Tommy	Be mad at Tommy and say "no!"	Say "no thank you"	Take the pencil and thank Tommy
When Tommy sees you, he waves to you and says "hi"	Kick or hit Tommy	Say "Leave me alone!"	Say "Sorry, I can't talk to you right now"	Say "hi" back
While outside, Tommy asks if you want to play baseball with him	Kick or hit Tommy	Be mad and say "No, I don't want to play with you!"	Say "no thank you"	Say that you will play with Tommy

Non-Taxing Control condition where children were not provided with any instructions for the tasks. In this sense, the Non-Taxing Control condition emulates free play activities that children would engage in if in a classroom setting while both the Taxing and Mindful-Control conditions mimic structured classroom activities that are guided by a set of rules (e.g., circle time). Importantly, all the components of the Taxing and Mindful-Control conditions (e.g., the gummy bear, meditation bell) were present in the Non-Taxing Control condition to match the stimuli present in the other two conditions as much as possible.

The participants began the Non-Taxing Control condition with a walking task but instead of walking around a circle, the participants were told they were going to go for a walk with the experimenter for 2 min "to stretch their legs and get some exercise" with no instruction regarding the speed at which they should walk. Participants were then given a box of small toys to play with while they sat with the stuffed animal on a yoga mat for 2 min and then sat at a table and listened to the meditation bell for 2 min. Following the meditation bell, participants were given a gummy bear as a small snack but they did not have to wait to eat it. Instead, participants continued to play with the toys for the remainder of the task (5 min).

2.2.4. The virtual school game

The virtual school game (VSG) is an adapted version of the Challenging Situations Task (Denham et al., 2013), a measure used to assess social problem solving abilities in preschool children. In the original Challenging Situations Task, participants are presented with six conflict situations that happen to a third-party victim who is gender-matched to the participants, but the perpetrator is always a boy. For the current study, the following adaptions were made to the presentation of the conflict situations. First, the social situations were framed as an interactive computer game that placed the participants as the targets of the social situations as opposed to third party observers. This may have made the situations more pertinent to the participants and elicited stronger emotional reactions. Second, the VSG gender-matched the perpetrator so that both the perpetrator and the victim in the conflict situations matched the gender of the participants. Finally, three additional benign situations were included along with the six conflict situations from the Challenging Situations Task – Version A so participants did not constantly face negative interactions during their virtual day at school (see Table 2 for a list of all situations).

The original Challenging Situation Task included an aggressive, a crying, a passive, and a prosocial response option. In the adapted VSG, the aggressive response was separated into two different response options – a verbal aggressive option and a physical aggressive option – and the crying response option was not used. The prosocial and passive (termed "avoidant" in the current study) response options remained the same as those used in the original Challenging Situations Task (see Table 2 for all response options). The VSG was presented on an Asus laptop computer using E-Prime software (Psychology Software Tools, Version 2.0) and was comprised of pictures of the social situations that were created using ToonDoo (2012), a web-based comic program. Responses were selected using a Cedrus Corporation Model RB-834 Response Pad.

Participants were first trained on how to provide a response on the VSG by asking them to indicate specific shapes (e.g., a square) from an array of four shapes (i.e., a square, a triangle, a circle, and a pentagon) in a 2×2 grid. Each shape choice was tagged with a color and a number that was needed to assist the experimenter with scoring. Participants were then assigned a gender matched cartoon character and were told they would be this character during the game. The participants were told that they were playing the game with real children at other schools and were then presented with the nine scenarios, one at a time, in a randomized order. Participants saw a pictorial depiction while the experimenter read a brief description (e.g., "While outside, Bobby kicked you in the sandbox"). The experimenter asked the participants "what do you want to do next" and proceeded to a second screen that presented the participant with four response options— physical aggression, verbal aggression, prosocial, and avoidant— in a 2×2 grid, presented in a randomized order (see Fig. 1). Similar to the shape training trials, each response option was labeled with a specific number and color. After all scenarios were presented, two additional shape trials were administered. Critically, children were correct on these trials so there was no indication that they used the color or number tags as response cues.

As in the original Challenging Situations Task, the experimenter pointed to each response option and said the option aloud to the participant (it took approximately 10 s to label all four response options). After labeling the response options, the experimenter asked the participant "what do you want to do next" for a second time. Participants indicated their response by pointing to the desired response option on the screen and the experimenter pressed the corresponding button on the response pad. The experimenter, not the children, pressed the response pad button because some children had difficulty mapping their responses onto the buttons, as the position of response options on the screen randomly changed after each scenario (e.g., response option "1" could first be presented in the top left quadrant, but later be presented in the bottom right quadrant, see Fig. 1).

The VSG produced four separate scores for each response option: a physical aggression score, a verbal aggression score, an avoidant score, and a prosocial score. Each score reflects the total number of times the participant selected the response across the six conflict trials.

3. Results

3.1. Effects of the training conditions on VSG responses

Descriptive statistics for each response option by condition and gender are listed in Table 3. Events/trials binary logistic generalized linear models (GLM) were used to assess the probability of choosing each response type based on condition assignment and gender (Table 4). The use of the events/trials binary logistic GLM procedure accounted for the dependency of the response choices for each individual participant (e.g., if a participant chose an avoidant response on the first trial, then the remaining three responses no longer had a possible maximum score value of six). The GLM also accounted for the within-subjects nature of the response choices

