ABSTRACT

Title of Thesis:	THE CONTRIBUTIONS OF TEMPERAMENT TRAITS TO REGULATORY FLEXIBILITY IN PRESCHOOLERS: THE IMPORTANCE OF CONTEXT
	Helena Shoplik, Master of Arts, 2019
Thesis Directed By:	Professor Hedwig Teglasi, Department of Counseling, Higher Education, and Special Education

Regulatory flexibility is the ability to meet demands of a situation by modulating behavior, cognitions, or emotions. While flexibility has been studied in early childhood, the role of reactive and regulatory temperamental building blocks of flexibility to meet requirements of different contexts has not been investigated in preschoolers. Routine and novel contexts require very different skills to navigate appropriately. For example, different aspects of inhibition and modulation of behavior may come into play in familiar/routine and novel contexts such those that depart from expectations. The current study utilized a parent-report measure of temperament and of regulatory flexibility to address the unique contributions of selected temperamental attributes—including attention, sensitivity, and activity level—to regulatory flexibility. Because of its multi-faceted nature (Kashdan & Rottenberg, 2010), an in-depth examination of regulatory flexibility could provide a better understanding of

how preschoolers meet the challenges that are introduced to them during this developmental period.

THE CONTRIBUTIONS OF TEMPERAMENT TRAITS TO REGULATORY FLEXIBILITY IN PRESCHOOLERS: THE IMPORTANCE OF CONTEXT

by

Helena M. Shoplik

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Advisory Committee:
Professor Hedwig Teglasi, Chair
Professor Dennis Kivlighan
Professor Mary Ann Hoffman

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Chapter 1: Introduction

Regulatory flexibility is a construct which encompasses the ability to meet the demands of a situation by modulating one's behavior, cognitions, or emotions. Social situations can elicit emotional responses from a child and require him or her to regulate and react to internal or external demands (Marcelo & Yates, 2014). Regulatory flexibility is required when the demands of a situation are constantly changing and an individual is required to attend to cues, be sensitive to the context of the situation, and regulate emotional or behavioral reactions (Bonnano & Burton, 2013). Some examples of situations that might require regulatory flexibility would be receiving an unwanted present, sitting in the waiting room at the doctor's office, or following classroom rules at school.

Situations requiring regulatory flexibility range on a continuum from routine to novel. Routine situations present demands that a preschooler can anticipate based on prior experience. For example, being expected to clean up toys before bedtime is a demand that a preschooler would be able to anticipate based on previous requests from parents. The navigation of routine demands is still being mastered in preschool, and might include following the explicit or implicit rules of a situation as well as handling typical demands of parents, teachers, and peers. For children who have difficulty anticipating the requirements of these demands, routine situations, though familiar, may be taxing. On the other hand, situations that occur in novel contexts include demands that cannot be anticipated easily based on prior experience. Examples include reacting to an unexpected postponement of a positive event—like a trip to the zoo—a demand which a child would not be able to anticipate ahead of time. Like routine situations, navigating novel situations is a skill that is still developing in the preschool years.

While many variables impact how successfully a preschooler is able to navigate a social situation, several temperament traits are building blocks for flexible responding and thus support the "big picture" process of regulatory flexibility. Temperament refers to biologically based individual differences in reactivity and self-regulation (Rothbart & Bates, 1998). Temperament traits are necessary but not sufficient for allowing a preschooler to respond to a situation with flexibility.

Many temperament traits fall into the category of "reactive" temperament traits or "regulatory" temperament traits. Reactivity refers to how disposed one is to react in terms of emotional, behavioral, and attentional reactivity, and regulation refers to the processes that modulate reactivity (Rothbart, 2011). Children who have regulatory and reactive traits that allow them to respond flexibly to such situations—whether in novel or routine contexts—are less likely to be strongly impacted by difficulties in everyday functioning (Moyer & Sandoz, 2015). Both regulatory and reactive temperament traits will be examined to determine how they contribute to regulatory flexibility in novel and routine situations.

Three specific temperament traits that have been demonstrated to contribute to regulatory flexibility in social situations are attention, sensitivity, and activity level. Attention refers to the ability or capacity to selectively attend to specific information and remain attentive for as long as needed (Anderson & Reidy, 2012). Sensitivity includes reactivity to changes in surroundings, sensory stimuli, and social stimuli. Activity level is a child's general pace of movement and expenditure of energy (Teglasi et al., 2009). Although this is not an exhaustive list of temperamental traits that are necessary to meet the demands of a situation, these particular traits were chosen because they have previously been demonstrated to be related to adjustment in preschoolers (Verron & Teglasi, 2018). In the current study, the measurement of these traits allows for the comparison of the contributions of cognitive (attention), emotional (sensitivity), and behavioral (activity level) temperament traits to regulatory flexibility in preschoolers. Additionally, because some of these traits are largely regulatory (attention and modulation of activity level) and others are largely reactive (sensitivity and activity level), including these three variables also enables the researcher to examine the contribution of regulatory and reactive temperament traits for regulatory flexibility in routine and novel contexts.

The current study examined the processes required for regulatory flexibility, both reactive and regulatory. In the literature, reactive and regulatory processes such as attention, sensitivity, and activity level are studied as single dimensions. In the current study, these broader dispositional qualities include sub-components that may be differentially relevant to adapting in novel or routine situations. The sub-components of each trait provide a more nuanced and detailed picture of what it is about each trait that is important for regulatory flexibility.

In order to lend substance to the distinction between regulatory flexibility in novel and routine situations, emotion recognition and emotion situation knowledge were also measured in the current study. During early childhood, preschoolers become more and more skilled at emotion recognition (Denham, Zoller, & Couchoud, 1994) as well as emotion situation knowledge, or the ability to infer emotions from a situation (Fine, Izard, & Trentacosta, 2006). Including a performance measure of emotion recognition and emotion situation knowledge enables the researcher to compare the relationship of regulatory flexibility in novel versus routine situations to variables that have previously been demonstrated to be connected to flexibility.

The goal of this study is to expand the literature on regulatory flexibility by examining parent ratings of regulatory flexibility and of regulatory and reactive temperament traits which are considered building blocks of more complex constructs such as regulatory flexibility. This study aimed determine which building blocks of regulatory flexibility—attention, sensitivity, and activity level—are most important in navigating novel and routine social situations for preschoolers. This information provides a greater understanding of which underlying processes are particularly imports for preschoolers navigating a complex, ever-changing world.

In the next section, regulatory flexibility and its cognitive, emotional, and behavioral building blocks will be discussed in more depth. This will be followed by an explanation of the importance of context in regulatory flexibility, and a review of emotion recognition and emotion situation knowledge.

Regulatory Flexibility

Within the literature on regulatory flexibility, the various definitions of the construct have commonalities. For purposes of this study, regulatory flexibility is "the ability to meet or navigate the demands of a given situation by modulating one's behavior, cognitions, or emotions" in order to be consistent with its measurement by the *Structured Temperament*

Interview (Teglasi, unpublished). Bonnano and Burton (2013) define regulatory flexibility as a process that includes sensitivity to the context of a situation, having a diverse repertoire of regulatory strategies at one's disposal, and having the ability to monitor feedback after the execution of regulatory strategies. A child should have an understanding of the emotions that are appropriate for a given situation in order to facilitate appropriate behavior. This is particularly useful in a predictable, routine situation in which a child is already familiar with the types of emotions that a situation can elicit—for example, expressing emotions appropriate to a preschool classroom versus emotions appropriate for the home context. Similarly, Williams, Ciarrocchi, & Heaven (2012) describe regulatory flexibility as the way that an individual experiences different events—thoughts, emotions, symptoms, or social situations—and that individual's ability to choose a response that best serves their goals for that situation. A child with regulatory flexibility is able to be sensitive to social and contextual cues in the environment, focus attention appropriately on these cues, and modulate the amount of energy expended based on the context.

Research on regulatory flexibility—including research under its various other names such as coping flexibility and psychological flexibility—has become more extensive in the past two decades, although the majority of these studies have been conducted with adult populations. The lack of research on regulatory flexibility in early childhood is surprising given that a preschooler's capacity for regulating negative emotions and behavior with a flexible coping style becomes increasingly important at this developmental stage (Marcelo & Yates, 2014). Children who are less flexible may experience certain situations as taxing, particularly those involving transitioning to new activities, coping with changes in routine, learning from their mistakes, holding information in working memory, and multi-tasking (Anderson & Reidy, 2012). Conversely, flexible responses to social situations are linked with better overall psychological health (Kashdan & Rottenberg, 2010). The next section will clarify some of the basic regulatory and reactive processes thought to be building blocks of the broader construct of regulatory flexibility.

Temperamental Building Blocks of Regulatory Flexibility

The capacity to focus attention as needed, control one's emotions, and inhibit inappropriate behavior are necessary for flexibility. Although research has not explicitly led to a consensus about the exact elements involved in flexibility (Kashdan & Rottenberg, 2010), there is evidence in the temperament literature that suggests a relationship between children's temperament and adjustment (Rothbart & Bates, 1998), which may point towards temperament's role in flexibility. Certain characteristics that are subsumed under the category of temperament—such as example attention and inhibition of inappropriate behaviors—have already been identified in the regulatory flexibility literature as contributing to flexibility in early childhood (Acar et al., 2015; Marcelo & Yates, 2014).

It is important to note that each of these temperament traits are multi-dimensional, and as such, have several sub-dimensions that are intentionally measured by the *Structured Temperament Interview* to provide a more well-rounded measurement of the trait (Teglasi, 1998). For example, in this study, the broader Attention scale subsumes External Attention, Internal Attention, and Emotional Attention. External Attention refers to how well a child can hold his or her attention on a task without being distracted by external stimuli, while Internal Attention refers to holding attention on a task without being distracted by one's own thoughts and Emotional Attention refers to an inability to be distracted away from one's own emotional reactions (Teglasi, unpublished). The Sensitivity scale is composed of Noticing, Sensitivity, and Sensitivity to Peers. Sensitivity in this study refers to being sensitive to not meeting the expectations of others, adult disapproval, punishment, and praise while Peer Sensitivity refers to sensitivity to peer approval and disapproval. Noticing refers to sensitivity to surroundings, sensory stimuli, and the appearance and emotions of others. Also of interest for the current study is a separate but related construct known as response intensity which refers to the intensity of a child's reaction to the stimuli that he or she is sensitive to. Activity Level is composed of Vigor/Energy and Modulation of Activity Level. Vigor/Energy is a reactive temperamental trait while the modulation of activity level is a self-regulatory trait. Vigor/Energy can be noted in a child's general pace of movement and expenditure of energy—whether frantic or subdued—and modulation of activity can be noted in situations in which the expectations are that a child modify his or her physical movements to suit the context (Teglasi et al., 2009). Although these traits and subdimensions of traits do not comprise an exhaustive list of the building blocks of regulatory flexibility, examining these constructs and their relations with the construct should provide a good first step in understanding the cognitive (attention), emotional (sensitivity), and behavioral (activity level) bases of flexibility in early childhood. Each of these broad traits is reviewed below with respect to regulatory flexibility.

Attention

Attention is the first building block of regulatory flexibility examined in this study, and is considered to be self-regulatory in nature. It refers to the ability or capacity to selectively attend to specific information and to remain attentive as long as needed (Anderson & Reidy, 2012). Without control over one's attentional processes, a child cannot sustain and shift his or her focus to the most salient aspects of a situation (Kashdan & Rottenberg, 2010).

The self-regulatory nature of attention is important for identifying its underlying relationship to regulatory flexibility. Preschool children who have a greater capacity for sustained attention without distraction by external stimuli are more likely to be able to modulate their behaviors to be appropriate for social interactions with peers than children with a lower capacity for sustained attention (e.g., Acar et al., 2015). The ability to sustain attention despite distractions in the environment helps children to react in a flexible manner. When preschoolers were asked to wait for two minutes to play with an attractive toy, children who were better able to direct their attention to helpful coping strategies without losing track of their ultimate goal of playing with the toy reacted in a more flexible manner than other children who had less attentional control (Marcelo & Yates, 2014). Similarly, Barragan-Jason and Attance (2017) found that preschoolers who have lower attentional capacities also have more difficulty in adjusting to a routine demand of waiting for an adult than preschoolers with higher attentional capacities. With a population of nine- and ten-year-old children, Babb, Levine, and Arseneault (2010) found an inverse relationship between flexibility and ADHD. When compared to same-age peers with ADHD, children without ADHD demonstrated greater flexibility in regulation and response to hypothetical vignettes (Babb, Levine, Arseneault, 2010). The ability to tune out distraction from the environment and one's thoughts are each contributing processes to successful regulatory flexibility in preschoolers.

Just as it is important to not be distracted by external and internal aspects of the environment, a balance of attention to emotions is important for preschoolers to be flexible. Shifting attention to emotional stimuli might be useful for a preschooler where a child has to attend to and monitor his or her emotions. However, it is not always adaptive for a child to be distracted by emotions. A child who cannot be distracted or appeased by anything else when feeling angry, or conversely, shifts from one emotion to another very quickly, may have difficulty in reacting adaptively. Therefore, while sustaining attention seems to be a very important construct, the ability to modulate attention by situation is key in navigating situations. It can also be concluded from these studies that the capacity to pay attention to environmental cues and inhibit inappropriate behavior and emotions is a necessary prerequisite for regulatory flexibility.

Sensitivity

Sensitivity, as well as the intensity with which one responds to emotional situations, are both considered reactive temperament traits. Based on the items in the Sensitivity scale on the *Structured Temperament Interview* (Teglasi, unpublished), children can differ from one another in their sensitivity to changes in surroundings (visual aspects of the environment), sensory stimuli (touch or taste), and social stimuli (emotions of others). Intensity of reaction to a situation is related to sensitivity, but not quite the same process. Two children may both have the same level of sensitivity to criticism by a parent, for example, but one child may react with a greater intensity than the other to the situation. Sensitivity and intensity were both chosen as temperament traits to be examined in the context of regulatory flexibility because of the connection made in much of the literature between sensitivity to one's context and the ability to behave flexibly. In particular, in their model of regulatory flexibility for adults, Bonnano and Burton (2013) cite contextual sensitivity—to surroundings, sensory stimuli, and others—as being the first step in being able to respond with flexibility to a situation.

Some studies demonstrate the connection between inflexibility and reactive temperament traits in children and adolescents, including sensitivity and intensity. Anxious children and adolescents, for example, are less accepting of their emotions and may react negatively to emotional experiences or attempt to suppress or stifle emotions, thus behaving in an inflexible manner (Matthews et al., 2016). Anxious youth are also less effective at expressing and understanding emotions, and report less emotional self-efficacy (Matthews et al., 2016). Paulus et al. (2016) found that for adolescents recruited from an inpatient clinic at ages 12-17 years old, levels of neuroticism were directly associated with regulatory flexibility as well as emotion dysregulation. This seems to also be true for preschoolers. In one study, young children who had a larger number of coping strategies to use during a delay of gratification task expressed a greater range of negative affect in their play which may point to a greater ability to work through and regulate a larger range of emotions (Marcelo & Yates, 2014). Furthermore, regulatory flexibility in preschoolers predicted lower examiner ratings of internalizing problem behaviors during observation at a follow-up session (Marcelo & Yates, 2014). Sensitivity and response intensity are connected to flexibility and may influence children's psychological functioning.

While being overly sensitive to stimuli and people in one's environment could become maladaptive in excess, research also connects sensitivity with higher cognitive abilities and a better understanding of emotions. A study by Cutting and Dunn (2002) that was conducted with preschoolers ages four to five years old looked at sensitivity to criticism from a teacher in a story that was acted out with puppets. Children who were the most sensitive to and aware of teacher criticism in the story about the puppet also scored the highest on theory of mind measures and so had a more advanced social understanding (Cutting & Dunn, 2002). Both the understanding of and sensitivity to the emotions of others makes it easier for children to express emotions that are appropriate to a particular affective context (Garner & Power, 1996). Therefore, a heightened sensitivity to one's environment—even if it is sensitivity to negative stimuli like criticism—can positively impact how a child is able to navigate that context.

Recognizing the emotions of a situation seems to impact a child's ability to navigate it. However, a study by Cummings and Rennels (2014) with 5- through 8-year-olds shows that younger preschoolers might still be developing the ability to be sensitive to the emotions of others within the context of a situation. Children were asked to identify a facial expression from one of four pictures of faces that matched an emotion label and to infer a particular emotion from a vignette task. The younger children in this study, particularly the five-, six-, and seven-year-olds, were significantly better at identifying a picture of an emotion rather than picking out the emotion from the situational details of a vignette (Cummings & Rennels, 2014). The ongoing development of sensitivity to emotional cues may impact the connection between a preschooler's ability to be flexible and his or her sensitivity to social cues, surroundings, and sensory stimuli. Although many preschoolers may still be developing sensitivity to social and emotional cues, the right amount of sensitivity to surroundings coupled with an understanding of emotions seems to enable regulatory flexibility.

Activity Level

A third building block of regulatory flexibility to be explored in this study is activity level. Activity level can be broken down into two basic components: vigor and modulation of energy (Teglasi et al, 2009). Vigor is noted in a child's general pace of movement and expenditure of energy—whether frantic or subdued. Vigor is a reactive temperamental trait while the modulation of activity level is a self-regulatory trait which requires inhibition. In school, for example, a child may be asked to modulate activity level when he or she switches from playing on the swing set outside during recess to sitting quietly during story time. Drastic improvements on tasks requiring inhibition—for example, saying "grass" when shown a picture of snow—take place in preschool, especially between three to six years of age (Carlson, 2005). Therefore, rapid improvement is occurring in a preschooler's ability to modulate activity level based on the demands of a situation.

Activity level was chosen as a temperament trait to study in relation to regulatory flexibility because of its well-documented relationship to adjustment. Children who perform well on tasks requiring behavioral inhibition have been found to have overall better mental and physical health than classmates who do not perform as well on these measures (Diamond, 2013). Similarly, low parent ratings of modulation of activity level have been demonstrated to have a strong relationship with adjustment problems as indexed by scores on the Behavioral Assessment System for Children and these low ratings are also related to classification of emotional disability in the public-school system (Teglasi et al., 2009). One study by Kieras et al. (2005) demonstrated that preschoolers who performed better on a behavioral inhibition task also exhibited higher levels of positive affect when they were given an unwanted gift by a researcher. The ability to inhibit immediate reactions to a situation may enable a more flexible—and in this case, socially appropriate—response from a child, and thus the modulation of activity level should also be important for regulatory flexibility.