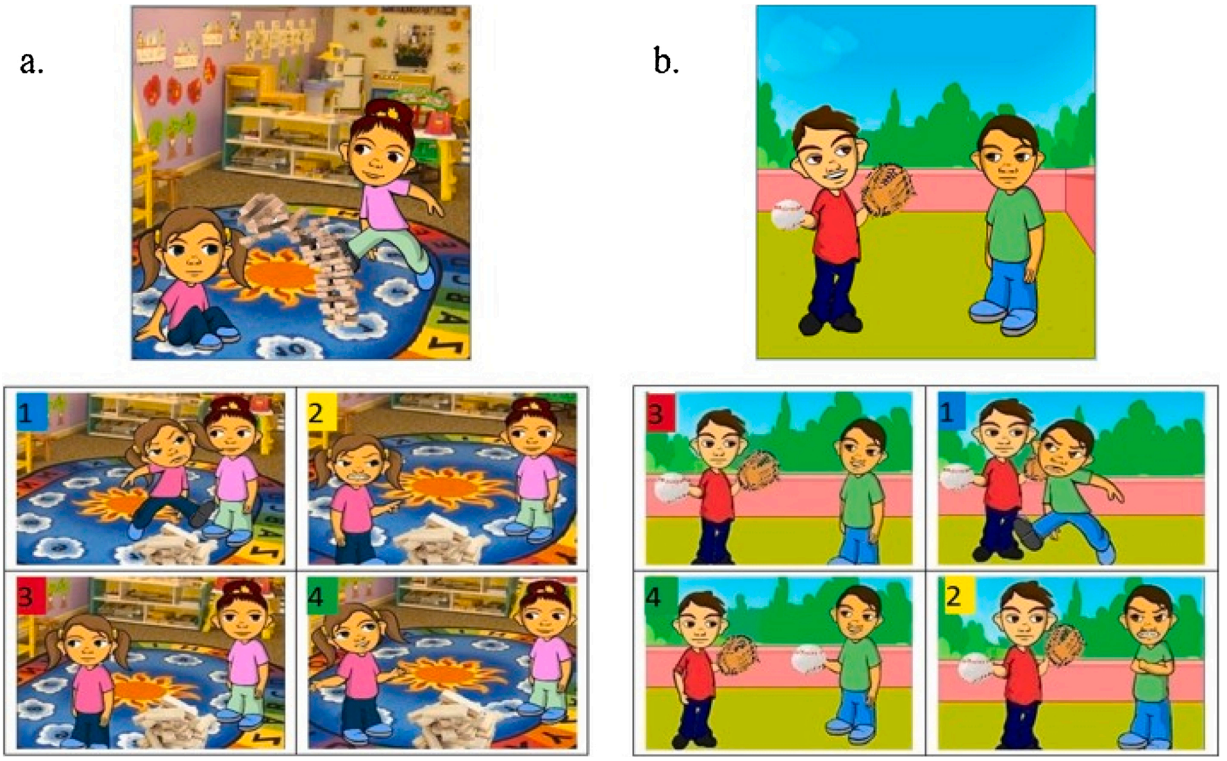

Fig. 1. Example situation screens with corresponding response screens for the virtual school game. A) Example conflict situation (i.e., peer knocking over target child's block tower) screen for girls with a corresponding response screen, b) example benign situation (i.e. peer asking the target child to play with him) screen for boys and a corresponding response screen.

Table 3
Percentage means and standard deviations (in parentheses) of each response choice by condition and gender.

Condition	Gender	Physical Aggression	Verbal Aggression	Avoidant	Prosocial
	Boys	22.8 % (26.2 %)	13.2 % (17.2 %)	16.6 % (23.6 %)	47.4 % (33.9 %)
Taxing	Girls	9.7 % (16.0 %)	7.0 % (17.8 %)	31.5 % (27.2 %)	51.8 % (34.7 %)
	Total	16.2 % (22.4 %)	10.1 % (17.6 %)	24.1 % (26.2 %)	49.6 % (33.9 %)
	Boys	15.8 % (23.9 %)	8.8 % (16.1 %)	13.1 % (16.3 %)	62.3 % (34.6 %)
Mindful-Control	Girls	3.5 % (8.9 %)	3.5 % (7.0 %)	27.2 % (16.9 %)	65.8 % (19.6 %)
	Total	9.7 % (18.8 %)	6.1 % (12.5 %)	20.2 % (17.8 %)	64.0 % (27.8 %)
	Boys	9.7 % (23.8 %)	2.6 % (8.4 %)	26.3 % (30.6 %)	61.4 % (33.4 %)
Non-Taxing Control	Girls	3.5 % (8.9 %)	9.7 % (12.8 %)	21.9 % (20.1 %)	64.9 % (28.3 %)
	Total	6.6 % (18.0 %)	6.1 % (11.2 %)	24.1 % (25.6 %)	63.2 % (30.6 %)
	Boys	16.1 % (24.8 %)	8.2 % (14.8 %)	18.7 % (24.4 %)	57.0 % (34.1 %)
Total	Girls	5.6 % (11.9 %)	6.7 % (13.3 %)	26.9 % (21.8 %)	60.8 % (28.4 %)
	Total	10.8 % (20.1 %)	7.5 % (14.0 %)	22.8 % (23.4 %)	58.9 % (31.3 %)

Note. Percentages sum to 100 % across the four response types for each condition and each gender.

because it examined the probability of choosing each response within the context of the other three responses across the six trials. The dependent variable for each analysis was the proportion that each response type was chosen (out of the six conflict trials). Age and annual household income served as continuous covariates for each analysis.[3] For all analyses, $\alpha = .05$ and post hoc two-tailed Bonferroni pairwise comparisons were conducted as part of the model.

3.1.1. Physical aggression responses

The binary logistic GLM for physical aggression responses revealed a main effect of training condition, Wald χ^2 (2, $N = 114$) = 12.87, $p = .002$. Follow up pairwise comparisons found that participants in the Taxing condition were significantly more likely

[3] The $n = 17$ missing annual household income data were imputed by the hot deck technique (Myers, 2011) to ensure that all participants were included in the primary analyses.

Table 4
Results from binary logistic generalized linear regressions.

		Physical Aggression	Verbal Aggression	Avoidant	Prosocial
Age (months)	Wald χ^2	11.69	1.54	1.05	3.53
		$p = .001$	$p = .22$	$p = .31$	$p = .06$
Annual Household Income	Wald χ^2	7.88	14.68	1.65	22.89
		$p = .01$	$p < .001$	$p = .20$	$p < .001$
Condition	Wald χ^2	12.87	5.14	1.70	15.25
		$p = .002$	$p = .08$	$p = .43$	$p < .001$
Gender	Wald χ^2	19.11	0.06	7.99	0.72
		$p < .001$	$p = .81$	$p = .01$	$p = .40$
Condition*Gender	Wald χ^2	2.30	8.46	7.69	0.57
		$p = .32$	$p = .02$	$p = .02$	$p = .75$

to choose a physical aggression response compared to participants in the Non-Taxing Control condition, t (74) = 3.09, p = .01, and participants in the Mindful-Control condition, t (74) = 2.64, p = .01. The Mindful-Control condition did not differ from the Non-Taxing Control condition, t (74) = 0.44, p = 1.00. There was also a main effect of gender, Wald χ^2 (1, N = 114) = 19.11, p < .001; boys were significantly more likely to choose physical aggression responses than girls. However, the interaction between training condition and gender was not significant, Wald χ^2 (2, N = 114) = 2.30, p = .32. Finally, annual household income, β = −.24, Wald χ^2 (1, N = 114) = 7.88, p = .01, and age, β = −.15, Wald χ^2 (1, N = 114) = 11.69, p = .001 negatively predicted physical aggression response choices; lower income and younger participants were more likely to choose physical aggression responses.

3.1.2. Verbal aggression responses

The binary logistic GLM for verbal aggression responses revealed an interaction between training condition and gender, Wald χ^2 (2, N = 114) = 8.46, p = .02, but the main effects for both condition and gender were not significant, both ps > .05. However, follow up pairwise comparisons for the interaction did not yield any significant results for specific pairwise comparisons (all p's < .05) An examination of the data trends showed that boys in the Taxing condition may have been more likely to choose a verbal aggression response compared to boys in the Non-Taxing Control condition. By comparison, girls did not differ as much in their probability to choose a verbal aggression response between the Taxing condition and the Non-Taxing Control condition. Finally, annual household income, β = −.38, Wald χ^2 (1, N = 114) = 14.68, p < .001, negatively predicted verbal aggressive response choices; lower income participants were more likely to choose a verbal aggressive response.