Routine and Novel Context

Social situations occur on a spectrum of novel to routine and require cognitive, emotional, or behavioral efforts to manage internal or external demands (Marcelo & Yates, 2014). Novel contexts require a child to adjust to the demands of a situation which cannot be anticipated easily while a routine situation requires a child to adjust to the demands of a situation that can be easily anticipated. Because of these differences, the temperament traits of attention, sensitivity, and activity level may be more or less relevant to routine versus novel situations.

Routine situations require sustained attention and behavioral inhibition which both develop rapidly during the preschool years (Kieras et al., 2005). Given this rapid development, it is logical to infer that preschoolers with undeveloped attentional and inhibitory capacities will have trouble handling routine demands from peers, parents, and teachers—even if they know what is expected of them in these situations—and therefore will be unable to respond flexibly to routine demands. For example, in Barragan-Jason and Atance's (2017) study, preschoolers were asked to wait in a waiting room with no explicit reward. Because this was a task with predictable demands—preschoolers are asked to wait for parents frequently—this is a good example of a routine situation. Children in the study with lower attentional and inhibitory capacities had difficulty directing their attention in productive and flexible ways to help them to complete the task. Attention and modulation of activity level seem to be particularly relevant for routine situations.

On the other hand, novel situations require a sensitivity and attention to surroundings such as social and emotional cues (Cutting & Dunn, 2002). They also pull for the ability to modulate activity so that inappropriate behavior is inhibited and socially appropriate behavior is possible (Garner & Power, 1996). Children in novel situations must be able to deal with intense positive and negative emotions that often occur when facing novelty, complexity, uncertainty, and unpredictability (Kashdan & Rottenberg, 2010). Children without sensitivity to social and emotional cues and without an ability to modulate activity level to match a situation and to regulate emotions will be unable to navigate novel situations which are often emotional. For example, Garner and Power (1996) found that preschoolers with a better understanding of emotional cues and those who were rated by parents as having greater control over intense emotions were more likely to provide a socially appropriate response to an unpredictable social situation. Sensitivity and attention to surroundings as well as appropriate modulation of activity level seem to be temperament traits which are relevant for novel situations. In the next section, emotion recognition and emotion situation knowledge will be discussed as sensitivity to and an understanding of emotions impact the navigation of social situations.

Emotion Recognition and Emotion Situation Knowledge

There are two domains of emotion understanding that were measured in this study: emotion recognition and emotion situation knowledge. In particular, emotion situation knowledge has already been demonstrated to be related to the flexible navigation of social situations. Because these variables are measured with a performance measure in the current study, the inclusion of emotion recognition and emotion situation knowledge should provide an external correlate for regulatory flexibility.

Socially effective behavior relies both on emotion recognition and an understanding of situational causes of emotions (Verron & Teglasi, 2018). During early childhood, preschoolers become more and more skilled at *emotion recognition*: being able to identify the emotions of themselves and others (Denham, Zoller, & Couchoud, 1994). Emotion recognition is a construct often measured by asking a child to identify the names of emotions pictured in facial expressions or exhibited in vignettes. It is positively related to children's adjustment (Deneault & Ricard, 2013). Lower levels of emotion recognition are correlated with low cognitive-language ability (Denham, Zoller, & Couchoud, 1994) and the display of predominantly negative emotions in preschoolers (Denham, 1986).

A second important domain of emotion understanding is *emotion situation knowledge*. Emotion situation knowledge is defined as the ability to infer emotions from a situation (Fine, Izard, & Trentacosta, 2006). This is a key skill for children who are navigating relationships in preschool and later in life. It is correlated with high ratings of prosocial behavior by teachers (Denham, 1986) and by independent observers (Cassidy et al., 2003). Emotion situation knowledge is often measured by providing children with vignettes and asking them to name the emotion that a character in the vignette is feeling based on a series of events (Cassidy et al., 2003). A slower trajectory of growth in emotion situation knowledge is correlated with temperament traits such as negative emotional intensity during preschool (Fine, Izard, & Trentacosta, 2006).

Emotion situation knowledge seems to be particularly important to flexible, adaptive behavior. Several studies demonstrate links between emotion situation knowledge and regulatory temperament traits that contribute to or are correlates of regulatory flexibility, particularly attentional focusing and effortful control. Emotion situation knowledge has been found to be negatively related to reticent—or uninvolved—play in preschoolers and positively related to social play (Gal-Szabo, Sprinrad, Eisenberg, & Sulik, 2018). Using the same data as the current study, Verron and Teglasi (2018) found a correlation between scores on an emotion situation knowledge task and attentional focusing in preschoolers as measured by teacher report. Regulatory abilities are important for preschoolers to understand emotions based on situational cues, and this understanding subsequently enables a preschooler to navigate social situations successfully. Importantly, neither of the above studies found significant correlations between emotion recognition and attentional focusing (Verron & Teglasi, 2018) or between emotion recognition and type of play in preschoolers (Gal-Szabo, Sprinrad, Eisenberg, & Sulik, 2018). It seems that the mere recognition of an emotion does not adequately differentiate ability to navigate social situations in early childhood. Emotion recognition by itself without the situational component will therefore not be a correlate of regulatory flexibility in the current study.

The Current Study

Although regulatory flexibility has been examined using several different methodologies in the literature, few studies directly address regulatory flexibility in early childhood. Also, while the extant literature surrounding regulatory flexibility does examine the construct in novel (Garner & Power, 1996; Marcelo & Yates, 2014) and routine (Barragan-Jason & Attance, 2017) situations, it has not sufficiently addressed the cognitive, emotional, and behavioral temperament traits that are important for meeting the demands of a routine or novel situation at the preschool age. There is also little research that compares flexibility in novel and routine contexts. Preschool is an important developmental stage in which to study regulatory flexibility by context as preschoolers are mastering routines as well as continually being exposed to new situations. The current study addresses these gaps in the literature by (a) using a sample of preschoolers and their parents, (b) comparing the contributions of regulatory and reactive building blocks of regulatory flexibility to the construct in preschoolers, and (c) using a measure of temperament that includes context as a rating of regulatory flexibility.

The *Structured Temperament Interview* (Teglasi, unpublished) was designed to sample items relevant to both familiar routines and novel situations and thus it seemed reasonable to expect that items would vary based on context. Before embarking on this study, the Regulatory Flexibility scale of the STI was factor analyzed to develop two internally consistent subscales—routine and novel regulatory flexibility. The STI was also used to measure cognitive, emotional, and behavioral temperament traits that are thought to be building blocks of regulatory flexibility by utilizing the Attention, Sensitivity, and Activity Level scales. Each of these temperament dimensions are complex and multi-faceted, and so preliminary analyses also included the identification of sub-dimensions within each of these temperament traits. Additionally, associations between regulatory flexibility and emotion understanding were measured using the *Emotion Comprehension Test* (ECT, Teglasi, unpublished), a performance test of emotion understanding associated with children's social competence. The use of this test lends substance to the distinction between regulatory flexibility in novel and routine situations.

The current study examined parent ratings of regulatory flexibility and of temperament in preschoolers from an archival data set (described in Teglasi et al., 2009) consisting of 112 preschool-age children to determine the unique contribution of selected temperament traits to regulatory flexibility. Prior research suggests that activity level, attention, and sensitivity will each contribute to preschoolers' ability to navigate the situations they encounter. This study seeks to answer which of these building blocks of regulatory flexibility—attention, sensitivity, and activity level—will add the most unique variance in the prediction of regulatory flexibility in novel and routine situations.

Chapter 2: Preliminary Research Questions

To ensure that the primary question of this study regarding the differences in the contributions of the building blocks of regulatory flexibility to flexibility in novel and routine situations could be answered, a few preliminary questions had to be addressed first, the results of which are detailed in this section. These questions were answered with an archival data set used in Teglasi et al., (2009) which consisted of parent ratings on the *Structured Temperament Interview* for 92 preschool-age children (46 male, 46 female) and scores on the Emotion Comprehension Test for 112 preschool-age children (48 male, 64 female).

Routine and Novel Components of Regulatory Flexibility

The Regulatory Flexibility scale of the *Structured Temperament Interview* included items that refer to novel and routine situations and it seemed reasonable to expect that factor analysis would support these two components. Questions such as "How does the child typically handle the routine demands/limits at school" require information from a routine context while questions like "How does the child react to departures from expectation" pull for information from a novel context. Novel and uncertain situations require the use of a wider range of coping strategies (Babb, Levine, & Arseneault, 2010). If a wider range of skills are needed to navigate novel situations, then it would make sense for the ability to adapt to novel situations to be separate from the ability to adapt to routine situations. It may even be that the ability to navigate routine situations emerges earlier developmentally, as an important part of early childhood is learning how to meet the demands of situations at school, home, and with friends.

A principal components analysis (PCA) of the STI Regulatory Flexibility scale was conducted with a varimax rotation. Factors were retained if they had Eigenvalues of 1 or greater and were consistent with Scree plots. The components that were derived along with the loadings of each of the items are listed in Table 1 below. Also included are the Cronbach's Alpha levels for each subscale as well as the corrected alpha levels adjusted to a scale length of 8 items using the Spearman-Brown Prophecy Formula. The corrected alpha levels are listed only for the Novel Regulatory Flexibility subscale, as that subscale has fewer than 8 items.

Table 1
Factor Loadings for Exploratory Factor Analysis with Varimax Rotation for Regulatory Flexibility Scale from the STI

STI Item	Reg. Flex. Routine	Reg. Flex. Novel
Item 98: Planned vs. haphazard behavior	**.758**	
Item 110: Rules vs. external limits	**.735**	
Item 97: Taking into account other's reactions	**.721**	
Item 109: Rules and standards vs. immediate wishes	**.708**	

Item 101: Following implicit rules without being told	**.645**	
Item 100: Following clear instructions	**.643**	
Item 107: Handles routine demands at home	**.521**	.368
Item 111: Acting without prior thought	**.477**	-.393
Item 99: Size up demands of change in routine	**.456**	
Item 112: Likelihood of planning ahead	**.437**	
Item 106: Handles routine demands at school	**.424**	.365
Item 104: Responds to changes in situation		**.745**
Item 103: Reacts to departure from expectations		**.727**
Item 102: Responds to postponement of positive events		**.602**
Item 47: Appropriateness of negative emotions		**.501**
Item 46: Appropriateness of positive emotions		**.479**
Item 105: Reacts to unexpectedly difficult activity		**.365**
Item 108: Handles routine demands of peers		**.359**
Eigenvalue	4.824	2.330
Cumulative Percent of Variance	26.800	39.743
Internal Consistency	.831	.688 (*.716*)
Number of Items in Subscale	11	7

Note. Extraction method = principal components analysis; rotation method = Varimax with Kaiser Normalization (rotation converged in 3 iterations). Highest factor loadings are indicated in bold. Internal consistency estimates in italics were adjusted to a scale length of 8 items using the Spearman-Brown Prophecy Formula; STI = *Structured Temperament Interview*

As expected, the PCA resulted in two strong factors (see Table 1). The first factor contained items dealing with routine situations, whereas the second had items dealing with novel situations. It is important to note that although the items in each of these two factors deal primarily with novel and primarily with routine situations, the division between novel and routine is not quite as binary. Many scenarios have elements that might be considered both routine and novel. For example, following rules at school every day is a routine demand, although there may be elements of novelty within the routine as small differences in the demands being placed on a child could be more or less predictable based on what is happening at school that day. The two categories of contexts are separate but related. In fact, a Pearson's correlation for this dataset shows that scores of regulatory flexibility in novel contexts are significantly correlated (r=.369, p<.001) with scores of regulatory flexibility in routine contexts.

Relations of ECT with Regulatory Flexibility

A second preliminary question addressed the external validity of using the STI as a measurement of regulatory flexibility in novel and routine situations. Emotion situation knowledge enables the individual to anticipate others' feelings and mental states in routine situations, and thus is most salient to regulatory flexibility in familiar or routine contexts.

To test this second preliminary hypothesis, bivariate correlations were run between the Routine and Novel subscales of the STI and the three scales from the ECT (see Table 2). Significant correlations were found between scores on the ECT Emotion-Situation dimension—which measures emotion situation knowledge—and the Regulatory Flexibility Scale and Routine subscale (p<.01) but, as expected, correlations were not significant for the Novel subscale. A Fisher's z test showed that the correlation between the ECT emotion situation knowledge and the Routine subscale was significantly different from the correlation between the ECT emotion situation knowledge and the Novel subscale (z=2.21, p<.05). Nonsignificant correlations were found between the emotion identification dimension of the ECT–which measures emotion recognition (from facial expressions)—and both subscales and the Regulatory Flexibility scale from the STI. This preliminary analysis demonstrates that the STI is related to external measures of a theoretically related construct, emotion situation knowledge, which lends additional weight to the distinction between novel and familiar context in relation to the current measure of regulatory flexibility.

Table 2
Correlations between ECT Dimensions and Adaptability Subscales from STI

ECT Scale	Regulatory Flex. Scale	Routine Subscale	Novel Subscale
ECT Emotion Recognition	.094	.115	.043
ECT Emotion Situation	.409**	.434**	.162

**p<.01

Subscales of Selected Temperament Constructs

The *Structured Temperament Interview* was designed intentionally so that several dimensions would be included in each scale to better capture many facets of temperament (Teglasi, 1998). To do so, the author (Teglasi, unpublished) identified domains to be sampled by the items. The Activity scale, for example, incorporated items to measure Vigor/Energy (movement) and Modulation (matching movement to context). As expected, these two dimensions emerged as distinct components that differed in their relations to external correlates (Teglasi et al., 2009). Likewise, the Attention and Sensitivity scales subsumed specified domains. It is important to examine these domains because each may have different implications for children's adjustment and development. For example, Teglasi and colleagues (2009) found that Modulation correlated with adjustment but Vigor/Energy (energy and movement) did not. Prior to testing this study's hypotheses, principal components analyses were conducted for the selected STI scales: Attention, Sensitivity, and Activity Level scales of the STI. The emerging components were used as separate sub-scales (see Table 3). These subscales are consistent with important theoretical distinctions with relevance to children's regulatory flexibility. This break down provides a more detailed understanding of the broader concept in relation to key processes of reactivity and regulation pertaining to cognitive, emotional, and behavioral building blocks and regulatory flexibility in novel and routine situations. For each subscale with fewer than 8 items—including the Vigor/Energy, Modulation, Internal Attention, Emotional Attention, Intensity Surroundings, Intensity Social, Noticing, Sensitivity, and Peer Sensitivity subscales—the Spearman-Brown Prophecy formula was computed to determine the corrected internal consistency with an 8-item scale. The corrected alphas are indicated in parentheses in Tables 4-7. See Table 3 for definitions of each subscale.

Table 3
Subscales of each STI Dimension

STI Dimension	Subscales
Attention	*External Attention* refers to how well a child can hold his or her attention on a task without being distracted by external stimuli. A high score indicates that the child can resist external distractions.
	Internal Attention refers to holding attention on a task without being distracted by one's own thoughts. A high score indicates that the child is not easily distracted by thoughts.
	Emotional Attention refers to an inability to be distracted away from one's own emotional reactions. A high score on emotional attention indicates the child is not distracted easily by emotions.

Activity Level	*Vigor* refers to the degree of physical energy that is expended by the child. A high score indicates that the child is consistently very physically active.
	Modulation of Activity Level is the regulatory component of activity level. A high score indicates the child can modulate the level of energy to fit the situation.
Sensitivity	*Noticing* refers to sensitivity to surroundings, sensory stimuli, and the appearance and emotions of others. A high score indicates high sensitivity.
	Sensitivity refers to being sensitive to not meeting the expectations of others, adult disapproval, punishment, and praise. A high score indicates high sensitivity.
	Peer Sensitivity refers to sensitivity to peer approval and disapproval. A high score indicates high sensitivity.
Intensity	*Intensity Surroundings* refers to the intensity of a reaction to one's surroundings. A high score indicates that the child typically has high intensity reactions.
	Intensity Social refers to the intensity of reaction to others. A high score indicates that the child typically has high intensity reactions.

Note. The STI dimensions in bold are the original four scales that were examined; items that fall under the Intensity dimension were examined separately from the other Sensitivity subscales in subsequent analyses

Activity Level

A PCA of the Activity Level scale of the STI yielded two factors: Vigor/Energy and Modulation subscales (see Table 4). The same results were found in a published study by Teglasi et al. (2009). Both subscales have appropriate internal consistency levels.

Table 4

Factor Loadings for Exploratory Factor Analysis with Varimax Rotation for Activity Level Scale from the STI[1]

STI Item	Vigor	Modulation

[1] These results were previously published in a study by Teglasi et al. (2009).

Item 1: Movement and energy	**.819**	
Item 2: Quiet vs. active situations	**.800**	
Item 4: Frequency of movement	**.769**	
Item 3: Pace of physical activity	**.618**	
Item 5: Modulation of activity level		**.772**
Item 7: Deliberateness of activity level		**.735**
Item 6: Control activity level		**.637**
Item 8: Change activity level when asked	-.356	**.547**
Eigenvalue	2.773	1.610
Cumulative Percent of Variance	34.668	54.789
Internal Consistency	.767 (*.868*)	.614 (*.761*)
Number of Items in Subscale	4	4

Note. Extraction method = principal components analysis; rotation method = Varimax with Kaiser Normalization (rotation converged in 3 iterations). Highest factor loadings are indicated in bold. Internal consistency estimates in italics were adjusted to a scale length of 8 items using the Spearman-Brown Prophecy Formula; STI = *Structured Temperament Interview*

Attention

PCA of the STI Attention scale yielded three factors initially. An examination of the impact of each item on the internal consistency of each subscale revealed that the removal of Item 15 ("To what extent is the child distracted from current activities by thoughts about an anticipated positive event?"), Item 23 ("When learning something new, to what extent does the child compare the information to what has been learned in the past or accept it as given?"), and Item 26 ("What is the duration of attention during self-selected activity?") would help the internal consistency of the subscales increase from an unacceptable level to an acceptable level. A PCA was then re-run with Items 15, 23, and 26 removed, yielding three strong factors: External Attention, Internal Attention, and Emotional Attention. The second factor—Emotional Attention—has a lower alpha level due to the small number of items in the subscale. Use of the Spearman-Brown formula to estimate internal consistency predicts that the Cronbach's alpha level for this subscale would be acceptable (.689) if there were eight items in the subscale instead of five.