3.1.3. Avoidant responses

The binary logistic GLM revealed a main effect of gender, Wald χ^2 (1, N = 114) = 7.99, p = .01; girls were significantly more likely to choose avoidant responses than boys. The main effect for training condition was not significant, Wald χ^2 (2, N = 114) = 1.70, p = .43. The gender main effect was qualified by a significant interaction between training condition and gender, Wald χ^2 (2, N = 114) = 7.69, p = .02. Follow up pairwise comparisons found that girls in the Taxing condition were more likely to choose an avoidant response than boys in the Mindful-Control condition, t (112) = 3.80, p = .01. No other pairwise comparisons were significant, all ps > .05. Finally, neither age nor annual household income significantly predicted avoidant responses, both ps > .05.

3.1.4. Prosocial responses

The binary logistic GLM for prosocial responses revealed a main effect of training condition, Wald χ^2 (2, N = 114) = 15.25, p < .001. Follow up pairwise comparisons found that participants in the Taxing condition were significantly less likely to choose a prosocial response compared to participants in the Non-Taxing Control condition, t (74) = 2.96, p = .01, and participants in the Mindful-Control condition, t (74) = 3.64, p = .001. The Mindful-Control condition did not differ from the Non-Taxing Control condition, t (74) = 0.65, p = 1.00. The main effect of gender and the interaction between training condition and gender were not significant, both ps > .05. Finally, annual household income positively predicted prosocial response choices, β = .26, Wald χ^2 (1, N = 114) = 22.89, p < .001; higher income participants were more likely to choose prosocial responses.

3.2. Post-hoc exploratory analyses

Following data collection, we decided to use an adapted frustration coding scheme (Rahman, Elke, & Wiebe, 2019) to capture behavioral displays of negative emotion, particularly affective displays (e.g., sighing) and coping behaviors (e.g., self-entertainment) in each of the experimental conditions (for the coding scheme and descriptive statistics for each code, see supplemental materials). The use of the frustration coding scheme allowed us to examine if the Taxing condition produced more aggressive and less prosocial responses because it induced negative emotions to a greater extent than the other two conditions.

A coder unfamiliar with the hypotheses of the current study coded the gummy bear and meditation bell portion of each video (a period of 7 min) for n = 108 participants (6 videos were missing due to technical errors). A second independent research assistant coded 22 (20 %) randomly selected videos. Inter-rater reliability for all individual codes was assessed using intraclass correlations, which revealed 81.5 % reliability. The codes "escape", and "sighing" were dropped from further analysis because they occurred far fewer times than the other codes (< 20 times across all participants). Scores from the remaining codes were standardized using z-scores

to account for a wide range of occurrences across the codes.

A 3 (Condition) x 2 (gender) MANCOVA, with age in months and annual household income as covariates, was conducted on the Fidgeting, Looking Away, Self-Comforting, Self-Entertainment, and Talking to Experimenter codes. There was a main effect of condition for all of the codes, except Talking to Experimenter: Fidgeting, $F(2, 105) = 19.97$, $p < .001$, $\eta^2_p = .29$; Looking Away, $F(2, 105) = 4.29$, $p = .02$, $\eta^2_p = .08$; Self-Comforting, $F(2, 105) = 12.62$, $p < .001$, $\eta^2_p = .21$; Self-Entertainment, $F(2, 105) = 5.80$, $p = .01$, $\eta^2_p = .11$. Follow up two-tailed Bonferroni pairwise comparisons on the estimated marginal means were conducted as part of the MANCOVA. The Fidgeting, Looking Away, and Self-Comfort codes in the Taxing and Mindful-Control conditions were significantly higher than those in the Non-Taxing Control condition, all $ps < .05$, but the Taxing and Mindful-Control conditions did not significantly differ, all $ps > .05$. The Self-Entertainment code in the Taxing condition was significantly higher than in the Non-Taxing Control condition, $p < .001$, but the Mindful-Control condition did not significantly differ from the Non-Taxing Control nor the Taxing condition, $ps > .05$ (see Table 5 for the pairwise comparisons for each code).

There was also significant main effect of gender for Self-Entertainment, $F(1, 105) = 5.31$, $p = .02$, $\eta^2_p = .05$. Follow up two-tailed Bonferroni pairwise comparisons on the estimated marginal means revealed that boys engaged in more self-entertainment behaviors ($M_z = 0.21$, $SD_z = 0.95$) than girls ($M_z = -.22$, $SD_z = 0.95$) across conditions, $t(104) = 2.31$, $p = .02$. There were no significant Condition X Gender interactions for any of the codes, nor were there any significant covariate effects, all $ps > .05$. Thus, participants in both the Taxing and Mindful-Control conditions exhibited signs of negative emotion more so than participants in the Non-Taxing control condition, but only participants in the Taxing condition exhibited more Self-Entertainment coping behavior. Boys also exhibited more Self-Entertainment behaviors, but the Condition X Gender interaction was not significant, further suggesting that boys were not more susceptible to the taxing procedure compared to girls.

4. Discussion

4.1. Taxing effects on social decision-making

Our primary goal was to examine the effects of taxing situations on preschool children's social problem solving skills. To this end, we found that the participants in the Taxing condition were more likely to choose physical aggression responses and less likely to choose prosocial responses compared to participants in both the Mindful-Control and Non-Taxing Control conditions. Although boys were more likely to choose physical aggression responses in general, this difference was not specific to the Taxing condition. The absence of an interaction between condition and gender for both physical aggression and prosocial responses is consistent with previous research that used taxing procedures with children (e.g., Gunzenhauser & von Suchodoletz, 2014; Powell & Carey, 2017; Steinbeis, 2018). However, condition did interact with gender for verbal aggression and avoidant responses. Follow up examination of these interactions suggests that girls may be more likely to choose avoidant responses while boys may be more likely to choose verbally aggressive responses in the Taxing condition. The observed gender differences in physical and verbal aggression is consistent with previous research that has found that boys tend to be more overtly aggressive than girls (Crick et al., 2006; McEarchern & Snyder, 2012; Ostrov & Keating, 2004; Ostrov et al., 2014; Poland et al., 2016), while may girls opt for more passive responses when taxed.

Although it has been demonstrated that cognitively demanding tasks hinder performance on subsequent cognitive tasks in children (e.g., Gunzenhauser & von Suchodoletz, 2014; Oeri & Roebers, 2020; Peverill et al., 2017; Pnevmatikos & Trikkaliotis, 2013), theory of mind (Powell & Carey, 2017), and altruistic sharing (Steinbeis, 2018), our study is the first to find that such tasks have a negative effect on social problem solving behavior in children. These results are broadly consistent with those found with adults (Osgood & Muraven, 2016; Stucke & Baumeister, 2006).