Table 5
Factor Loadings for Exploratory Factor Analysis with Varimax Rotation for Attention Scale from the STI

STI Items	External Attention	Internal Attention	Emotional Attention
Item 9: Distracted by external stimuli	**.676**		
Item 12: Distracted by external stimuli during school work	**.676**		
Item 10: Distracted by external stimuli when engrossed in a chosen activity	**.476**		
Item 27: Duration of attention	**.389**		
Item 25: Duration of attention for school work	**.422**		.235
Item 29: Wants to complete assigned task	**.376**		
Item 24: Duration of attention during conversation	**.320**		
Item 33: Absorption in activities not chosen	**.244**		
Item 22: Active concentration	**.281**		
Item 19: Screen out irrelevant information		**.694**	
Item 18: Interference from less central details		**.580**	
Item 17: Distracted by extraneous information	.371	**.547**	

Item 14: Distractibility by own thoughts		**.579**	.484
Item 13: Distractibility by own thoughts during school work		**.515**	.488
Item 16: Cheer up by thinking of something else			**.547**
Item 31: Absorbed in chosen activity			**.341**
Item 20: Change focus of attention when necessary			**.456**
Item 21: Quality of concentration and effort for school work	.453		**.470**
Item 32: Quality of interest in tasks			**.293**
Eigenvalue	3.507	1.230	1.203
Cumulative Percent of Variance	27.199	36.735	46.068
Internal Consistency	.776	.742 *(.821)*	.581*(.689)*
Number of Items in Subscale	9	5	5

Note. Extraction method = principal components analysis; rotation method = Varimax with Kaiser Normalization (rotation converged in 3 iterations). Highest factor loadings are indicated in bold. Internal consistency estimates in italics were adjusted to a scale length of 8 items using the Spearman-Brown Prophecy Formula; STI = *Structured Temperament Interview*

Sensitivity

PCA with the Sensitivity plus Intensity scales from the STI initially yielded three factors, the Intensity factor being the strongest. Because Intensity was initially intended to be a separate subscale in the construction of the STI (Teglasi et al., 2009), the items in that factor were removed from the subsequent PCAs and treated as a separate scale (see Table 6). The removal of item 95 and 96 changed the internal consistency of the Intensity scale from an unacceptable level to acceptable for this scale, and so those items were left out of further analyses.

Table 6

Factor Loadings for Exploratory Factor Analysis with Varimax Rotation for Intensity Scale from the STI

STI Items	Intensity Surroundings	Intensity Social
Item 82: Intensity of reactions to changes in surroundings	**.869**	
Item 84: Intensity of reactions to changes in others' appearance	**.830**	
Item 80: Intensity of reactions to sensory stimuli	**.547**	.446
Item 86: Intensity of reactions to changes in others' feelings		**.864**
Item 88: Intensity of reactions to social cues		**.849**
Eigenvalue	2.352	1.119
Cumulative Percent of Variance	47.049	22.383
Internal Consistency	.681*(.850)*	.709*(.907)*
Number of Items in Subscale	3	2

Note. Extraction method = principal components analysis; rotation method = Varimax with Kaiser Normalization (rotation converged in 3 iterations). Highest factor loadings are indicated in bold. Internal consistency estimates in italics were adjusted to a scale length of 8 items using the Spearman-Brown Prophecy Formula; STI = *Structured Temperament Interview*

From the PCA analysis of the Sensitivity scale without the Intensity items, three factors emerged. While the third factor only has two items, it was decided to keep these two items as a separate subscale instead of trying to force them into the other two factors as both Items 94 and 93 did not cross load on either of the other factors and had very high loadings of .879 and .860, respectively. Although the resulting High Peer Sensitivity subscale has an appropriate alpha level, there are not enough items to be able to use it as a reliable measure of sensitivity to peers. While the current scale may still have important relations with regulatory flexibility, future scales should perhaps expand the number of items on peer sensitivity as it seems to be an important and strong component of Sensitivity. Given that the current study's focus was not on the contribution of Intensity to Regulatory Flexibility, the Intensity subscales were not included in either of the final path analysis models.

Table 7

Factor Loadings for Exploratory Factor Analysis with Varimax Rotation for Sensitivity Scale from the STI

STI Items	Noticing	Sensitivity	Peer Sensitivity
Item 81: Notices subtle changes in surroundings	**.797**		
Item 79: Notices subtle changes in sensory stimuli	**.757**		
Item 83: Notices subtle changes in appearance	**.741**	.317	
Item 87: Notices subtlety in social encounters	**.625**	.371	
Item 85: Sensitive to changes in others' feelings	**.613**		
Item 92: Sensitivity to cues of adult disapproval		**.755**	
Item 90: Sensitive to falling short of expectations		**.692**	
Item 91: Sensitive to cues that predict punishment		**.652**	
Item 89: Sensitive to approval by adults		**.629**	
Item 94: Sensitivity to cues of disapproval from peers			**.879**

Item 93: Sensitivity to cues of acceptance from peers			**.860**
Eigenvalue	3.787	1.705	1.195
Cumulative Percent of Variance	34.428	15.498	10.868
Internal Consistency	.788 (*.855*)	.673 (*.804*)	.785 (*.936*)
Number of Items in Subscale	5	4	2

Note. Extraction method = principal components analysis; rotation method = Varimax with Kaiser Normalization (rotation converged in 3 iterations). Highest factor loadings are indicated in bold. Internal consistency estimates in italics were adjusted to a scale length of 8 items using the Spearman-Brown Prophecy Formula; STI = *Structured Temperament Interview*

Primary Research Questions

Having established two factors—novel and routine regulatory flexibility—from the Regulatory Flexibility scale, relations with conventional social-emotional knowledge as measured by the ECT, and subdimensions of the Attention, Sensitivity, and Activity Level scales in the preliminary analyses, this study proposed to determine which cognitive, emotional, and behavioral building blocks of regulatory flexibility—as measured by the Activity Level (behavioral), Attention (cognitive), and Sensitivity (emotional) scales of the STI—add significant variance in the prediction of a preschooler's ability to navigate routine versus novel situations. A secondary analysis also investigated whether regulatory temperament traits—Attention and Modulation of Activity Level— moderate the relationship between Sensitivity and Regulatory Flexibility in both contexts. Below are specific hypotheses for which traits will be the most predictive in each context.

General Predictions

As can be seen from Table 8, most of the temperament traits in the current study—with the exception of Vigor/Energy—were expected to correlate significantly with regulatory flexibility in one or both contexts as most of the temperament traits have been demonstrated in the literature to be related to adjustment or flexibility. Notably, a high level of extraneous or repetitive activity can be useful in certain situations, but it can also interfere when a situation calls for modulating activity level to meet the demands of a situation (Teglasi et al., 2009) and therefore Vigor/Energy was not expected to be correlated with Regulatory Flexibility in either context. Additionally, Sensitivity, Noticing, and Peer Sensitivity was not hypothesized to predict Regulatory Flexibility in Novel situations. In one study by Lee and Carlson (2015), researchers performed a baseline trial where each preschooler's ability to delay or not to delay gratification to receive a treat was ascertained. When the task was administered the second time, each child's preference for delaying gratification or not resulted in losing treats instead of gaining them. A very low percentage (between 25 and 50 percent) of preschoolers were able to adjust their decisions based on the contextual cues of receiving or not receiving a treat during the second trial in which the demands were more unpredictable. This should also be true for sensitivity to peer and adult criticism or correction. Even with clear and consistent feedback from adults, a majority of preschoolers have difficulty actually changing their behavior in a context in which the demands are constantly changing and thus sensitivity to context does not always translate into flexible actions.

Table 8
Variables' Hypothesized Relationship to Regulatory Flexibility

	Subscales	Relationship to Regulatory Flexibility in Routine Context	Relationship to Regulatory Flexibility in Novel Context
Regulatory Temperament Traits			
	External Attention	**X**	**X**
	Internal Attention	**X**	**X**
	Emotional Attention	**X**	**X**
	Modulation of Activity Level	**X**	**X**
Reactive Temperament Traits			
	Sensitivity	**X**	**-**
	Noticing	**X**	**-**
	Peer Sensitivity	**X**	-
	Vigor/Energy	-	**-**

Note. X = expected to contribute to regulatory flexibility; hypothesized relationships in **bold** were those that are supported by the current study.

Hypothesis for Routine Context

Routine situations require sustained attention and behavioral inhibition which both develop rapidly during the preschool years (Kieras et al., 2005). While sensitivity and activity level modulation have each been demonstrated to be related to adjustment and flexibility (Garner & Power, 1996; Kieras et al., 2005; Lee & Carlson, 2015; Cutting & Dunn, 2002) the subscales of the STI that measure Internal Attention and External Attention will explain more variance in Regulatory Flexibility in Routine contexts than the other temperament traits and subcomponents. Internal Attention allows a child to not be distracted from his or her goal in a situation by thoughts and is related to flexibility in routine situations such as waiting for a parent (Barragan-Jason & Attance, 2017) and using a variety of coping strategies to inhibit inappropriate behavior in a flexible manner (Marcelo & Yates, 2014). External attention allows a child to not be distracted by stimuli in the environment and has been demonstrated to be related to appropriate social interactions (Acar et al., 2015). High levels of external inattention as measured by ADHD diagnosis is also inversely related to flexibility in older children (Babb, Levine, & Arseneault). There is therefore evidence for a connection between Internal and External Attention being important and unique contributors to regulatory flexibility in routine situations.

Hypothesis for Novel Context

Novel contexts require sensitivity to surroundings such as social and emotional cues from others (Cutting & Dunn, 2002), an ability to modulate behavior according to the demands of the situation (Garner & Power, 1996) and a capacity to deal with any intense emotions coming from the unpredictable nature of the situation (Kashdan & Rottenberg, 2010). Sensitivity to social cues—for example, criticism from a teacher—has been demonstrated to contribute to a more advanced social understanding (Cutting & Dunn, 2002) and should contribute to Regulatory Flexibility in Routine contexts in which a child can learn from past experiences and anticipate the demands of a similar situation for the future. Children who are more sensitive to context may be in a better place to react to criticism and feedback from the environment and modify behavior accordingly (Cutting & Dunn, 2002).

However, while sensitivity is important, to put the information learned from being sensitive to environmental cues into action requires inhibition and modification of energy level. Research demonstrates that preschoolers who perform better on behavioral inhibition tasks are more likely to be able to inhibit an inappropriate response to a situation and initiate an appropriate behavior instead (Kieras et al., 2005). Therefore, the temperament trait that was hypothesized to be uniquely predictive of regulatory flexibility in novel situations at this age will be Modulation of Activity Level. Given the strong support in the literature for the contribution of regulatory traits to flexible responding in unfamiliar contexts (Garner & Power, 1996; Kieras et al., 2005) but also the importance of sensitivity to the environment in similarly novel contexts (Cutting & Dunn, 2002) it was also reasonable to expect that regulatory temperament traits—Attention and Modulation of Activity Level—will moderate the relationship between sensitivity and Novel Regulatory Flexibility. Specifically, at higher levels of regulatory temperament traits, the relationship between Sensitivity and Regulatory Flexibility will increase. High sensitivity to a situation but low behavioral inhibition and modulation limits his or her ability to modulate activity level appropriate to a novel situation whereas high sensitivity and high regulation should result in higher regulatory flexibility abilities.

Chapter 3: Methods

Participants

The current study is based on an archival data set that was also used in a study by Teglasi et al. (2009). The sample of participants who completed the *Structured Temperament Interview* (STI) consisted of 54% European Americans, 13% African Americans, 13% Asian Americans, and 17% in the "other" categorization. Most of the parents who were interviewed for the STI had at least a bachelor's degree, with many of them additionally possessing either a master's degree or higher. Table 9 details the number of participants who completed the STI and the ECT, the mean age of the participants, and the number of participants of each gender. As can be seen from the table, the split between male and female participants is fairly even.

Table 9
Gender, Age, and Number of Participants for Each Measure

Measure	N	Males	Females	Mean Age (months)	Std. Deviation
STI	92	46	46	55.97	9.97
ECT Emotion ID	112	48	64	57.26	11.02
ECT Emotion Situation	111	48	63	57.17	11.03

Procedures

Recruitment of Participants

The participants in the current study were children ages 3-6 years old and were enrolled in a private preschool on the campus of a large, public university in the Mid-Atlantic region of the United States. A member of the research team placed letters about the study in each child's mailbox in the classroom at the beginning of the school year. The letters detailed the purpose of the study, the time commitment required for children and their parents, contact information, and a consent form. Research team members also gave a short overview of the study and what would be expected of parents and children at a "Back to School Night" event. They were able to answer any questions about the purpose and procedure of the study at this time.

On recruitment letters and during the presentation at the "Back to School Night" event, the study was presented as a research study to help educators learn about preschoolers' temperament, mental processes, and social skills. The data from the STI and the ECT that are used in the current study were collected in conjunction with several other parent rating scales and child measures as part of a larger study, and thus parents were told that they would be asked to fill out several questionnaires and take part in an interview—the STI—that could be done in person or on the phone with a graduate student. Parents were also told that their child would be doing several different, fun activities over a series of several sessions with trained doctoral graduate students. They were told that these activities—which included the ECT—measure various areas of functioning.

Administration of Measures

Regulatory flexibility was assessed utilizing the *Structured Temperament Interview* (STI). Doctoral-level school psychology graduate students conducted the structured interview with the parents either in person or on the phone. The STI required about one hour and fifteen minutes to complete per participant. All conversations were recorded to ensure that notes taken during the section on the qualitative information were as accurate as possible. These structured interviews were scheduled on an individual basis shortly after parents returned consent forms for the study. During the interview, the parent was asked a series of 112 items about his or her child's functioning in the areas of Activity Level, Attention, Emotions, Sensitivity, and Regulatory Flexibility. The parent was asked to rank each item on a specific Likert scale (see Appendix A). After ranking an item, parents were asked by the researcher for specific examples to support the rating. Researchers followed up with more questions as needed to obtain sufficient qualitative information about the parent's rating for that particular item.

The *Emotion Comprehension Test* (ECT) was also administered by doctoral-level school psychology graduate students. Each graduate researcher was assigned to a classroom and performed a series of informal classroom observations in addition to spending time playing with the children. This time spent in the classroom was intended to facilitate rapport with the children and make them comfortable enough with the researcher to join the researcher in the "research room" to administer the ECT.

During a separate school day following the time spent in the classroom, the researchers asked the children with parental consent to come to the designated research room in the building. Children were assessed one at a time. The purpose of the study was explained to each child in an age-appropriate manner. The children were told that they would be playing a few games with the researcher and that they could choose to stop their participation at any time. They were also given an opportunity to ask any questions about the study. Only children who gave verbal assent to participate in the study were assessed.

During administration of the ECT, the researcher showed the preschooler a series of pictures of children making facial expressions that reveal a particular emotion: happy, sad, mad, scared, or no feeling. The child was asked to name the emotion that was displayed by the picture. Next, a series of vignettes was read to the child by the researcher, who used two puppets to act out the actions of the characters in the vignettes. The vignettes used either situational cues or behaviors to present a particular emotion of the main character, and children were asked to name that emotion based on the cues in the story. Only the data from the situational vignettes is used in the current study. In total, the ECT took roughly 30 minutes to administer, although given the large age range and variety in attention span of the preschoolers there was variability in this time from child to child. Researchers were highly attentive to each child and allowed them to return back to the classroom in case of any distress or restlessness that might impact their performance on the measure.

Structured Temperament Interview (STI)

To measure regulatory flexibility and its building blocks, the *Structured Temperament Interview* was administered. The STI is a parent-report rating scale of temperament composed of several scales which measure temperament traits. It contains 112 items which examine temperament across several dimensions on a Likert scale. For example, one item is “How does the child typically handle the routine demands/limits of peers?” and parents are asked to rate this question as 1 (very comfortably, anticipates peer expectations well) 2 (comfortable) 3 (more comfortable in structured peer interaction) 4 (uncomfortable, needs reminders) or 5 (confused or resistant to routine peer expectation). Parents are encouraged to supplement their ratings for each item with specific stories or examples.

The categories of questions on the STI include Activity Level, Attention/Distractibility, Emotions, Sensitivity/Response Intensity, Approach/Sociability, and Adaptability/Executive Self-Regulation. Each of these broad dimensions have sub-categories that are based on emerging concepts in the temperament literature and are designed to include multiple components (Teglasi et al., 2009). The current study made use of the Activity Level, Attention/Distractibility, Sensitivity/Response Intensity, and Adaptability/Self-regulation dimensions of the STI. Preliminary analyses for this study used principal components analyses to establish the subscales within each of the following broad domains that were selected. Subsequent analyses to test hypotheses will make use of these subscales. Therefore, the psychometric properties of these smaller subscales were examined individually and their psychometric properties are given below.

Activity Level

The Activity Level scale asks questions about how well a child can modulate his or her activity to a particular situation. Activity level is composed of Vigor/Energy and Modulation level. Vigor/Energy refers to the degree of physical energy that is expended by the child and Modulation is the regulatory component of Vigor/Energy (Teglasi et al., 2009). A study by Teglasi et al. (2009) provides some psychometric calculations for the Vigor and Modulation subscales from the Activity Level scale of the STI. The internal consistency for the Vigor subscale is .86 and .84 for the Modulation subscale. When corrected for number of items in the scale and loadings for each item on the two factors were robust. The mean parent score assigned to boys is 3.83 (*SD* = .70) for the Vigor/Energy subscale and 4.17 (*SD* = .62) for the Modulation subscale, while the mean parent score assigned to girls was 3.53 (*SD* = .78) for the Vigor/Energy subscale and 4.36 (*SD* = .46) for the Modulation subscale (Teglasi et al., 2009). Unlike the current sample, the sample from the study by Teglasi and colleagues (2009) also included teacher ratings of the same preschoolers on the STI. Teachers rated boys as being higher in the Vigor/Energy subscale of the STI and they also rated girls as being higher than boys in the Modulation subscale, whereas parent ratings were not significantly different between girls and boys for either subscale. Scores did not differ significantly based on age.