Previous research on the taxing effect has concluded that worse performance following a taxing procedure is indicative of the causal role of EF in theory of mind (Powell & Carey, 2017) and altruistic sharing (Steinbeis, 2018). Following this conclusion, the current study provides preliminary evidence for a causal relation between EF and social problem solving. The robust correlations observed between EF and social problem solving (e.g., Alduncin et al., 2014; Caporaso et al., 2019; Denham et al., 2014; Hughes et al., 2000; Kochanska & Knaack, 2003; Razza & Blair, 2009; Rhoades et al., 2009) may be due to the possibility that the two share the same underlying causal mechanism: reflection. The ability to reflect on the current contents of consciousness is thought to support the development of EF (Zelazo, 2004, 2015). It is through the engagement of reflective thought that children are able to control their

Table 5
Pairwise comparisons of frustration behavior codes for condition main effect.

Pairwise Comparison		Fidgeting	Looking Away	Self-Comforting	Self- Entertainment
Taxing – Non-Taxing Control	M^a	0.46 v. −0.76	0.21 v. −0.4	0.30 v. −0.64	0.38 v. −0.39
	t test	$t(67) = 5.89$, $p < .001$	$t(67) = 2.63$, $p = .03$	$t(67) = 4.28$, $p < .001$	$t(67) = 3.40$, $p = .003$
Taxing – Mindful-Control	M^a	0.46 v. 0.26	0.21 v. 0.16	0.30 v. 0.31	0.38 v. −0.01
	t test	$t(70) = 0.97$, $p = 1.00$	$t(70) = 0.21$, $p = 1.00$	$t(70) = 0.08$, $p = 1.00$	$t(70) = 1.78$, $p = .24$
Mindful-Control – Non-Taxing Control	M^a	0.46 v. −0.76	0.16 v. −0.4	0.31 v. −0.64	−0.01 v. −0.39
	t test	$t(69) = 5.01$, $p < .001$	$t(69) = 2.45$, $p = .05$	$t(69) = 4.41$, $p < .001$	$t(69) = 1.68$, $p = .29$

Note. [a] Estimated marginal mean. *p* values indicate the adjusted values following the Bonferroni correction.

thoughts, behavior, and emotions. Similarly, the RED model (Fontaine & Dodge, 2006) suggests that children's aggressive responses to provocation are impulsive responses that are the product of a lack of reflective evaluation of different response choices. Consequently, when the resources needed to engage in the evaluation process are taxed, children may have a harder time controlling their behavior through reflection and may be more likely to choose the impulsive, anger-driven physical aggression response. Prosocial responses may also suffer from a lack of reflection because they cannot be script-based and must be tailored to the specific provocation. In the current study, the prosocial responses were provided to the participants and did not have to be constructed from scratch. However, EF and reflective thought may still be required to recognize the response as optimal and inhibit the choice of another response type.

By contrast, verbal aggression responses and avoidant responses did not differ between conditions, and perhaps this is because they require less cognitive effort to inhibit (verbal aggression) or enact (avoidant). Avoidant responses are a script-based response that could be applied to any provocation situation. It may also be considered an "easy" choice; instead of dealing with the provocation itself and thinking of a way to resolve the situation, children may simply walk away. Similarly, there may be less of a need to use cognitive control to inhibit verbal aggression because it is seen as a less serious offense (Bell & Willis, 2016; Wenger, Berg-Cross, & Berg-Cross, 1980). Children may not be told to refrain from yelling as often or face as serious of consequences if they do yell, nor does it cause obvious harm to the victim. Consequently, it is possible that children do not actively avoid responding to provocation by yelling in the same way that they refrain from using a physically aggressive response. Because the avoidant and the verbal aggressive responses likely require less cognitive control, children would not be more or less likely to endorse these responses following taxing situations. Instead, children chose these responses at equal rates across the three conditions, possibly based on response preferences that mirror their real-life response tendencies that could vary by gender.

Interestingly, the two covariates were also differentially related to the four response choices. Age only significantly predicted physical aggression responses. This is consistent with longitudinal research that has found a decrease in occurrences of physical aggression beginning at 3.5 years of age and continuing through the early school years (e.g., Carbonneau, Boivin, Brendgen, Nagin, & Tremblay, 2016). Annual household income predicted both types of aggressive responses and prosocial responses, but not avoidant responses. Indeed, poverty is directly associated with abnormal stress reactivity due to a high exposure of daily life stressors (Blair, Raver, Granger, Mills-Koonce, & Hibel, 2011), which can lead to deficits in emotion regulation (Calkins & Keane, 2009), EF (e.g., Raver, Blair, & Willoughby, 2013), and social competence (Murray-Close et al., 2014; Perry, Braren, Blair, & Family Life Project Key Investigators, 2018). In fact, low income status is a salient predictor of high levels of aggression above and beyond other indicators of low socioeconomic status, such as maternal age and education, and household dysfunction (Tremblay et al., 2004). Impoverished neighborhoods are also more likely to have higher rates of crime and violence, which has been shown to negatively impact children's moral judgements (Ball, Smetana, Sturge-Apple, Suor, & Skibo, 2017) and displays of aggression (Miller & Tolan, 2019).

4.2. *Taxing effects on emotion and frustration behaviors*

Instead of assuming that the taxing situation in the current study strictly led to a depletion of cognitive resources, it is also important to consider the role of emotion. Previous research using taxing paradigms have attributed their results not just to cognitive depletion but also to the experience of negative emotions felt during the taxing procedures (Pnevmatikos & Trikkaliotis, 2013). The relatively frequent occurrence of the frustration behaviors observed in the current study suggests that it is possible that that the experimental conditions produced strong enough feelings of frustration that could have carried over to the social conflict task and negatively affected children's performance. The presence of negative emotions interferes with EF and the ability to engage in reflective processing (Blair, 2014; Calkins & Marcovitch, 2010).

Aside from interfering with EF processes, the presence of a negative mood could have also led participants to choose more physically aggressive and less prosocial responses. The feelings-as-information theory (Forgas & Eich, 2013; Schwarz & Clore, 2007) states that individuals often misattribute their emotional state to current external situations. If participants were already in a negative mood prior to the conflict task, they could have attributed the negative feelings to the peer conflict itself and react based on that mood. Lemerise and Arsenio (2000) further suggested that mood colors children's perception of their current social situations and affects the type of information gathered from the situation. For example, negative moods could lead to greater instances of hostile attribution because children perceive more mood-congruent information than what is currently present in the social situation. In addition, negative feelings can prime negative reactions to later social situations (Forgas & Eich, 2013). These feelings could have led participants to choose more physically aggressive responses, as anger is associated with aggressive response choices (Denham et al., 2013), but it could have also made participants less willing to engage with their transgressor in the prosocial response choice.

The frustration coding scheme was used to assess the possibility that participants in the Taxing condition experienced higher levels of negative emotion that in turn contributed to their increased aggressive and decreased prosocial responses. There is some evidence that the Taxing condition induced more negative emotions, evidenced by the greater number of coping Self-Entertainment behaviors compared to the Non-Taxing Control condition. Yet the Taxing and Mindful-Control conditions did not significantly differ on any behavioral codes and the Mindful-Control condition significantly differed from the Non-Taxing control condition on most codes. Nevertheless, participants in the Taxing condition were more likely to endorse physical aggression responses and less likely to endorse prosocial responses compared to those in both the Mindful-Control and Non-Taxing Control conditions.

There are several explanations for these findings. It is possible that participants in the Mindful-Control condition, despite showing outward signs of frustration, were buffered from the effects of these feelings during the subsequent social problem solving task because of the mindfulness directives. Mindfulness training is meant to practice reflective thought and equip individuals with the skills needed to handle subsequent cognitively and emotionally demanding situations (Zelazo & Lyons, 2012). Despite the brevity of the training in the current study, perhaps the participants in that condition were able to apply some principals of mindfulness when faced with social

provocation. Although a provocative explanation, it is speculative and requires additional research to determine the exact effects of one session mindfulness trainings.

It is also possible that a coding scheme based solely on outward displays of negative emotions is not sensitive enough to capture the differences in the emotional experience that can interfere with social problem solving, particularly because children temperamentally differ in how they express negative emotions (Rothbart & Bates, 2006). Similarly, the effects of cognitive depletion were likely not captured by the coding scheme. Consequently, cognitive depletion may have occurred to a greater extent in the Taxing condition compared to the Mindful-Control condition, as it had in other studies using similar taxing procedures (e.g., Powell & Carey, 2017; Steinbeis, 2018), and it is these unobservable effects that led to an overall decrease in social competence on the VSG in the Taxing condition but not the Mindful-Control condition.

4.3. Limitations and future directions

The results of the current study provide preliminary evidence of a causal relation between EF and social competence, but this claim could be strengthened in several ways. First, future research should further explore the mechanisms of the taxing effect with regards to children's aggressive behavior with more direct, and perhaps more sensitive, measures of cognitive demand and emotional experience. The use of pre- and post-test measures of cognitive control and emotion could also be used to determine if taxing situations have a direct effect on these constructs and if this effect mediates the observed effect on social problem solving skills. Replication of the current study using a pre-test measure of children's social competence would also strengthen the causal claims of the current study. The use of an experimental design with control conditions and random assignment does suggest that the Taxing condition had a causal effect on children's aggressive behavior, but it is also possible that sampling error occurred and children who were more aggressive at baseline happen to have been assigned to the Taxing condition.

Additionally, future research should examine how taxing situations affect social competence beyond the use of computer-based social conflicts. The modification of the Challenging Situations Task (Denham et al., 2013) was done in an effort to move away from the use of completely hypothetical, third-party social situations but the computer situations may still be limited in their ability to mimic real-life situations. Virtual situations may not elicit the same level of emotion, nor do they capture the contextual complexity of real-life situations, particularly because the perpetrator was unknown to the participant and it is unclear how strongly the preschool participants personally identified with their virtual avatar. However, the use of current questionnaire-based methods of assessing aggression is not conducive to an experimental design. The development of a more ecologically valid, yet ethical, measure that can be used in experimental designs will be a challenge for future research.

There should also be consideration of the different forms and functions of aggression. The current study exclusively considered overt reactive aggression. Perhaps taxing situations only have a detrimental effect on this specific form and function of aggression due to its characterization of being impulsive and anger-driven. It remains untested the extent to which taxing situations affect proactive, planned aggression as well as more covert forms of aggression (i.e., relational aggression).

One methodological difference between the Taxing condition and the Mindful-Control conditions was the task order. The participants in the Taxing condition completed the gummy bear task last, while the participants in the Mindful-Control condition completed the gummy bear task first. Although we had a principled reason for changing the order, the possibility exists that the confound of order may have had an impact. We also believe it is important for future research to study the effects of mindfulness on children's social behavior, but the one-session mindfulness procedure used in the current study was not an adequate way to do so. Longer, multi-session procedures that are designed to be enjoyable for children may be a more appropriate method for addressing this question.

Despite the limitations, we believe that the current study provides an important first step in establishing an empirical link between taxing situations and social competence in preschool children. The findings provide an exciting foundation for future research to explore potential moderators of the taxing effect. Perhaps taxing situations are only detrimental for a certain subset of children and, such as children who are already susceptible to aggressive behavior. For example, children with lower executive function (Caporaso et al., 2019), less mature moral reasoning (Gasser, Malti, & Gutzwiller-Helfenfinger, 2012), and children high on the temperamental dimension of surgency (Dollar & Stifter, 2012) all show elevated levels of aggression.

5. Conclusion

We found that experiencing taxing situations increased the likelihood of a physically aggressive response to peer conflict, as well as decreased the likelihood of a prosocial response. These results provide preliminary evidence for a causal link between EF and social competence, but more research is needed to explore the causal mechanism and address the limitations of the current study. Nevertheless, the current study suggests that preschool children may be more susceptible to social competence failures following the completion of activities that ask them to sit still, wait, and delay desired behavior. As these activities are likely a significant part of preschoolers' everyday lives, future research should also systematically study the different types of taxing situations that are likely to occur outside of the laboratory. Further understanding of when children may be more vulnerable to aggressive reactions in response to peer situations may help inform intervention and promote practices that counteract these effects before engaging in peer play.

Declaration of Competing Interest

Both authors serve as editorial assistant and editor, respectively, of *Cognitive Development*. Neither author was involved in the

editorial process for the manuscript and appropriate steps were taken to ensure that both authors were blind to the review process.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.cogdev.2020.100989.

References

Alduncin, N., Huffman, L. C., Feldman, H. M., & Loe, I. M. (2014). Executive function is associated with social competence in preschool-aged children born preterm or full term. *Early Human Development, 90*(6), 299–306. https://doi.org/10.1016/j.earlhumdev.2014.02.011

Ball, C. L., Smetana, J. G., Sturge-Apple, M. L., Suor, J. H., & Skibo, M. A. (2017). Moral development in context: Associations of neighborhood and maternal discipline with preschoolers' moral judgements. *Developmental Psychology, 53*(10), 1881–1894. https://doi.org/10.1037/dev0000378

Bell, K. J. S., & Willis, W. G. (2016). Teachers' perceptions of bullying among youth. *Journal of Education and Research, 2*, 159–168. https://doi.org/10.1080/00220671.2014.931833

Black, D. S., & Fernando, R. (2014). Mindfulness training and classroom behavior among lower- income and ethnic minority elementary school children. *Journal of Child and Family Studies, 23*, 1242–1246. https://doi.org/10.1007/s10826-013-9784-4

Blair, C. (2002). School readiness: Integrating cognition and emotion in a neurobiological conceptualization of children's functioning at school entry. *The American Psychologist, 57*, 111–127. https://doi.org/10.1037//0003-066X.57.2.111

Blair, C. (2014). Stress and the development of executive functions: Experiential canalization of brain and behavior. In P. Zelazo, & M. Sera (Eds.), *37th Minnesota symposium on child psychology: Developing cognitive control processes: Mechanisms, implications, and interventions* (pp. 145–180). Hoboken NJ: Wiley.