Attention

The Attention/Distractibility scale asks questions about how much a child is distracted by external stimuli, internal sources of distraction such as thoughts, extraneous information, and how well the child focuses and shifts attention. A principal components analysis found that three distinct factors emerged from this scale. External Attention refers to how well a child can hold his or her attention on a task without being distracted by external stimuli, while Internal Attention refers to holding attention on a task without being distracted by one's own thoughts and Emotional Attention refers to an inability to be distracted away from one's own emotional reactions (Teglasi et al., 2009). Internal consistencies were calculated for External Attention ($\alpha = .776$), Internal Attention ($\alpha = .742$), and Emotional Attention ($\alpha = .581$). for research at $\alpha = .821$ and $\alpha = .689$, respectively. For External Attention, the mean score given by parents for boys was 3.4 (*SD* = .439) and 3.45 (*SD* = .476) for girls. For Internal Attention, the mean score given to boys was 3.63 (*SD* = .617) and 3.59 (*SD* = .648) for girls. For the Emotional Attention subscale, the mean score given to boys was 3.23 (*SD* = .609) and for girls it was 3.50 (*SD* = .346). Parent ratings were not significantly different between boys and girls for any Attention subscale and scores did not differ significantly based on age based on bivariate correlational analyses conducted with age in months.

Sensitivity

The Sensitivity/Response Intensity scale measures sensitivity to sensory stimuli, physical stimuli, and positive or negative social stimuli. A principal components analysis revealed three main components of sensitivity—Sensitivity, Peer Sensitivity, and Noticing—as well as the related construct of intensity which is composed of intensity of a reaction to one's surroundings and intensity of reaction to others. Sensitivity ($\alpha = .673$) in this study refers to being sensitive to not meeting the expectations of others, adult disapproval, punishment, and praise while Peer Sensitivity ($\alpha = .785$) refers to sensitivity to peer approval and disapproval. Noticing ($\alpha = .788$) refers to the level of alertness to surroundings, sensory stimuli, and the appearance and emotions of others. When internal consistencies were adjusted to account for smaller numbers of items in the subscales using the Spearman-Brown Prophecy Formula to estimate internal consistency for an 8-item scale, they were found to be at acceptable levels of $\alpha = .804$, $\alpha = .936$ and $\alpha = .855$, respectively. For the Sensitivity subscale, the mean parent score assigned to boys was 3.62 (*SD* = .674) and 3.75 for girls (*SD* = .574). For the Peer Sensitivity subscale, the mean score assigned to boys was 2.76 (*SD* = 1.003) and for girls the mean score was 2.63 (*SD* = .829). For the Noticing subscale, the mean score for boys was 3.46 (*SD* = .759) and the mean score for girls was 3.56 (*SD* = .735). Parent ratings were not significantly different between boys and girls for any Sensitivity subscale. Scores did not differ significantly based on age as demonstrated with bivariate correlations with age in months.

Regulatory Flexibility

The Regulatory Flexibility scale measures how children adapt to new or changing circumstances and day to day routines in cognitive organization, emotional adaptability, and executive self-regulation. It echoes several themes from the regulatory flexibility literature including (a) sensitivity to situational context (How efficiently does this child size up the demands of a new learning task or change in routine?), (b) possessing many emotion regulation strategies (How does the child react when an activity proves more difficult than expected?), (c) varying strategies based on situation (How does the child handle the routine demands/limits at home? How does the child handle the routine demands/limits at school? How does the child handle the routine demands/limits of peers?), and (d) monitoring the results of emotion regulation strategies and making changes accordingly (To what extend does the child's behavior take into account how others will respond? How systematic, organized, or planned versus haphazard is the child's behavior?).

A principal components analysis revealed that the Regulatory Flexibility Scale has two main factors, Novel Regulatory Flexibility ($\alpha = .688$) and the Routine Regulatory Flexibility ($\alpha = .831$) subscales. Mean parent ratings for the Routine subscale were significantly higher than mean parent ratings for the Novel subscale (t=4.65, p<.001), with the mean Routine score at 3.61 (SD=0.56) and the mean Novel score at 3.31 (SD=0.55).When internal consistency for the Novel subscale was adjusted to account for a low number of items with the Spearman-Brown Prophecy Formula for an 8-item scale, it was found to be acceptable at $\alpha = .716$. The mean parent rating on the Novel subscale for boys was 3.24 (SD = .5439) and 3.37 (SD = .557) for girls. For the Routine subscale, the mean score for boys was 3.56 (SD = .599) and for girls the mean score was 3.65 (SD = .509). Parent ratings were not significantly different between boys and girls for either subscale. Of all the subscales, only scores from the Routine Regulatory subscale correlated significantly with age in months (r=-0.22, p<.05).

Emotion Comprehension Test (ECT)

The ECT was designed as an adaptation of the *Affect Knowledge Test* and the *Assessment of Children's Emotion Skills* (ACES) for preschoolers. The ECT consists of three parts. However, for this study, only data from the first two parts is utilized and detailed. In the first "emotion identification" component, several pictures are shown to the child one at a time and children are asked to identify the emotion of the child in the picture as being happy, sad, mad, scared, or having no feeling. In the second "emotion situation" component, 15 vignettes are read and acted out by the researcher using two puppets that were named according to their shirt colors. Each vignette provides situational cues as to what the person in the story might be feeling. One example of a vignette is the following: "Green let Red play with Green's favorite toy. Red plays with the toy and then it breaks. Do you think Green feels happy, sad, mad, scared, or no feeling?" To score the measure, 2 points are awarded for the correct answer and correct valence of emotion, 1 point is awarded for the incorrect answer but correct valence of emotion, and 0 points for answers that had an incorrect emotion and incorrect valence.

A recently published study by Verron and Teglasi (2018) examined the psychometric properties of the ECT. For the "emotional identification" area of competence, the composite score was calculated by adding up all of the scores for the individual items (M = 53.56, SD = 5.78) and internal consistency was found to be acceptable (α = .70). For the second "emotion situation" area of competence, the scores were added together to create a composite score (M = 35.12, SD = 5.99) and the alpha level for this scale was found to also be acceptable (α = .80). No significant gender differences were found between girls' and boys' scores for the first two ECT dimensions. Performance on both the emotion identification and the emotion situation tasks were significantly correlated with age (Verron & Teglasi, 2018).

Chapter 4: Results

The current study examines which cognitive, emotional, and behavioral building blocks of regulatory flexibility—as measured by the Activity Level, Attention, and Sensitivity scales of the STI—are unique predictors of Novel and Routine Regulatory Flexibility.

Gender

Independent-samples *t*-tests were run to examine any potential gender differences in scores for each subscale of the *Structured Temperament Interview*. Results revealed that for the current sample, girls (M=3.5, SD=0.35) were rated significantly higher for the subscale of Emotional Attention than boys (M=3.23, SD=0.61) by parents (t=-2.58, p<.001). A high score on emotional attention indicates the child is not distracted easily by emotions, and so girls were rated as being less distracted by emotions as compared to boys. No other significant gender differences were found in the other subscales of the STI.

Bivariate Associations Among STI Subscales

Next, bivariate correlations were conducted to examine the associations between the subcomponents of the Attention, Sensitivity, and Activity Level scales of the STI and the Regulatory Flexibility scale (which includes the whole Regulatory Flexibility scale as well as the Routine and Novel Regulatory Flexibility subscales). See Table 10 for the correlations between each of the subscales of the STI. The hypotheses for which subscales would significantly correlate with Routine and Novel Regulatory Flexibility were fully supported (see Table 8). Routine Regulatory Flexibility was significantly positively correlated with External Attention, Internal Attention, Emotion Attention, Sensitivity, Peer Sensitivity, Noticing, Modulation of Activity Level, and Regulatory Flexibility in Novel situations (p<.01). As was predicted, Regulatory Flexibility in Novel situations was significantly positively correlated with fewer subscales than was Regulatory Flexibility in Routine situations, which included Internal Attention, Emotion Attention, and Modulation of Activity Level at the p<.01 level, and with External Attention at the p<.05 level.

Table 10
Correlations between subcomponents of Structured Temperament Interview

	1	2	3	4	5	6	7	8	9	10	[11]	[12]
External Attn (1)	1	.494**	.422**	.219*	.130	.036	.280*	-.027	-.170	-.021	.270*	.470**
Internal Attn (2)		1	.335**	.296**	.189	.271*	.290**	.064	.075	.022	.305**	.624**
Emotion Attn(3)			1	.103	-.008	.170	.183	.156	.012	-.063	.622**	.272**
Sensitivity (4)				1	.385**	.379**	.285**	-.014	-.054	-.042	.118	.453**
Peer Sensitivity (5)					1	.294**	.103	.101	.334**	.166	.096	.310**
Noticing (6)						1	-.008	.270*	-.346**	.288**	.112	.286**
Mod. Activity Level (7)							1	-.286**	-.271*	.140	.348**	.514**
Vigor (8)								1	-.064	.111	-.002	-.166
Intensity Social (9)									1	-.377**	.051	-.093
Intensity Surroundings (10)										1	-.105	-.001
Reg. Flex. Novel (11)											1	.369**
Reg. Flex. Routine (12)												1

**p<.01, *p<.05; bracketed subscales indicate variables for which there are hypothesized relations in the current study.

Other interesting patterns emerged in the bivariate correlations among subscales. Emotional Attention correlated only with Routine and Novel Regulatory Flexibility, Internal Attention, and External Attention, making it distinct from the other two Attention subscales that had a higher number of correlates. Vigor/Energy was significantly correlated with Noticing and negatively and significantly correlated with Modulation of Activity Level, but was not significantly correlated with any other subscale. Modulation of Activity Level had several positive and significant correlates, including Internal Attention, External Attention, and Sensitivity. Additionally, Noticing and Internal Attention were significantly correlated. Unsurprisingly, most of the subscales derived from the same scale—for example, Internal Attention, External Attention, and Emotional Attention—were significantly correlated with one another with the exception of Vigor/Energy and Modulation of Activity Level. Sensitivity, Peer Sensitivity, and Noticing were each significantly correlated with one another, as were the Routine Regulatory Flexibility and Novel Regulatory Flexibility subscales. Overall, many subscales of the STI were significantly correlated with one another with small to modest coefficients, indicating that they are related but distinct constructs.

Compositing Variables

Consistent with the view of temperament as comprising reactive and regulatory components, a factor analysis was conducted with all of the subscales from the STI. The results of this factor analysis are found in Table 11. The factor analysis revealed three factors, and subsequent use of Horn's parallel analysis on the ten subscales of interest confirmed that the three factor model was the most appropriate when compared with the two factor model ($p<.01$) and the one factor model ($p<.001$) for the current data set. The Internal Attention, External Attention, and Modulation subscales load on one factor, which indicates that there is a self-regulatory component of the subscales in the current study. These three subscales were thus composited into a variable composed of items that tap into regulatory processes, and the resulting reliability for this composite variable was found to be in the acceptable range ($\alpha = 0.82$). The Noticing and Intensity Surroundings subscales loaded onto the second factor, which seemed to consist of subscales that measure reactivity to physical surroundings. Both the Intensity Social and the Peer Sensitivity subscales loaded negatively onto this reactivity to physical surroundings factor. The Sensitivity subscale loaded equally onto the regulatory factor as well as the reactivity to physical surroundings factor. The Vigor/Energy and Emotional Attention subscales loaded onto a third factor, which seems to have to do with reactivity to emotional stimuli. Overall, the factor analysis supports the idea that temperament consists of regulatory and reactive components, and provides further support for exploring the regulatory and reactive traits in relation to regulatory flexibility.

Table 11
Factor Loadings for Exploratory Factor Analysis with Varimax Rotation for Subscales of the STI

STI Subscales	Regulatory Factor	Factor 2	Factor 3
External Attention	**.764**	.203	
Modulation	**.743**	-.101	-.309
Internal Attention	**.689**		.301
Sensitivity	.459	.456	
Intensity Social	.128	-.790	.144
Peer Sensitivity	.251	.722	
Noticing		-.641	.433
Intensity Surroundings	-.518	.527	.108
Vigor/Energy	-.197	.124	.812
Emotional Attention	.459	-.133	.616
Eigenvalue	2.437	2.249	1.303
Cumulative Percent of Variance	24.375	46.862	59.891

Note. Extraction method = principal components analysis; rotation method = Varimax with Kaiser Normalization (rotation converged in 3 iterations). Factor loadings for subscales included in the Regulatory Composite are indicated in bold. STI = *Structured Temperament Interview*

Main Effects

To examine the main effects of each of the eight subscales of interest from the STI on both Routine and Novel Regulatory Flexibility, an initial path analysis was conducted without the interaction term or Regulatory Composite included. It was originally hypothesized that Internal and External Attention would be significant predictors of Routine Regulatory Flexibility, and that Modulation of Activity Level would be a significant predictor of Novel Regulatory Flexibility.

Routine Context

See Table 12 for a summary of main effects for Routine Regulatory Flexibility. Internal Attention (b=0.36, β=0.36, p<.01) and Modulation of Activity Level (b=0.31, β=0.29, p<.01) each emerged as unique predictors of Routine Regulatory Flexibility and Vigor/Energy was negatively and significantly related to Routine Regulatory Flexibility (b=-0.24, β=-0.22, p<.01). Sensitivity, Emotional Attention, Noticing, Peer Sensitivity, and External Attention each contributed to Routine

Regulatory Flexibility at a non-significant level. Age was a negative and non-significant predictor of Routine Regulatory Flexibility.

Table 12
Main Effects for Routine Regulatory Flexibility

Subscale	b	β
Internal Attention	0.36*	0.36*
External Attention	0.12	0.09
Emotional Attention	0.04	0.04
Sensitivity	0.17	0.19
Peer Sensitivity	0.06	0.09
Noticing	0.08	0.11
Vigor/Energy	-0.24*	-0.24*
Modulation	0.31*	0.29*

*p<.05, **p<.01, ***p<.001

Novel Context

See Table 13 for a summary of main effects for Novel Regulatory Flexibility. With Novel Regulatory Flexibility as the outcome variable, only Emotional Attention emerged as a unique predictor (b=0.58, β=0.54, p<.001) and Internal Attention, Noticing, age, and Modulation of Activity Level each were contributors at a non-significant level. Sensitivity, Vigor/Energy, Peer Sensitivity, and External Attention each contribute negatively to Novel Regulatory Flexibility at a non-significant level. Overall, the results from analysis of the main effects of each of the eight subscales of interest for the current study indicate that different subscales predict regulatory flexibility in different contexts. Internal Attention and Modulation of Activity Level are important for preschoolers in routine contexts, whereas Emotion Attention is important for preschoolers in novel contexts.

Table 13
Main Effects for Novel Regulatory Flexibility

Subscale	b	β
Internal Attention	0.07	0.07
External Attention	-0.02	-0.01
Emotional Attention	0.58***	0.54***
Sensitivity	-0.06	-0.07
Peer Sensitivity	0.00	0.00
Noticing	0.03	0.04
Vigor/Energy	-0.04	-0.04
Modulation	0.22	0.21

*p<.05, **p<.01, ***p<.001

Interaction Effects

To determine unique predictors for the Novel and Routine Regulatory Flexibility scales with an interaction term included, several path analyses were conducted with Regulatory Flexibility in Routine contexts and Regulatory Flexibility in Novel contexts as outcome variables. Predictor variables included in both sets of analyses consisted of the Regulatory composite variable, the Sensitivity subscale, the Peer Sensitivity Subscale, the Noticing subscale, the Vigor/Energy subscale, and the Emotional Attention subscale. Age was also used as a variable in the path analysis given that many of the temperament traits being investigated have been found to improve substantially over the course of the preschool years (Carlson, 2005) and thus age should be controlled for. For both sets of analyses—with Routine Regulatory Flexibility and Novel Regulatory Flexibility as outcome variables—various combinations of the Sensitivity subscales and Regulatory composite subscales were used in the interaction term. It was originally predicted that Regulatory traits would moderate the relationship between Sensitivity and Regulatory Flexibility in novel but not routine contexts.

Interaction Effects for Routine Regulatory Flexibility

The path analyses with Regulatory Flexibility in Routine Contexts as the outcome variable as well as interaction plots of significant interactions are presented in Figures 1 through 15. Figures 1, 3 and 4 show the results of the model with Sensitivity, Peer Sensitivity and Noticing included in the interaction term, respectively. Figures 5 through 15 show models that were created to explore various combinations of the three regulatory subscales with the three sensitivity subscales in the interaction term. Table 14 shows a summary of all interaction effects that were analyzed in the study. As suggested by Kenny, Kaniskan, and McCoach (2014) fit indices were not reported for the Routine models due to the small number of degrees of freedom (*df*=0). In cases where degrees of freedom are small, fit indices can be misleading unless the sample size is large. Using cutoff scores in conjunction with both a small sample size and small degrees of freedom has been found to erroneously indicate poor model fit (Kenny, Kaniskan, & McCoach, 2014) and thus should be avoided.

Table 14
Interaction Effects

Regulatory Flexibility Scale	Sensitivity Trait in Interaction	Regulatory Trait in Interaction	b	β
Routine Regulatory Flexibility	Sensitivity	Regulatory Composite	-0.55**	-2.96**
	Peer Sensitivity	Regulatory Composite	-0.29	-1.97
	Noticing	Regulatory Composite	-0.12	-0.68
	Sensitivity	Internal Attention	-0.36**	-2.21**
	Sensitivity	External Attention	-0.16	-0.86
	Sensitivity	Modulation	-0.31	-1.90
	Peer Sensitivity	Internal Attention	-0.25	-1.79
	Noticing	Internal Attention	-0.15	-1.01
	Peer Sensitivity	External Attention	-0.13	-0.85
	Peer Sensitivity	Modulation	-0.30*	-2.22*
	Noticing	External Attention	0.12	0.67
	Noticing	Modulation	-0.11	-0.65
Novel Regulatory Flexibility	Sensitivity	Regulatory Composite	-0.09	-0.50
	Sensitivity	Regulatory Composite	-0.09	-0.50
	Peer Sensitivity	Regulatory Composite	0.15	1.06
	Noticing	Regulatory Composite	0.16	0.88
	Sensitivity	Internal Attention	-0.08	-0.50
	Sensitivity	External Attention	-0.18	-0.99

	Sensitivity	Modulation	0.30	1.95
	Peer Sensitivity	Internal Attention	0.06	0.44
	Noticing	Internal Attention	-0.04	-0.27
	Peer Sensitivity	External Attention	0.12	0.79
	Peer Sensitivity	Modulation	0.00	-0.01
	Noticing	External Attention	0.16	0.85

*p<.05, **p<.01, ***p<.001

Sensitivity and Regulatory Traits in the Interaction Term

First, interaction effects between Regulatory traits and the Sensitivity subscales were analyzed for Routine Regulatory Flexibility. In this first path analysis model (see Figure 1) with Sensitivity included in the interaction term, the Regulatory Composite (b=2.98, β=1.92, p<0.001) as well as the Sensitivity subscale (b=2.17, β=2.44, p<0.01) were found to significantly positively predict Regulatory Flexibility in Routine Situations. In addition, the Vigor/Energy subscale is significantly negatively related to Regulatory Flexibility in Routine Situations (b=-0.28, β=-0.24, p<.01).