Blair, C., Raver, C. C., Granger, D., Mills-Koonce, R., & Hibel, L. (2011). Allostasis and allostatic load in the context of poverty in early childhood. *Development and Psychopathology, 23*(3), 845–857. https://doi.org/10.1017/S0954579411000344

Boguszewski, K., & Lillard, A. (2015). The immediate effect of mindfulness tasks on young children's EF. March. In *Poster Presented at the Biennial Meeting of the Society for Research in Child Development*.

Calkins, S. D., & Keane, S. P. (2009). Developmental origins of early antisocial behavior. *Development and Psychopathology, 21*(4), 1095–1109. https://doi.org/10.1017/S095457940999006X

Calkins, S. D., & Marcovitch, S. (2010). Emotion regulation and executive functioning in early development: Integrated mechanisms of control supporting adaptive functioning. In S. D. Calkins, & M. A. Bell (Eds.), *Human brain development. Child development at the intersection of emotion and cognition* (pp. 37–57). Washington, DC: American Psychological Association.

Caporaso, J. S., Boseovski, J. J., & Marcovitch, S. (2019). The individual contributions of three executive functions to preschool social competence. *Infant and Child Development*, 1–17. https://doi.org/10.1002/icd.2132

Carbonneau, R., Boivin, M., Brendgen, M., Nagin, D., & Tremblay, R. E. (2016). Comorbid development of disruptive behaviors from age 1½ to 5 years in a population birth-cohort and association with school adjustment in first grade. *Journal of Abnormal Child Psychology, 44*, 677–690. https://doi.org/10.1007/s10802-015-0072-1

Carlson, S. M. (2005). Developmentally sensitive measures of executive function in preschool children. *Developmental Neuropsychology, 28*(2), 595–616. https://doi.org/10.1207/s15326942dn2802_3

Carlson, S. M., & Moses, L. J. (2001). Individual differences in inhibitory control and children's theory of mind. *Child Development, 72*, 1032–1053. https://doi.org/10.1111/1467-8624.00333

Carlson, S. M., & Wang, T. S. (2007). Inhibitory control and emotion regulation in preschool children. *Cognitive Development, 22*, 489–510. https://doi.org/10.1016/j.cogdev.2007.08.002

Chen, D. W., Fein, G. G., Killen, M., & Tam, H. (2001). Peer conflicts of preschool children: Issues, resolution, incidence, and age-related patterns. *Early Education and Development, 4*(12), 523–544. https://doi.org/10.1207/s15566935eed1204

Crick, N. R., Ostrov, J. M., Burr, J. E., Cullerton-Sen, C., Jansen-Yeh, E., & Ralston, P. (2006). A longitudinal study of relational and physical aggression in preschool. *Journal of Applied Developmental Psychology, 27*(3), 254–268. https://doi.org/10.1016/j.appdev.2006.02.006

Denham, S. A., & Bassett, H. (2018). You hit me! That's not nice and it makes me sad!!': Relations of young children's social information processing and early school success. *Early Child Development and Care*, 1–15. https://doi.org/10.1080/03004430.2018.1491562

Denham, S. A., Bassett, H. H., Way, E., Kalb, S., Warren-Khot, H., & Zinsser, K. (2014). "How would you feel? What would you do?" development and underpinnings of preschoolers' social information processing. *Journal of Research in Childhood Education, 28*(2), 182–202. https://doi.org/10.1080/02568543.2014.883558

Denham, S. A., Way, E., Kalb, S. C., Warren-Khot, H. K., & Bassett, H. H. (2013). Preschoolers'social information processing and early school success: The challenging situations task. *The British Journal of Developmental Psychology, 31*(2), 180–197. https://doi.org/10.1111/j.2044-835X.2012.02085.x

Devine, R. T., & Hughes, C. (2014). Relations between false belief understanding and executive function in early childhood: A meta-analysis. *Child Development, 85*, 1777–1794. https://doi.org/10.1111/cdev.12237

Dodge, K. A., Lansford, J. E., Burks, V. S., Bates, J. E., Pettit, G. S., Fontaine, R., & Price, J. M. (2003). Peer rejection and social information-processing factors in the development of aggressive behavior problems in children. *Child Development, 74*(2), 374–393. https://doi.org/10.1111/1467-8624.7402004

Dollar, J. M., & Stifter, C. A. (2012). Temperamental surgency and emotion regulation as predictors of childhood social competence. *Journal of Experimental Child Psychology, 112*(2), 178–194. https://doi.org/10.1016/j.jecp.2012.02.004

Flook, L., Goldberg, S. B., Pinger, L., & Davidson, R. J. (2015). Promoting prosocial behavior and self-regulatory skills in preschool children through a mindfulness-based kindness curriculum. *Developmental Psychology, 51*(1), 44–51. https://doi.org/10.1037/a0038256

Fontaine, R. G., & Dodge, K. A. (2006). Real-time decision making and aggressive behavior in youth: A heuristic model of response evaluation and decision (RED). *Aggressive Behavior, 32*(3), 604–624. https://doi.org/10.1002/ab

Fontaine, R. G., Yang, C., Dodge, K. A., Pettit, G. S., & Bates, J. E. (2009). Development of Response Evaluation and Decision (RED) and antisocial behavior in childhood and adolescence. *Developmental Psychology, 45*(2), 447–459. https://doi.org/10.1037/a0014142

Forgas, J. P., & Eich, E. (2013). Affective influences on cognition: Mood congruence, mood dependence, and mood effects on processing strategies. In A. F. Healy, R. W. Proctor, I. B. Weiner, A. F. Healy, R. W. Proctor, & I. B. Weiner (Eds.), *Handbook of psychology: Experimental psychology* (2nd ed., Vol. 4, pp. 61–82). Hoboken, NJ, US: John Wiley & Sons Inc.