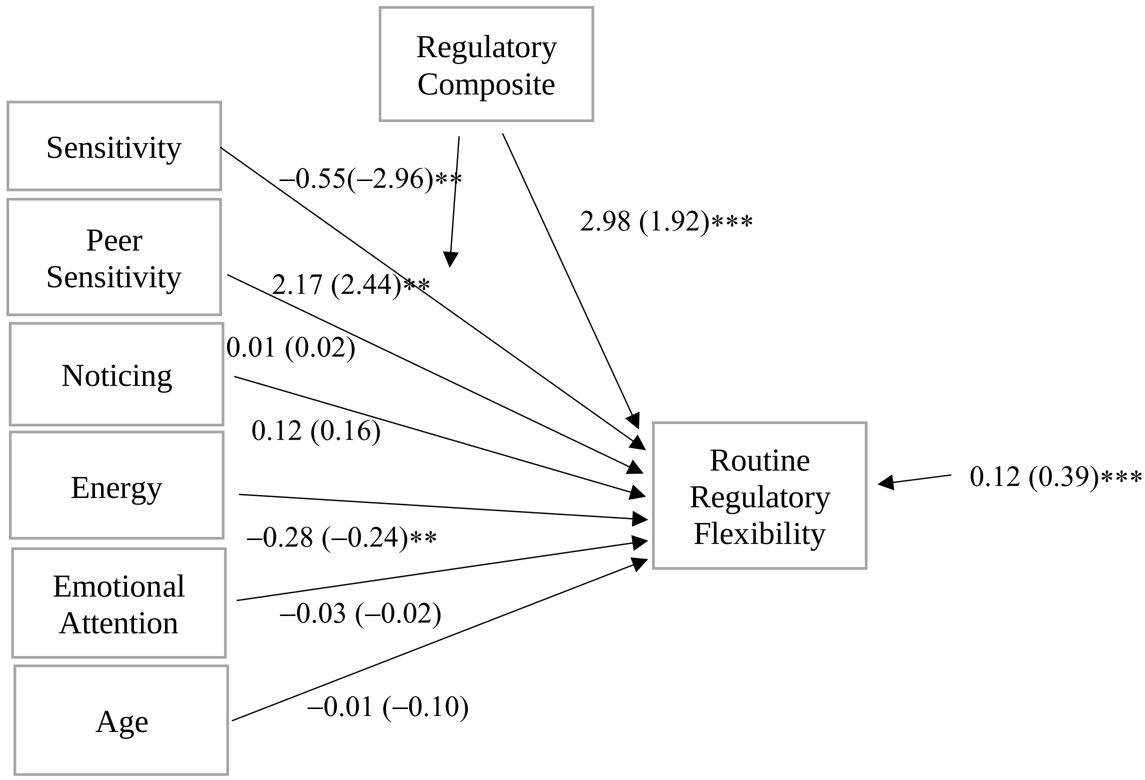

Figure 1.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Sensitivity and the Regulatory composite in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

In this model, the interaction term was found to be negatively significant (b=-0.55, β=-2.96, p<.01). The interaction graph (see Figure 2) indicates that for a child who is rated by parents as being high in regulatory traits, the level of sensitivity does not impact his or her regulatory flexibility in routine situations. Regulatory traits seem to be important for the navigation of routine situations. On the other hand, children with lower regulation were rated high in Regulatory Flexibility in routine contexts only when they were also rated as being highly sensitive. Overall, the relationships proposed in the model with Sensitivity in the interaction term (Figure 1) explains 61 percent of the variance in Regulatory Flexibility in Routine Context (R^2=0.61).

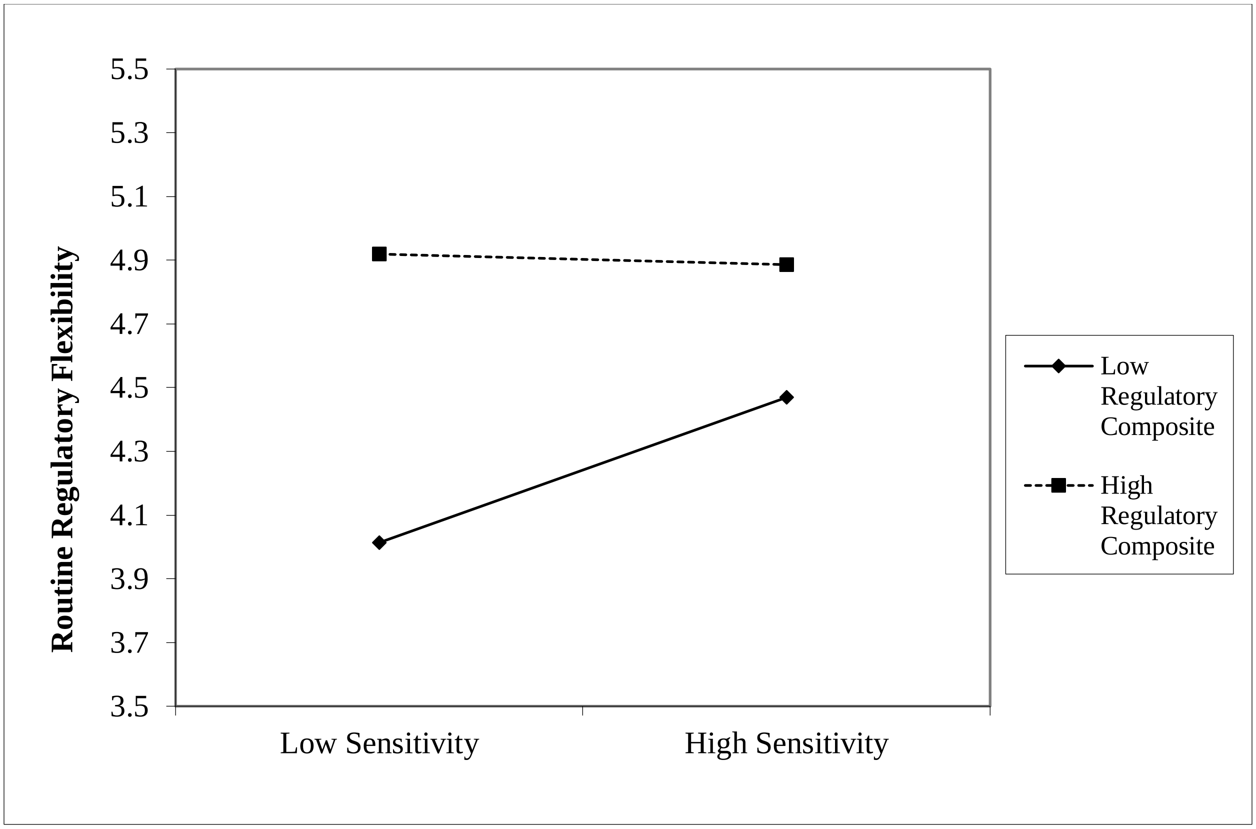

Figure 2.

Interaction of Regulatory Composite on the relationship between Sensitivity and Regulatory Flexibility in Routine Context.

Peer Sensitivity and Regulatory Traits in the Interaction Term

To further explore other combinations of variables, in the second path analysis model (see Figure 3) Peer Sensitivity and the Regulatory composite were included in the interaction term. The Regulatory composite was found to be a unique predictor of Routine Regulatory flexibility (b=1.81, β=1.17, p<.01). The Vigor/Energy subscale was significantly negatively related to Routine Regulatory Flexibility (b=-0.21, β=-0.18, p<.05). The interaction term was non-significant.

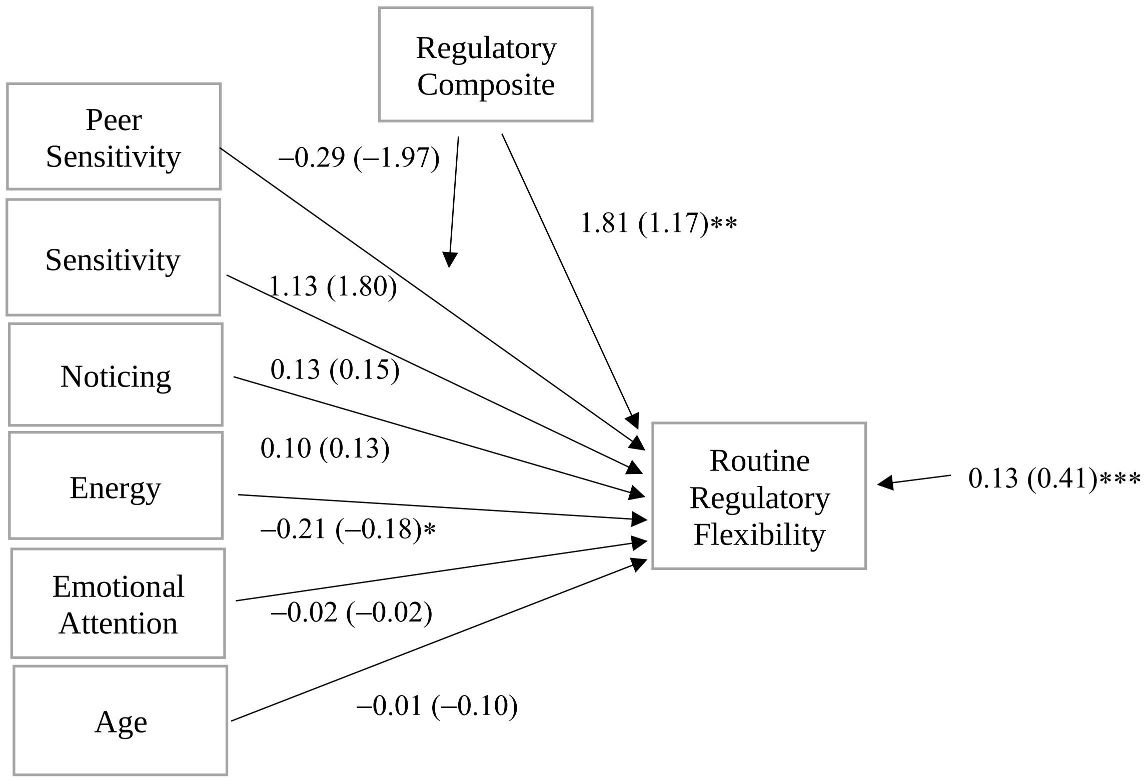

Figure 3.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Peer Sensitivity and the Regulatory composite in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

Noticing and Regulatory Traits in the Interaction Term

A third path analysis model (see Figure 4) with Noticing and the Regulatory composite included in the interaction term was conducted to examine the combination of Modulation of Activity Level and the Regulatory composite. In the third model, only the Vigor//Energy subscale was found to have a significant negative relation to Routine Regulatory Flexibility (b=-0.23, β=-0.20, p< .05). The interaction term was non-significant in the third path analysis.

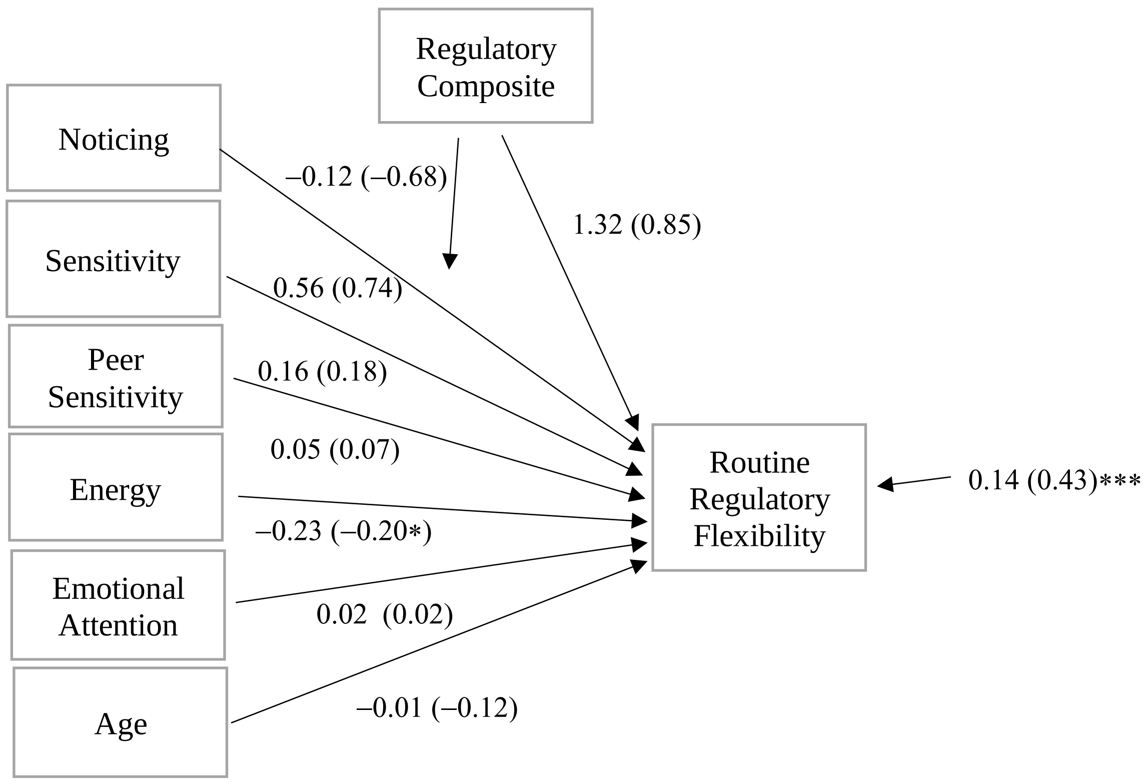

Figure 4.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Noticing and the Regulatory composite in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

Exploration of Regulatory Composite in Routine Context

To further explore the interaction effect found between Sensitivity and the Regulatory Composite, several additional models were tested in which the Regulatory Composite was broken down and each of its three subscales—Internal Attention, External Attention, and Modulation of Activity Level—and included in the interaction term with the Sensitivity, Peer Sensitivity, and Noticing subscales. Interaction terms (see Figures 6 and 13) were negatively significant in the model with Sensitivity and Internal Attention in the interaction (b=-0.36, β=-2.21, p<.01) as well as in the model with Modulation and Peer Sensitivity in the interaction term (b=-0.30, β=-2.22, p<.05). Plots of both significant interaction terms indicate that for children who are rated by parents as being high in regulatory traits such as Modulation and Internal Attention, the child's level of sensitivity does not impact how he or she is rated on Regulatory Flexibility in routine situations. Children rated as having lower Modulation or Internal Attention were rated higher in regulatory flexibility in routine contexts only when they were also rated as being more sensitive. In other words, regulatory traits are particularly important for the navigation of routine situations, whereas sensitivity may only impact regulatory flexibility when a child has lower levels of regulatory traits.

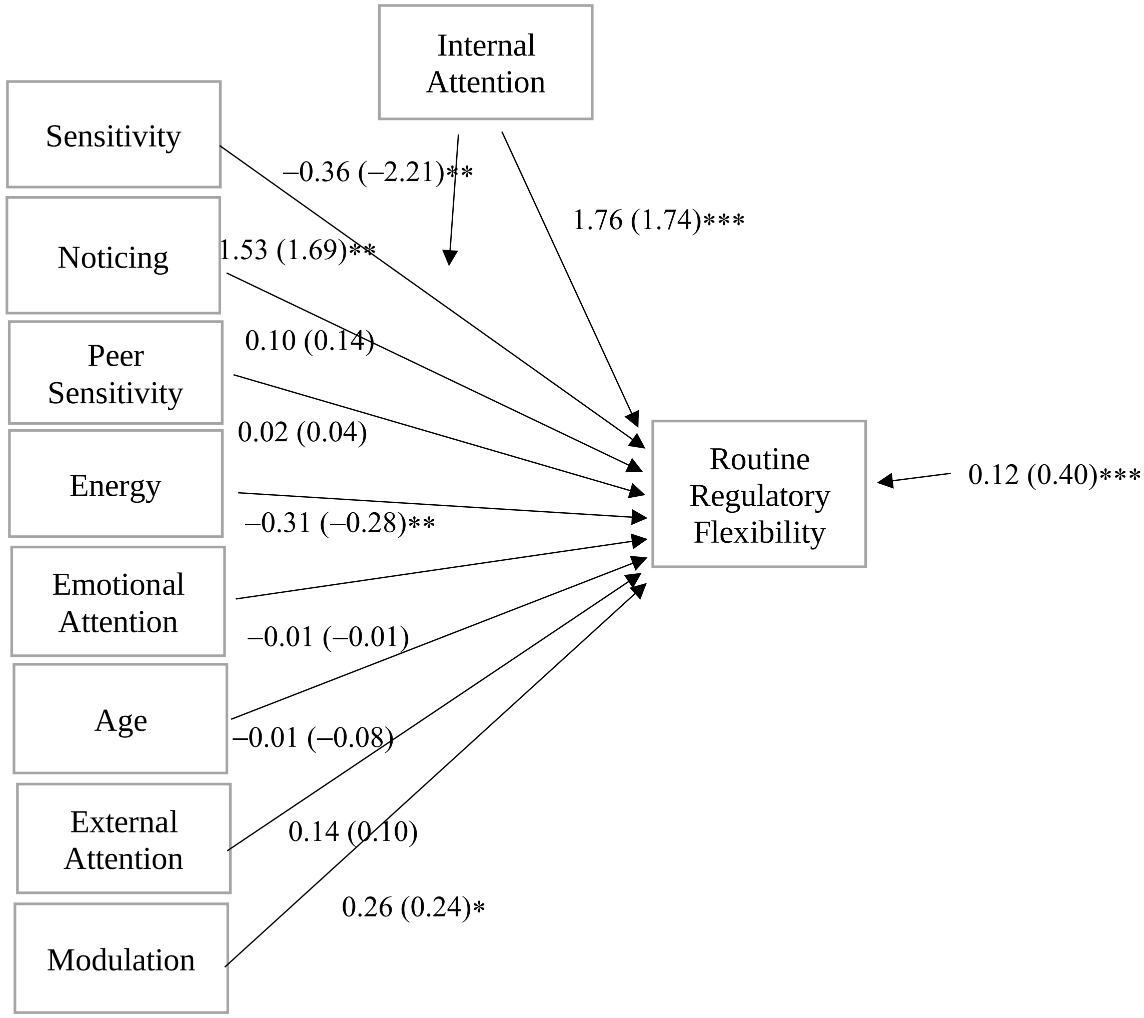

Figure 5.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Sensitivity and Internal Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

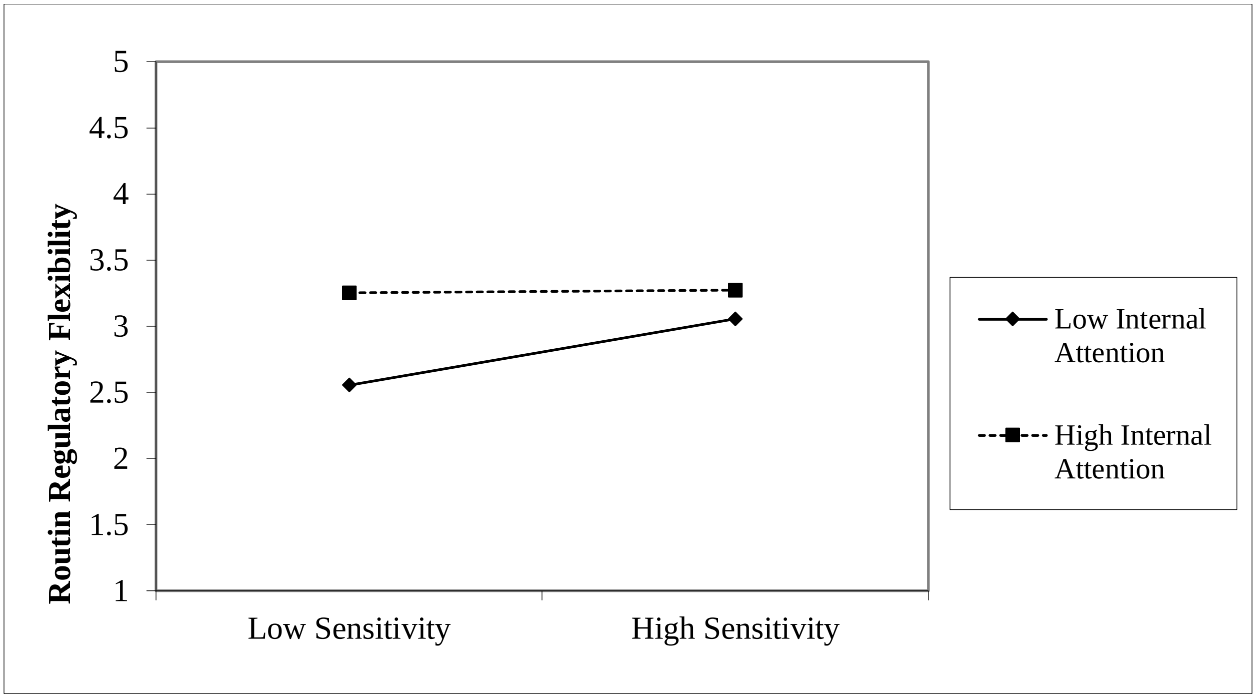

Figure 6.

Interaction of Internal Attention on the relationship between Sensitivity and Regulatory Flexibility in Routine Context.

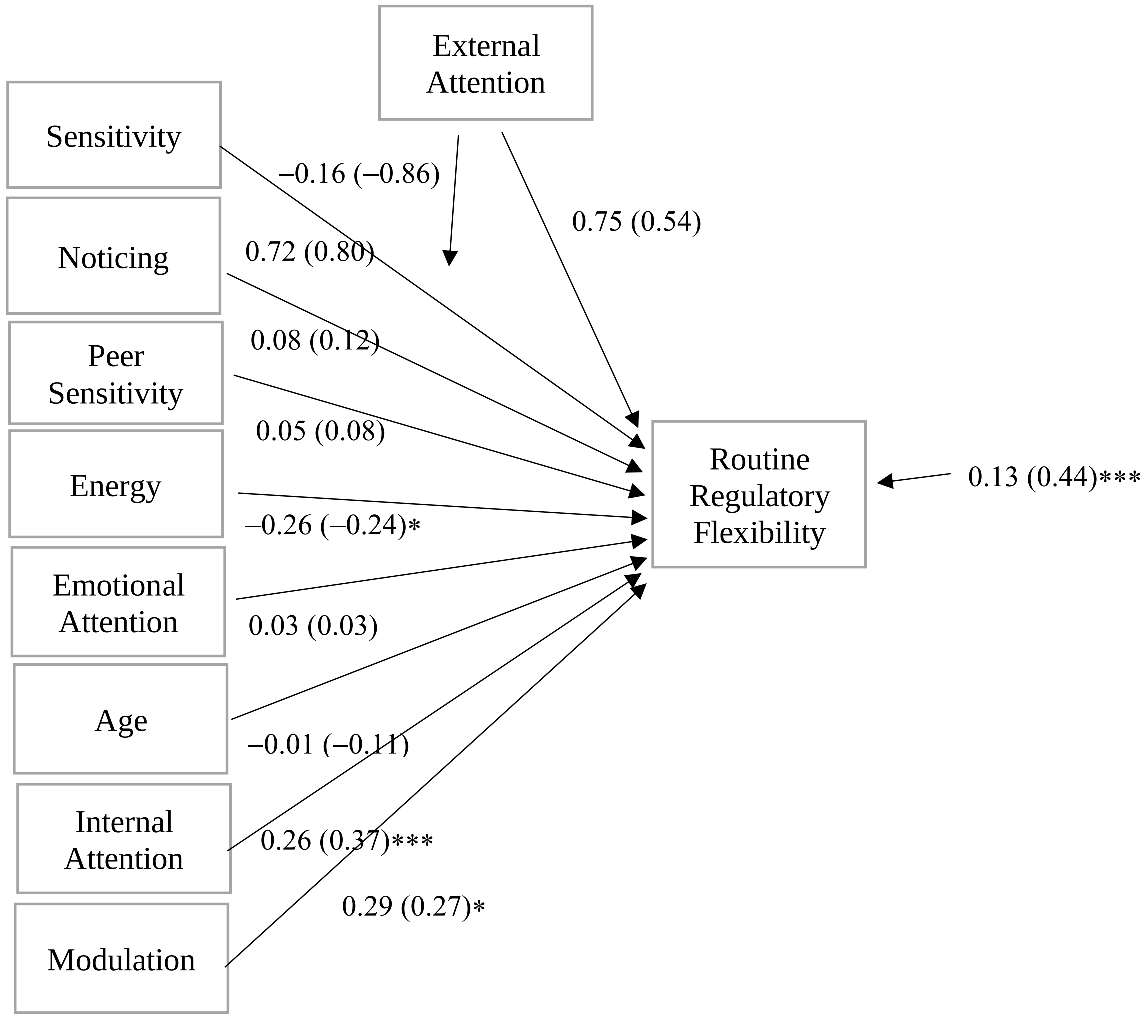

Figure 7.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Sensitivity and External Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

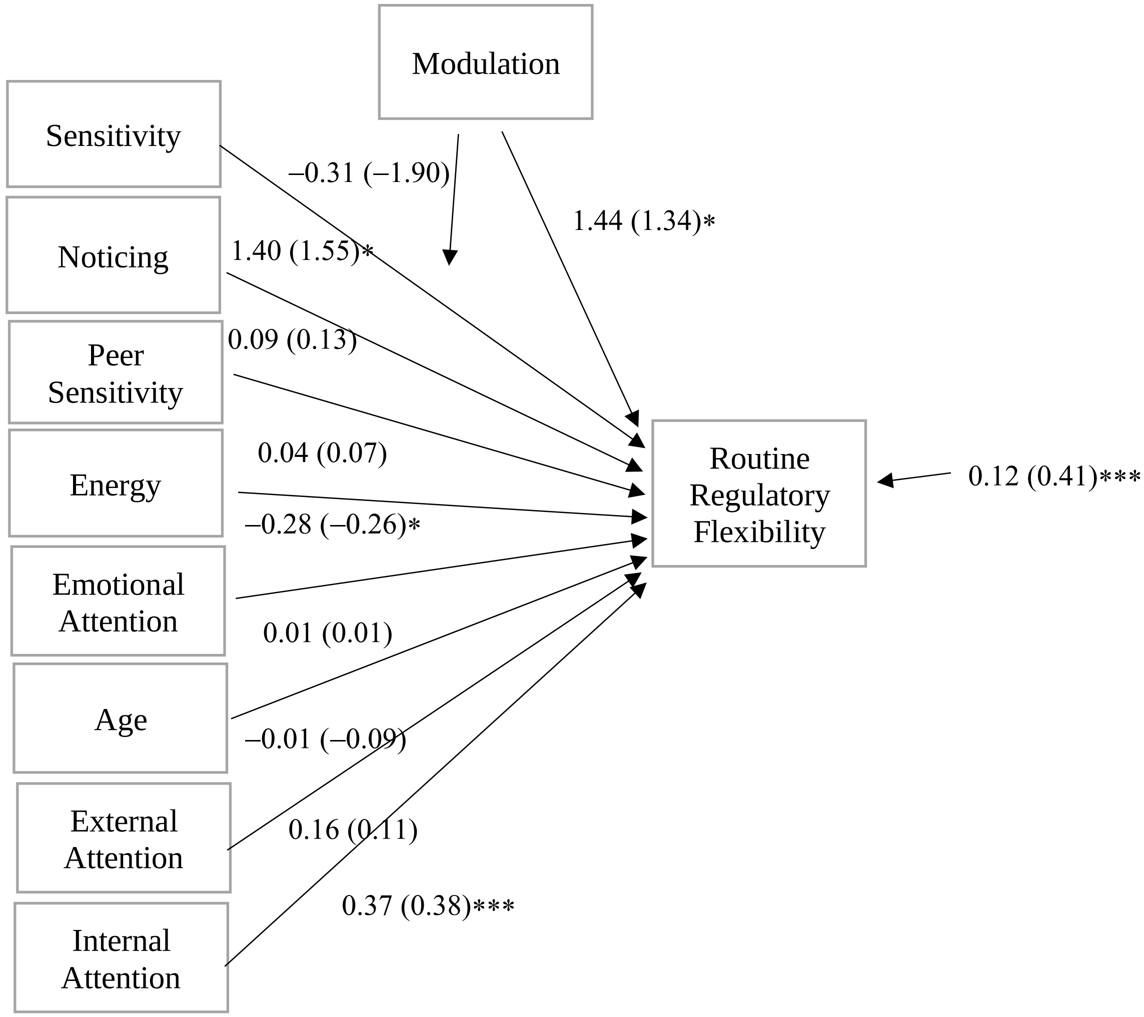

Figure 8.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Sensitivity and Modulation of Activity Level in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

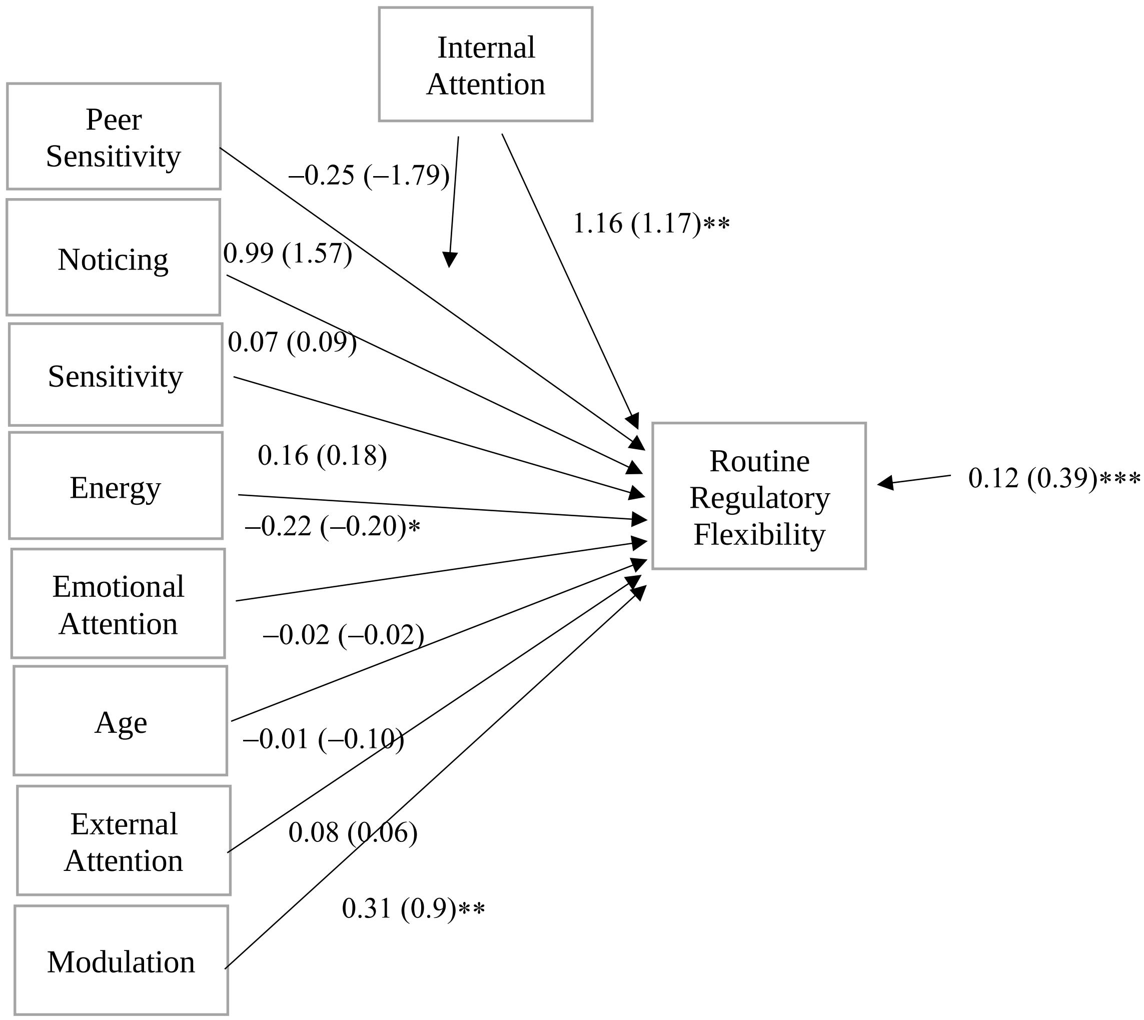

Figure 9.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Peer Sensitivity and Internal Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

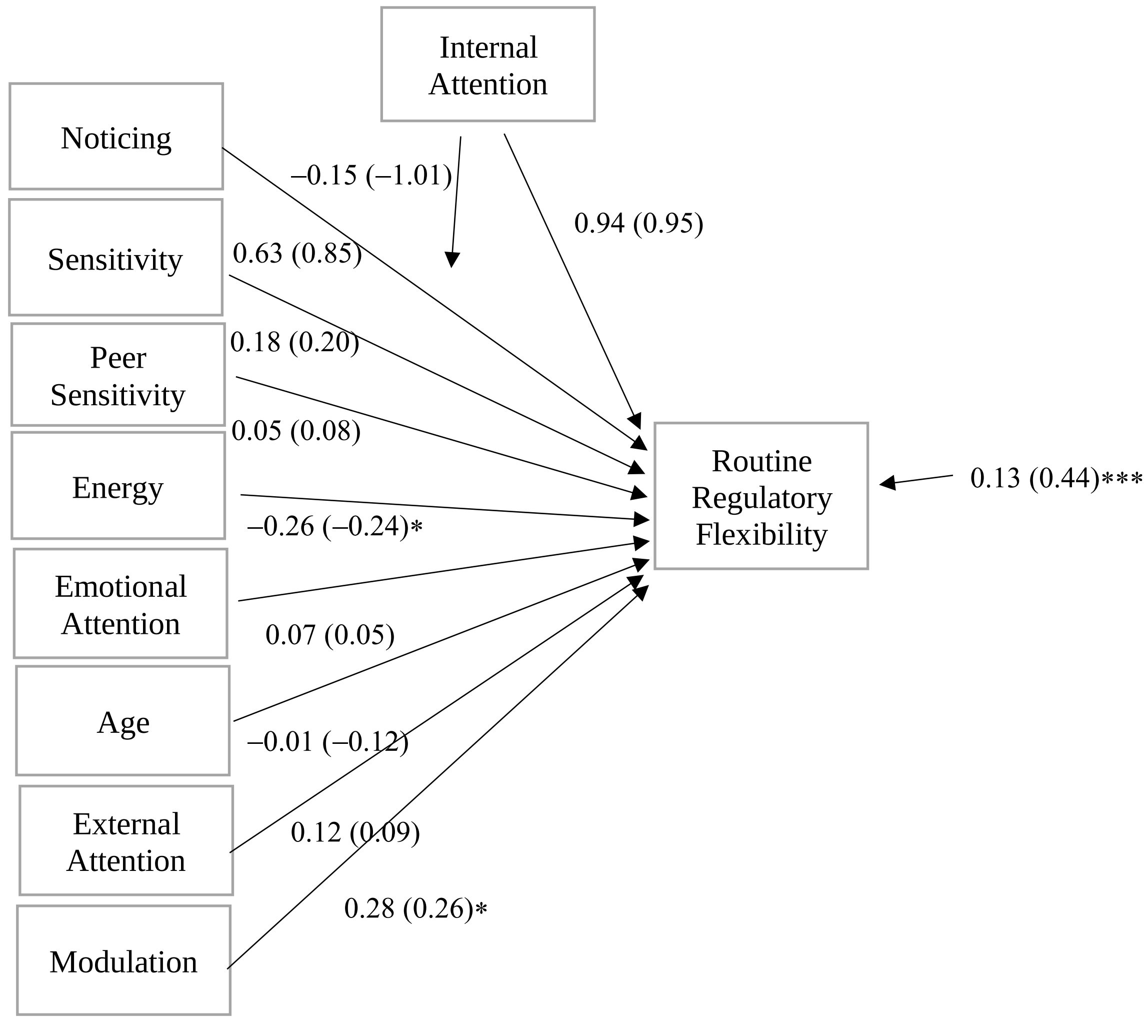

Figure 10.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Noticing and Internal Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