Garon, N., Bryson, S. E., & Smith, I. M. (2008). Executive function in preschoolers: A review using an integrative framework. *Psychological Bulletin, 134*(1), 31–60. https://doi.org/10.1037/0033-2909.134.1.31
Garon, N., Longard, J., Bryson, S. E., & Moore, C. (2012). Making decisions about now and later: Development of future-oriented self-control. *Cognitive Development, 27*, 314–322. https://doi.org/10.1016/j.cogdev.2012.05.003
Gasser, L., Malti, T., & Gutzwiller-Helfenfinger, E. (2012). Aggressive and nonaggressive children's moral judgments and moral emotion attributions in situations involving retaliation and unprovoked aggression. *The Journal of Genetic Psychology: Research and Theory on Human Development, 173*(4), 417–439. https://doi.org/10.1080/00221325.2011.614650
Granvald, V., & Marciszko, C. (2016). Relations between key executive functions and aggression in childhood. *Child Neuropsychology, 25*(5), 537–555. https://doi.org/10.1080/09297049.2015.1018152
Gunzenhauser, C., & von Suchodoletz, A. (2014). Preschoolers' use of suppression influences subsequent self-control but does not interfere with verbal memory. *Learning and Individual Differences, 32*, 219–224. https://doi.org/10.1016/j.lindif.2014.03.007
Hay, D. F., Nash, A., Caplan, M., Swartzentruber, J., Ishikawa, F., & Vespo, J. E. (2011). The emergence of gender differences in physical aggression in the context of conflict between young peers. *The British Journal of Developmental Psychology, 29*(9), 158–175. https://doi.org/10.1111/j.2044-835X.2011.02028.x
Hughes, C., & Ensor, R. (2007). Executive function and theory of mind: Predictive relations from ages 2 to 4. *Developmental Psychology, 43*, 1447–1459. https://doi.org/10.1037/0012-1649.43.6.1447
Hughes, C., White, A., Sharpen, J., & Dunn, J. (2000). Antisocial, angry, and unsympathetic: "Hard-to-manage" preschoolers' peer problems and possible cognitive influences. *Journal of Child Psychology and Psychiatry, and Allied Disciplines, 41*(2), 169–179. https://doi.org/10.1111/1469-7610.00558
Keenan, K., & Shaw, D. (1997). Developmental and social influences on young girls' early problem behavior. *Psychological Bulletin, 121*, 95–113. https://doi.org/10.1037/0033-2909.121.1.95
Keng, S. L., Tan, E. L. Y., Eisenlohr-Moul, T. A., & Smoski, M. J. (2017). Effects of mindfulness, reappraisal, and suppression on sad mood and cognitive resources. *Behavior Research and Therapy, 91*, 33–42. https://doi.org/10.1016/j.brat.2017.01.006
Kochanska, G., & Knaack, A. (2003). Effortful control as a personality characteristic of young children: Antecedents, correlates, and consequences. *Journal of Personality, 71*(6), 1087–1112. https://doi.org/10.1111/1467-6494.7106008
Kochanska, G., Murray, K., Jacques, T. Y., Koenig, A. L., & Vandegeest, K. A. (1996). Inhibitory control in young children and its role in emerging internalization. *Child Development, 67*(2), 490–507. https://doi.org/10.2307/1131828
Lehto, J. E., Juujaervi, P., Kooistra, L., & Pulkkinen, L. (2003). Dimensions of executive functioning: Evidence from children. *The British Journal of Developmental Psychology, 21*, 59–80. https://doi.org/10.1348/026151003321164627
Lemerise, E., & Arsenio, W. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development, 71*(1), 107–1118.
Leyland, A., Emerson, L. M., & Rowse, G. (2018). Testing for an effect of a mindfulness induction on child executive functions. *Mindfulness, 9*(6), 1807–1815. https://doi.org/10.1007/s12671-018-0923-2
Leyland, A., Rowse, G., & Emerson, L.-M. (2019). Experimental effects of mindfulness inductions on self-regulation: Systematic review and meta-analysis. *Emotion, 19*(1), 108–122. https://doi.org/10.1037/emo0000425
Lim, X., & Qu, L. (2017). The effect of single-session mindfulness training on preschool children's attentional control. *Mindfulness, 8*(2), 800–810. https://doi.org/10.1007/s12671-016-0600-2
Marcovitch, S., O'Brien, M., Calkins, S. D., Leerkes, E. M., Weaver, J. M., & Levine, D. W. (2015). A longitudinal assessment of the relation between executive function and theory of mind at 3, 4, and 5 years. *Cognitive Development, 33*, 40–55. https://doi.org/10.1016/j.cogdev.2014.07.001
Marcovitch, S., & Zelazo, P. D. (2009). A hierarchical competing systems model of the emergence and early development of executive function. *Developmental Science, 12*(1), 1–25. https://doi.org/10.1111/j.1467-7687.2008.00754.x
McClelland, M. M., Acock, A. C., & Morrison, F. J. (2006). The impact of kindergarten learning-related skills on academic trajectories at the end of elementary school. *Early Childhood Research Quarterly, 21*, 471–490. https://doi.org/10.1016/j.ecresq.2006.09.003
McClelland, M. M., Morrison, F. J., & Holmes, D. H. (2000). Children at-risk for early academic problems: The role of learning-related social skills. *Early Childhood Research Quarterly, 15*, 307–329. https://doi.org/10.1016/S0885-2006(00)00069-7
McEarchern, A. D., & Snyder, J. (2012). Gender differences in predicting antisocial behaviors: Developmental consequences of physical and relational aggression. *Journal of Abnormal Child Psychology, 40*, 501–512. https://doi.org/10.1007/s10802-011-9589-0
Miller, G. M., & Tolan, P. H. (2019). The influence of parenting practices and neighborhood characteristics on the development of childhood aggression. *Journal of Community Psychology, 47*, 135–146. https://doi.org/10.1002/jcop.22105
Mischel, W., Shoda, Y., & Rodriguez, M. L. (1989). Delay of gratification in children. *Science, 244*(4907), 933–938. https://doi.org/10.1126/science.2658056
Moriguchi, Y., Shinohara, I., & Yanaoka, K. (2018). Neural correlates of delay of gratification choice in young children: Near-infrared spectroscopy studies. *Developmental Psychobiology, 50*, 989–998. https://doi.org/10.1002/dev.21791
Murray-Close, D., Crick, N. R., Tseng, W.-L., Lafko, N., Burrows, C., Pitula, C., & Ralston, P. (2014). Physiological stress reactivity and physical and relational aggression: The moderating roles of victimization, type of stressor, and child gender. *Development and Psychopathology, 26*, 589–603. https://doi.org/10.1017/S095457941400025X
Myers, T. A. (2011). Goodbye, listwise deletion: Presenting hot deck imputation as an easy and effective tool for handling missing data. *Communication Methods and Measures, 5*, 297–310. https://doi.org/10.1080/19312458.2011.624490
Oeri, N., & Roebers, C. M. (2020). Regulating disappointment can impair cognitive performance in kindergarten children: Individual differences in ego depletion. *Journal of Experimental Child Psychology, 190*. https://doi.org/10.1016/j.jecp.2019.104728
Osgood, J. M., & Muraven, M. (2016). Does counting to ten increase or decrease aggression? The role of state self-control (ego-depletion) and consequences. *Developmental Science, 21*(1). https://doi.org/10.1111/jasp.12334
Ostrov, J. M., & Keating, C. F. (2004). Gender differences in preschool aggression during free play and structured interactions: An observational study. *Social Development, 13*(2), 255–277. https://doi.org/10.1111/j.1467-9507.2004.000266.x
Ostrov, J. M., Kamper, K. E., Hart, E. J., Godleski, S. A., & Blakely-McClure, S. J. (2014). A gender-balanced approach to the study of peer victimization and aggression subtypes in early childhood. *Developmental Psychopathology, 26*(3), 575–587. https://doi.org/10.1017/S0954579414000248
Perry, R. E., Braren, S. H., Blair, C., & Family Life Project Key Investigators. (2018). Socioeconomic risk and school readiness: Longitudinal mediation through children's social competence and executive function. *Frontiers in Psychology, 9*, 1–15. https://doi.org/10.3389/fpsyg.2018.01544
Peverill, S., Garon, N., Brown, A., & Moore, C. (2017). Depleting and motivating self-regulation in preschoolers. *Cognitive Development, 44*, 116–136. https://doi.org/10.1016/j.cogdev.2017.09.005
Pnevmatikos, D., & Trikkaliotis, I. (2013). Intraindividual differences in executive functions during childhood: The role of emotions. *Journal of Experimental Child Psychology, 115*(2), 245–261. https://doi.org/10.1016/j.jecp.2013.01.010
Poland, S. E., Monks, C. P., & Tsermentseli, S. (2016). Cool and hot executive function as predictors of aggression in early childhood: Differentiating between the function and form of aggression. *The British Journal of Developmental Psychology, 34*, 181–197. https://doi.org/10.1111/bjdp.12122
Powell, L. J., & Carey, S. (2017). Executive function depletion in children and its impact on theory of mind. *Cognition, 164*, 150–162. https://doi.org/10.1016/j.cognition.2017.03.022
Rahman, A. A., Elke, J., & Wiebe, S. (2019). The effects on emotion on children's attention: Insights from electroencephalography. March. In *Paper Presented at the Biennial Meeting of the Society for Research in Child Development*.
Raikes, H. A., Virmani, E. A., Thompson, R. A., & Hatton, H. (2013). Declines in peer conflict from preschool through first grade: Influences from early attachment and social information processing. *Attachment & Human Development, 15*(1), 65–82. https://doi.org/10.1080/14616734.2012.728381
Raver, C. C., Blair, C., & Willoughby, M. (2013). Poverty as a predictor of 4-year-olds' executive function: New perspectives on models of differential susceptibility. *Developmental Psychology, 49*, 292–304. https://doi.org/10.1037/a0028343