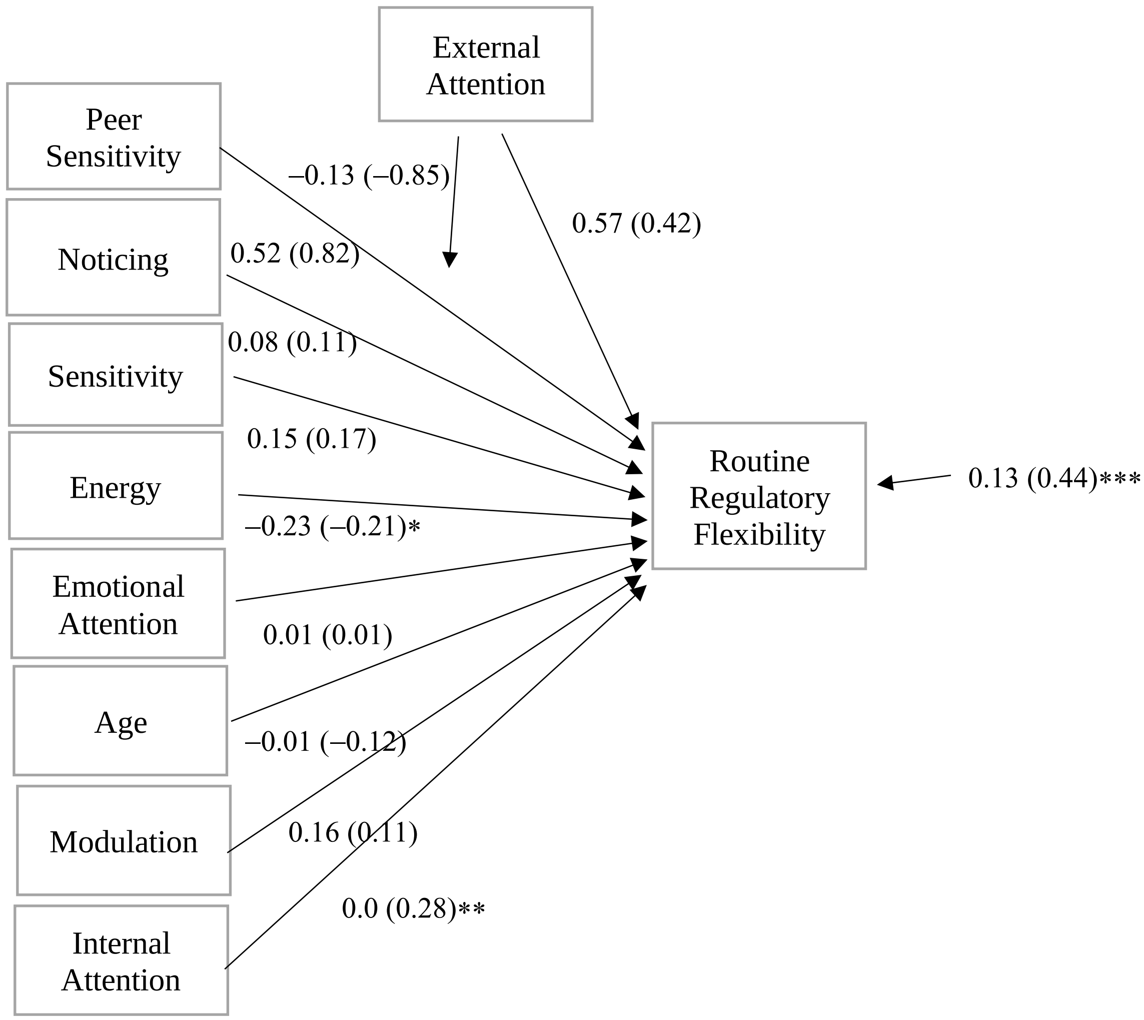

Figure 11.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Peer Sensitivity and External Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

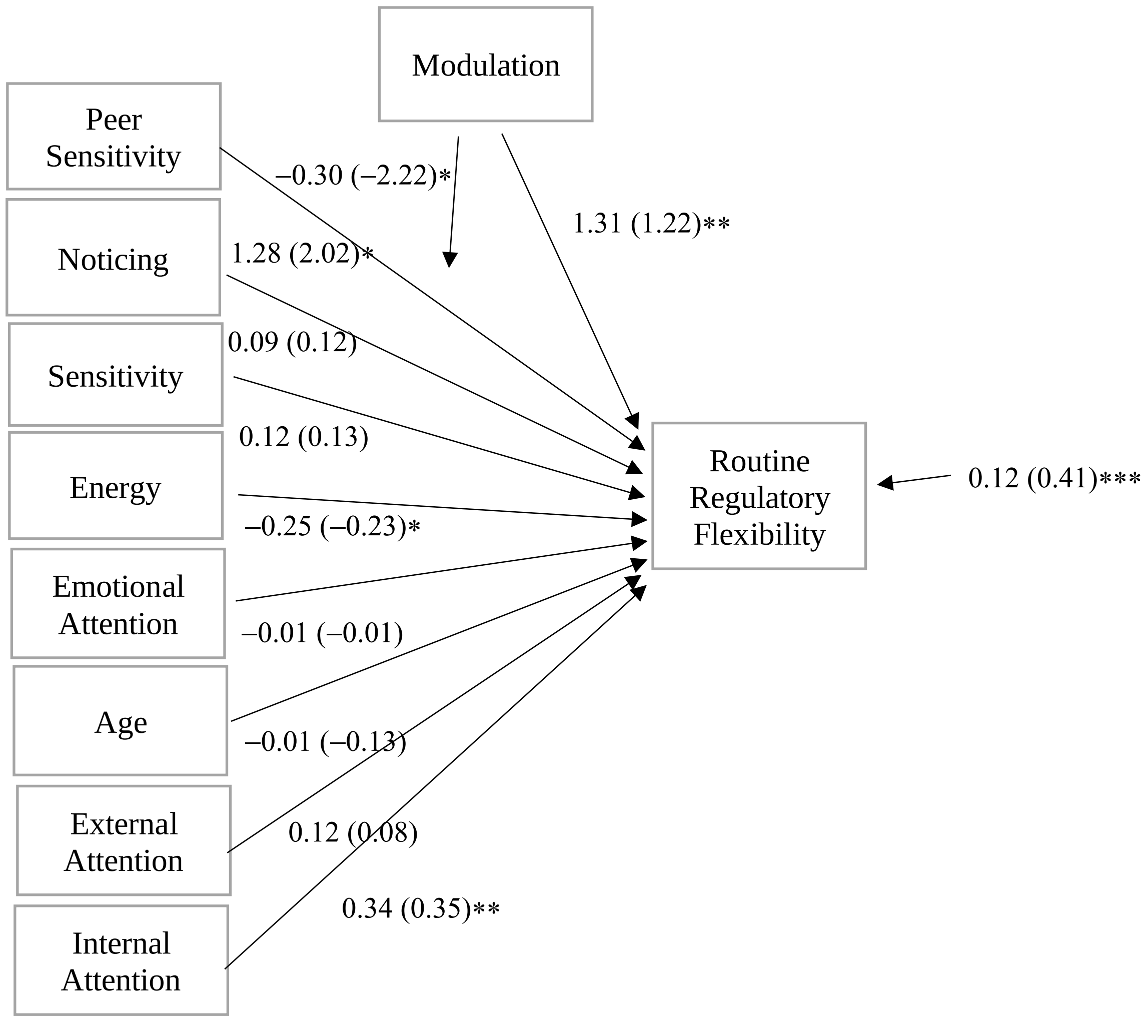

Figure 12.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Peer Sensitivity and Modulation of Activity Level in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

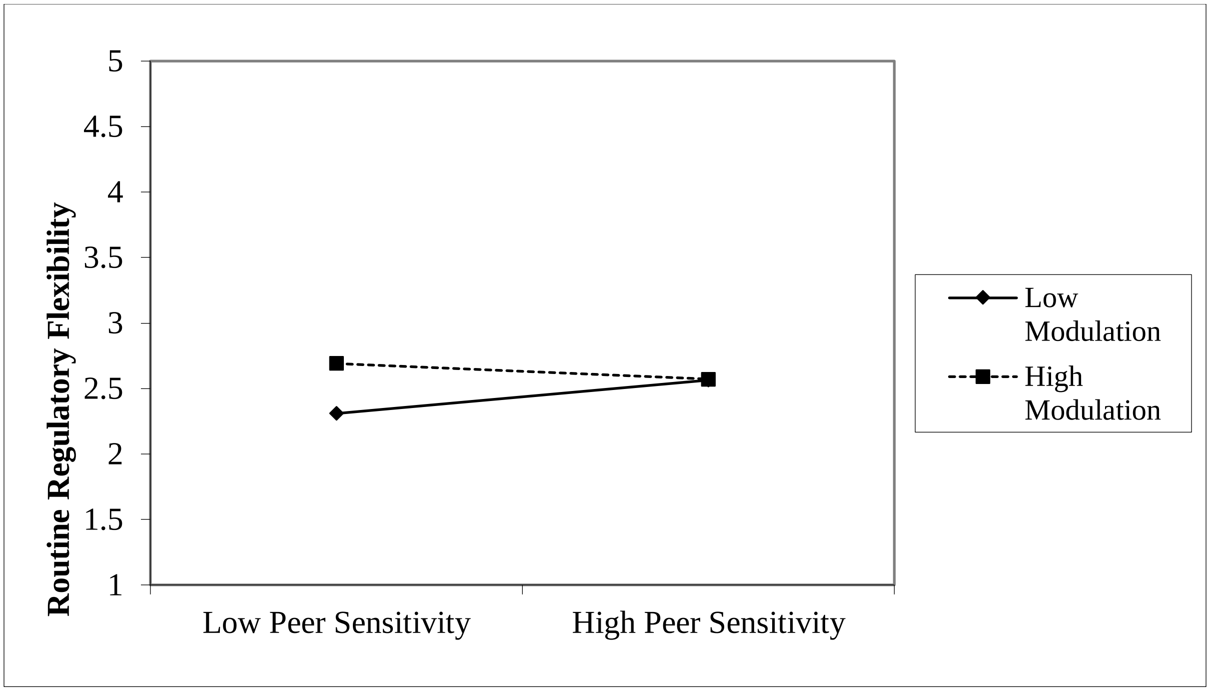

Figure 13.

Interaction of Modulation of Activity Level on the relationship between Peer Sensitivity and Regulatory Flexibility in Routine Context.

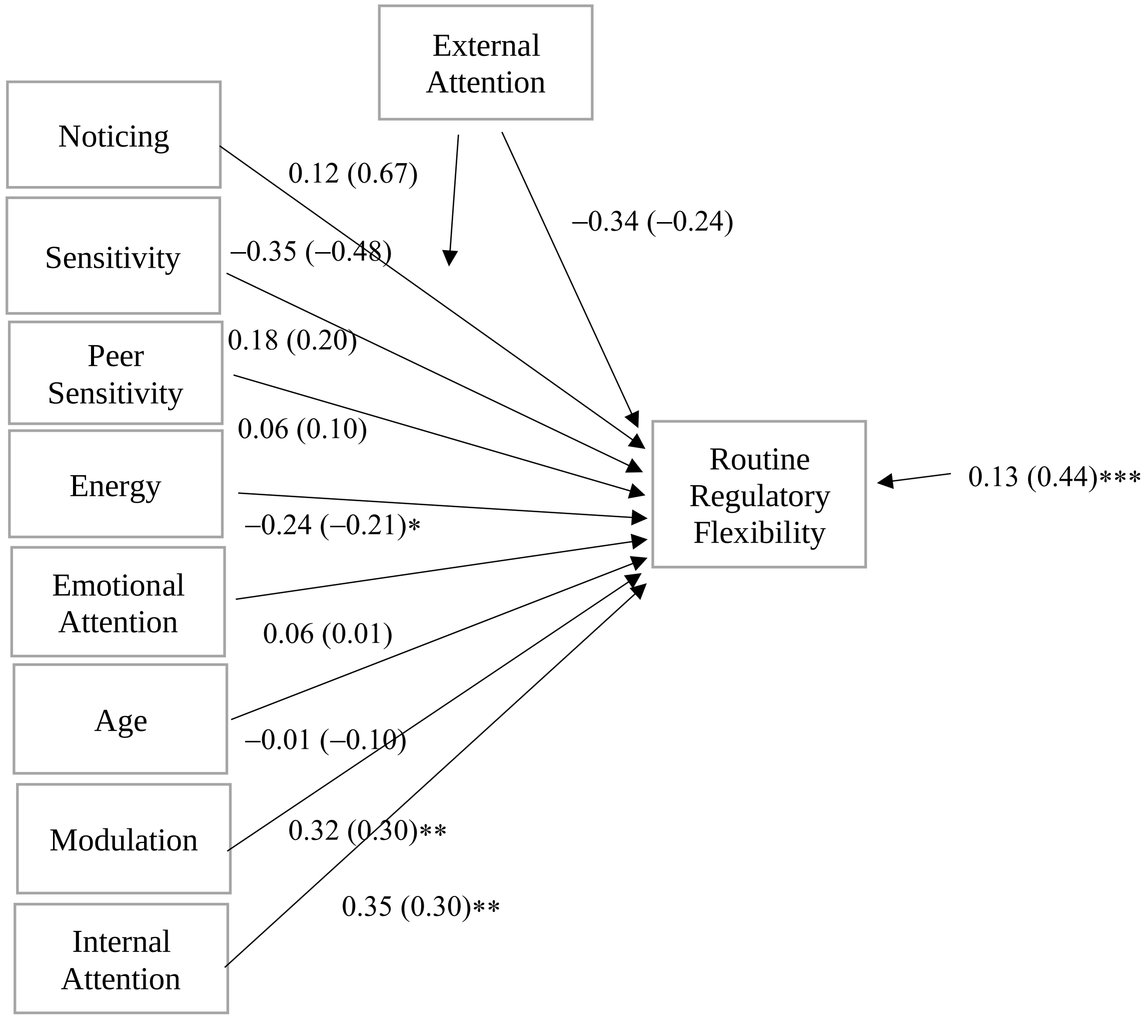

Figure 14.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Noticing and External Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

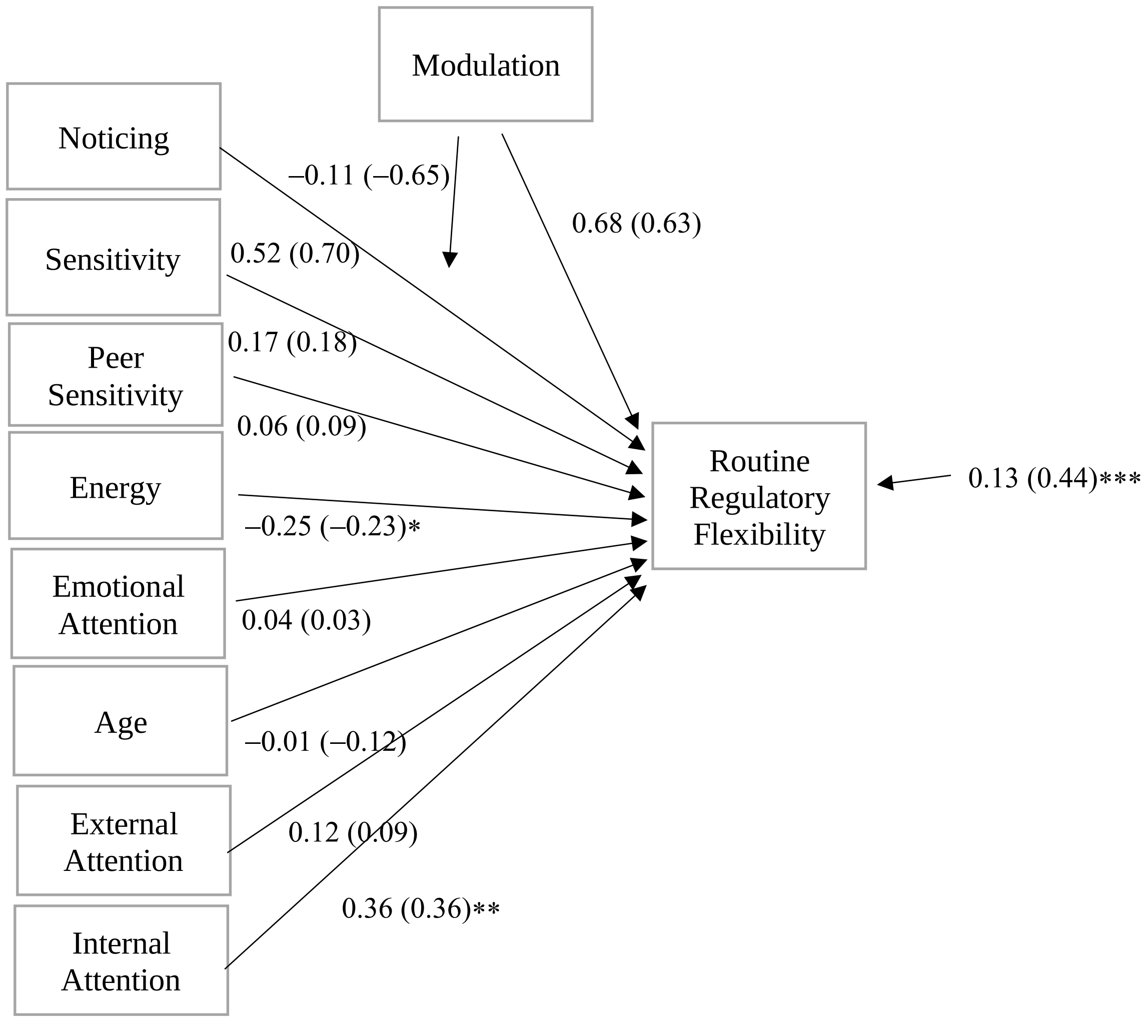

Figure 15.