Razza, R. A., & Blair, C. B. (2009). Associations among false-belief understanding, executive function, and social competence: A longitudinal analysis. *Journal of Applied Developmental Psychology, 30*(3), 332–343. https://doi.org/10.1016/j.appdev.2008.12.020

Rhoades, B. L., Greenberg, M. T., & Domitrovich, C. E. (2009). The contribution of inhibitory control to preschoolers' social-emotional competence. *Journal of Applied Developmental Psychology, 30*(3), 310–320. https://doi.org/10.1016/j.appdev.2008.12.012

Rose, A. J., & Asher, S. R. (1999). Children's goals and strategies in response to conflicts within a friendship. *Developmental Psychology, 35*(1), 69–79. https://doi.org/10.1037/0012-1649.35.1.69

Rothbart, M. K., & Bates, J. E. (2006). Temperament. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology: Social, emotional, and personality development* (6th ed., pp. 99–166). Hoboken, NJ: Wiley.

Sabbagh, M. A., Xu, F., Carlson, S. M., Moses, L. J., & Lee, K. (2006). The development of executive functioning and theory of mind: A comparison of Chinese and U.S. preschoolers. *Psychological Science, 17*, 74–81. https://doi.org/10.1111/j.1467-9280.2005.01667.x

Schonert-Reichl, K. A., Oberle, E., Lawlor, M. S., Abbott, D., Thomson, K., Oberlander, T. F., & Diamond, A. (2015). Enhancing cognitive and social–Emotional development through a simple-to-administer mindfulness-based school program for elementary school children: A randomized controlled trial. *Developmental Psychology, 51*(1), 52–66. https://doi.org/10.1037/a0038454

Schwarz, N., & Clore, G. L. (2007). Feelings and phenomenal experiences. In A. W. Kruglanski, & E. T. Higgins (Eds.), *Social psychology: Handbook of basic principles* (pp. 385–407). New York, NY: The Guilford Press.

Smith-Donald, R., Raver, C. C., Hayes, T., & Richardson, B. (2007). Preliminary construct and concurrent validity of the Preschool Self-Regulation Assessment (PSRA) for field-based research. *Early Childhood Research Quarterly, 22*, 173–187. https://doi.org/10.1016/j.ecresq.2007.01.002

Steinbeis, N. (2018). Taxing behavioral control diminishes sharing and costly punishment in childhood. *Developmental Science, 21*(1). https://doi.org/10.1111/desc.12492

Stucke, T. S., & Baumeister, R. F. (2006). Ego depletion and aggressive behavior: Is the inhibition of aggression a limited resource? *European Journal of Social Psychology, 36*(1), 1–13. https://doi.org/10.1002/ejsp.285

ToonDoo. (2012). Pleasonton, CA: Jambav. www.toondon.com.

Tremblay, R. E., Nagin, D. S., Seguin, J. R., Zoccolillo, M., Zelazo, P. D., Boivin, M., … Japel, C. (2004). Physical aggression during early childhood: Trajectories and predictors. *Clinical Neurophysiology, 123*(3), 106–116. https://doi.org/10.1016/j.clinph.2011.06.006.A

Wenger, S., Berg-Cross, L., & Berg-Cross, G. (1980). Parents' judgments of children's aggressive behavior. *Merrill-Palmer Quarterly, 26*, 161–169.

Willoughby, M. T., Wirth, R. J., Blair, C. B., & Family Life Project Investigators. (2012). Executive function in early childhood: Longitudinal measurement invariance and developmental change. *Psychological Assessment, 24*(2), 418–431. https://doi.org/10.1037/a0025779

Zelazo, P. D. (2004). The development of conscious control in childhood. *Trends in Cognitive Sciences, 8*(1), 12–17. https://doi.org/10.1016/j.tics.2003.11.001

Zelazo, P. D. (2015). Executive function: Reflection, iterative reprocessing, complexity, and the developing brain. *Developmental Review, 38*, 55–68. https://doi.org/10.1016/j.dr.2015.07.001

Zelazo, P. D., & Lyons, K. E. (2012). The potential benefits of mindfulness training in early childhood: A developmental social cognitive neuroscience perspective. *Child Development Perspectives, 6*(2), 154–160. https://doi.org/10.1111/j.1750-8606.2012.00241.x

Zelazo, P. D., Anderson, J. E., Richler, J., Wallner-Allen, K., Beaumont, J. L., & Weintraub, S. (2013). II. NIH Toolbox Cognition Battery (cb): Measuring executive function and attention. *Monographs of the Society for Research in Child Development, 78*(4), 16–33. https://doi.org/10.1111/mono.12032

Zelazo, P. D., Müller, U., Frye, D., & Marcovitch, S. (2003). The development of executive function in early childhood. *Monographs of the Society for Research in Child Development, 68*(3), 1–155.

Ziv, Y. (2013). Social information processing patterns, social skills, and school readiness in preschool children. *Journal of Experimental Child Psychology, 114*, 306–320. https://doi.org/10.1016/j.jecp.2012.08.009