Structural model with Regulatory Flexibility in Routine Contexts as the outcome variable and Noticing and Modulation of Activity Level in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Routine Contexts. *p<.05, **p<.01, ***p<.001

Interaction Effects for Novel Regulatory Flexibility

Next, interaction effects between Regulatory traits and the Sensitivity subscales were analyzed for Novel Regulatory Flexibility. The path analyses with Regulatory Flexibility in Novel Contexts as the outcome variable are presented in Figures 16 through 26. Figures 16 through 18 show the results of the model with Sensitivity, Peer Sensitivity, and Noticing included in the interaction term with the Regulatory composite. Once again, fit indices were not reported because of the small degrees of freedom (*df*=0).

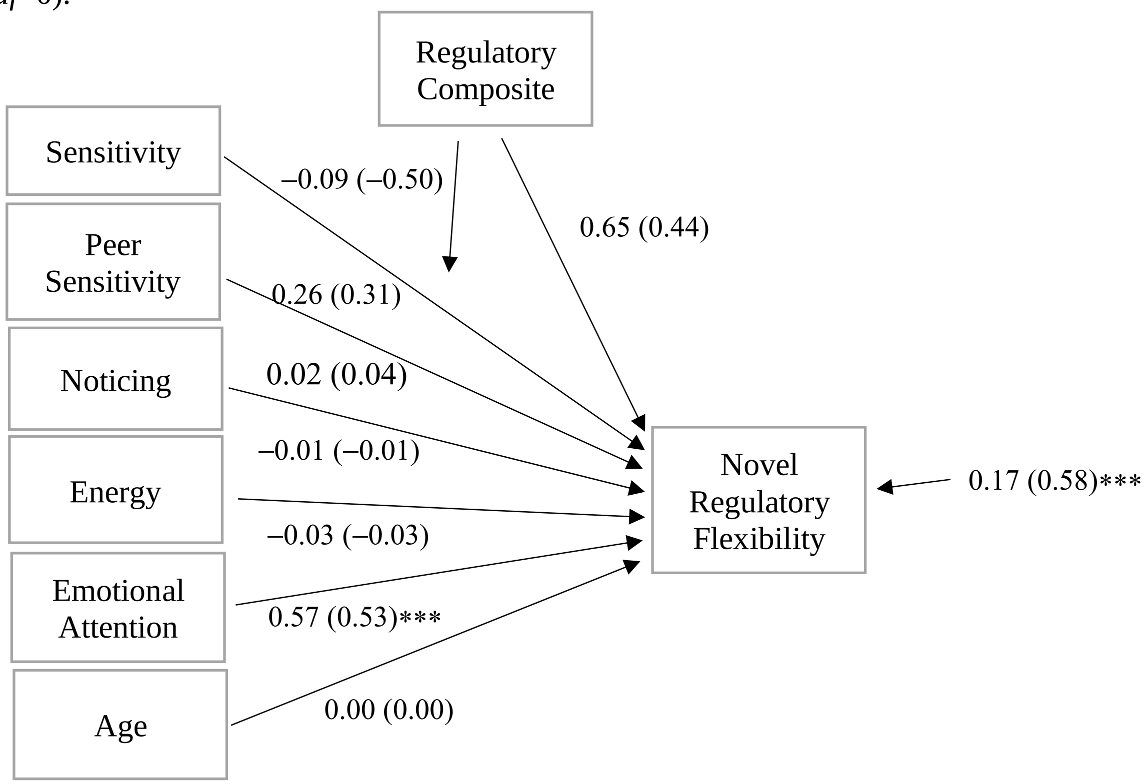

Figure 16.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Sensitivity and the Regulatory composite in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

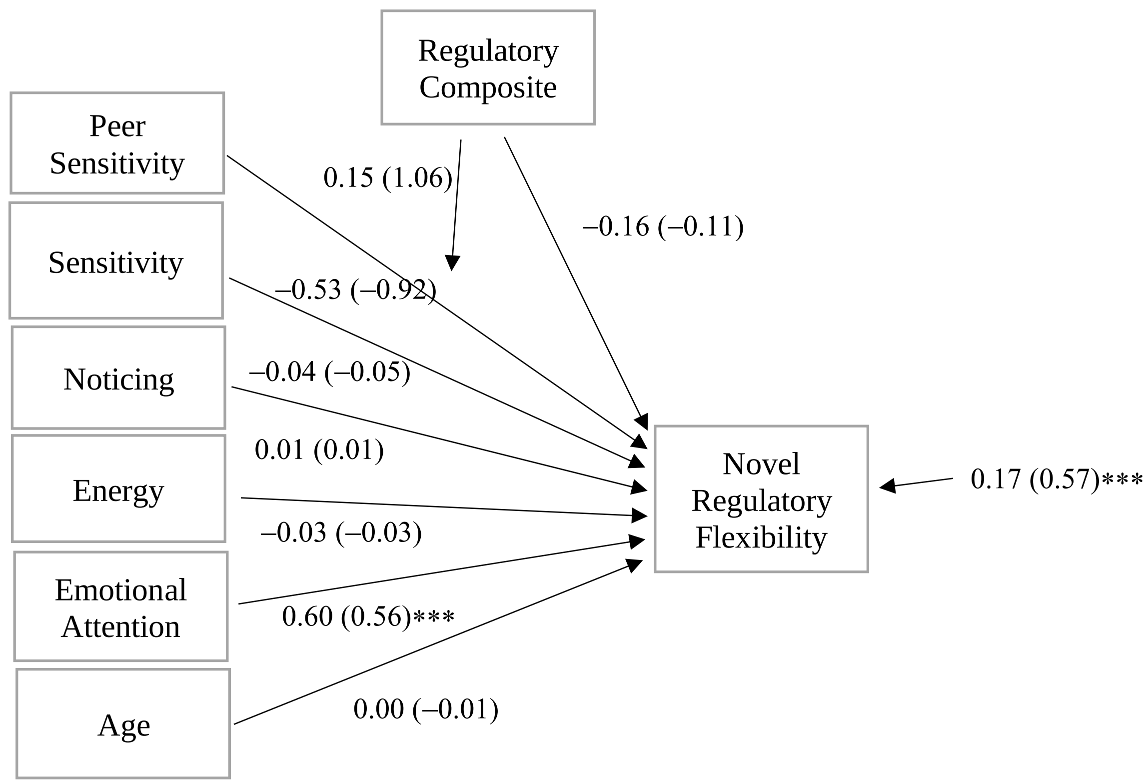

Figure 17.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Peer Sensitivity and the Regulatory composite in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

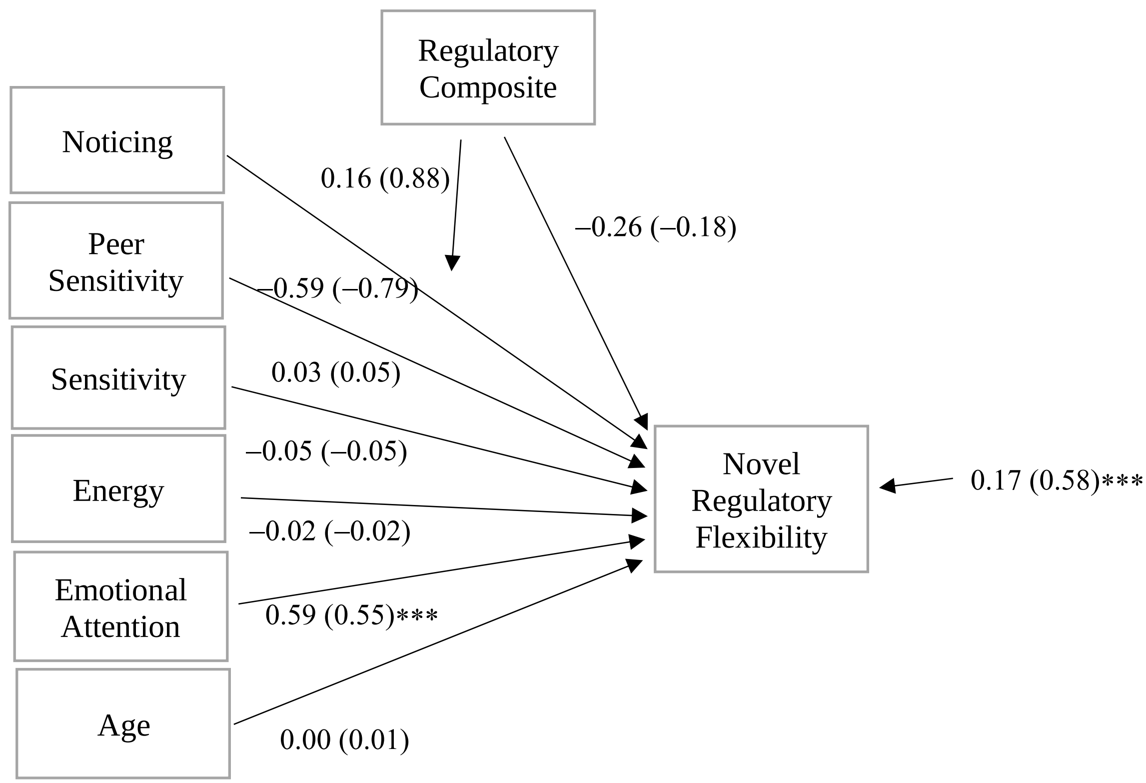

Figure 18.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Noticing and the Regulatory composite in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

Sensitivity Subscales and Regulatory Traits in the Interaction Term

Emotional Attention was the only unique predictor of Regulatory Flexibility in Novel Contexts for each of the models. The coefficients for Emotional Attention were b=0.57 (β=0.53), b=0.60 (β=0.57), and b=0.59 (β=0.55) at the *p*<.001 level when Sensitivity, Peer Sensitivity, and Noticing were included with the Regulatory composite in the interaction term, respectively. The relationships proposed in these models explain 42 percent of the variance in Novel Regulatory Flexibility (R^2=0.42).

Exploration of Regulatory Composite in Novel Context

In order to further explore the components of the Regulatory composite in relation to Novel Regulatory Flexibility, several more models were analyzed with various combinations of Sensitivity subscales and Regulatory traits as the interaction term. See Figures 19 through 26 for the results of these models. Emotional Attention was consistently the only unique and significant predictor of Novel Regulatory Flexibility for each of these models at the p<.001 level. For preschoolers, Emotional Attention consistently adds unique variance to ratings of Novel Regulatory Flexibility whether or not an interaction term was included in the analysis. This construct appears to be particularly important for navigating unfamiliar situations in early childhood.

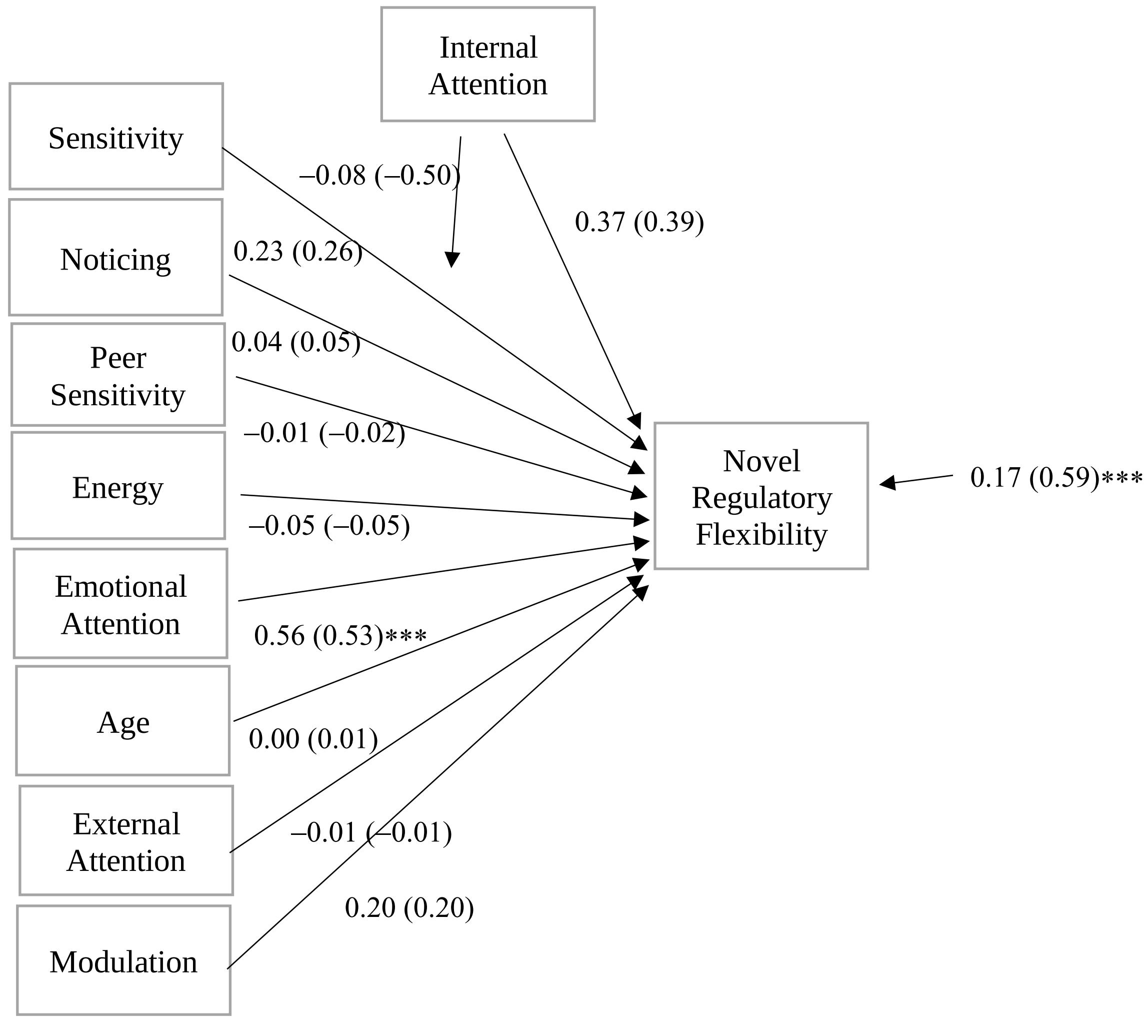

Figure 19.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Sensitivity and Internal Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

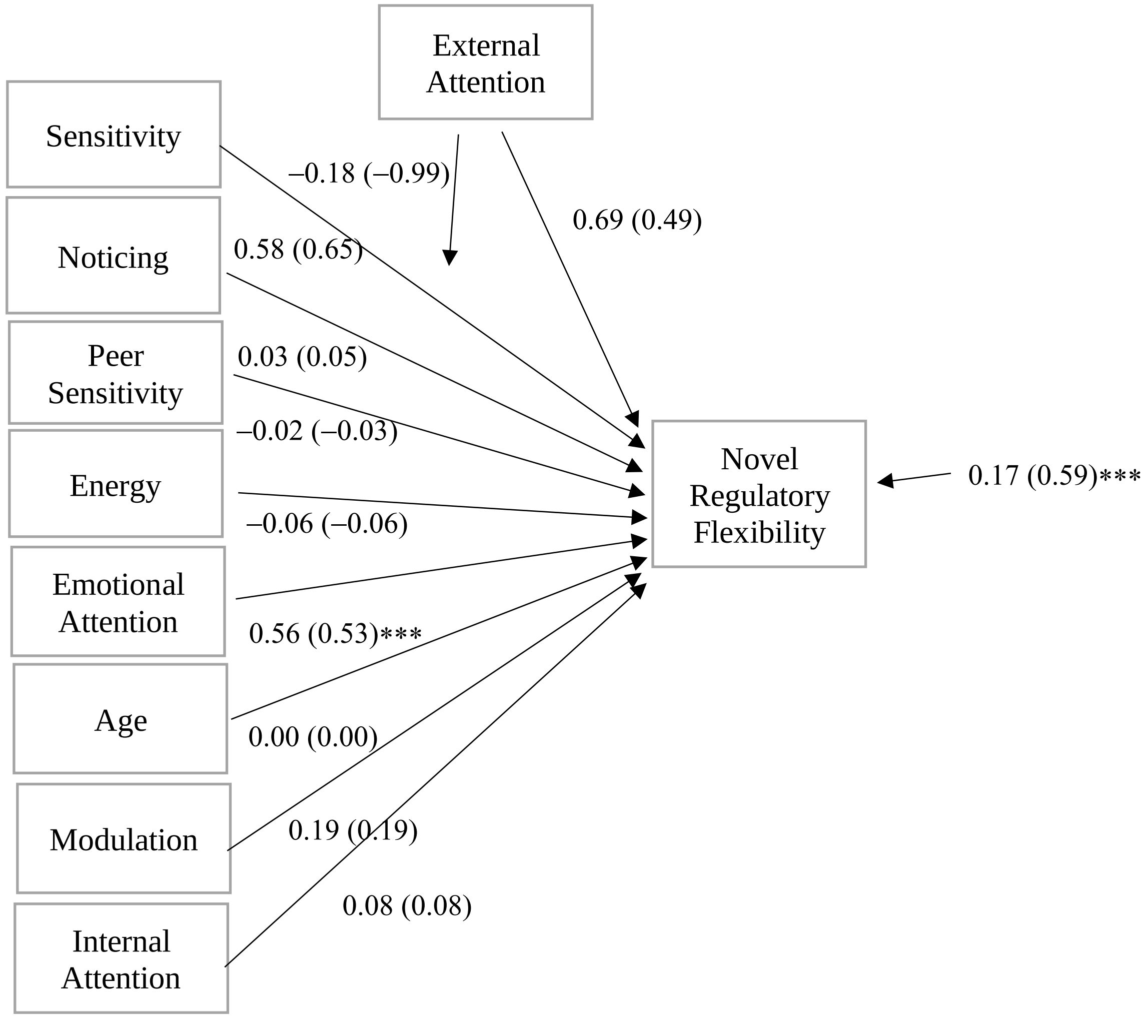

Figure 20.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Sensitivity and External Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

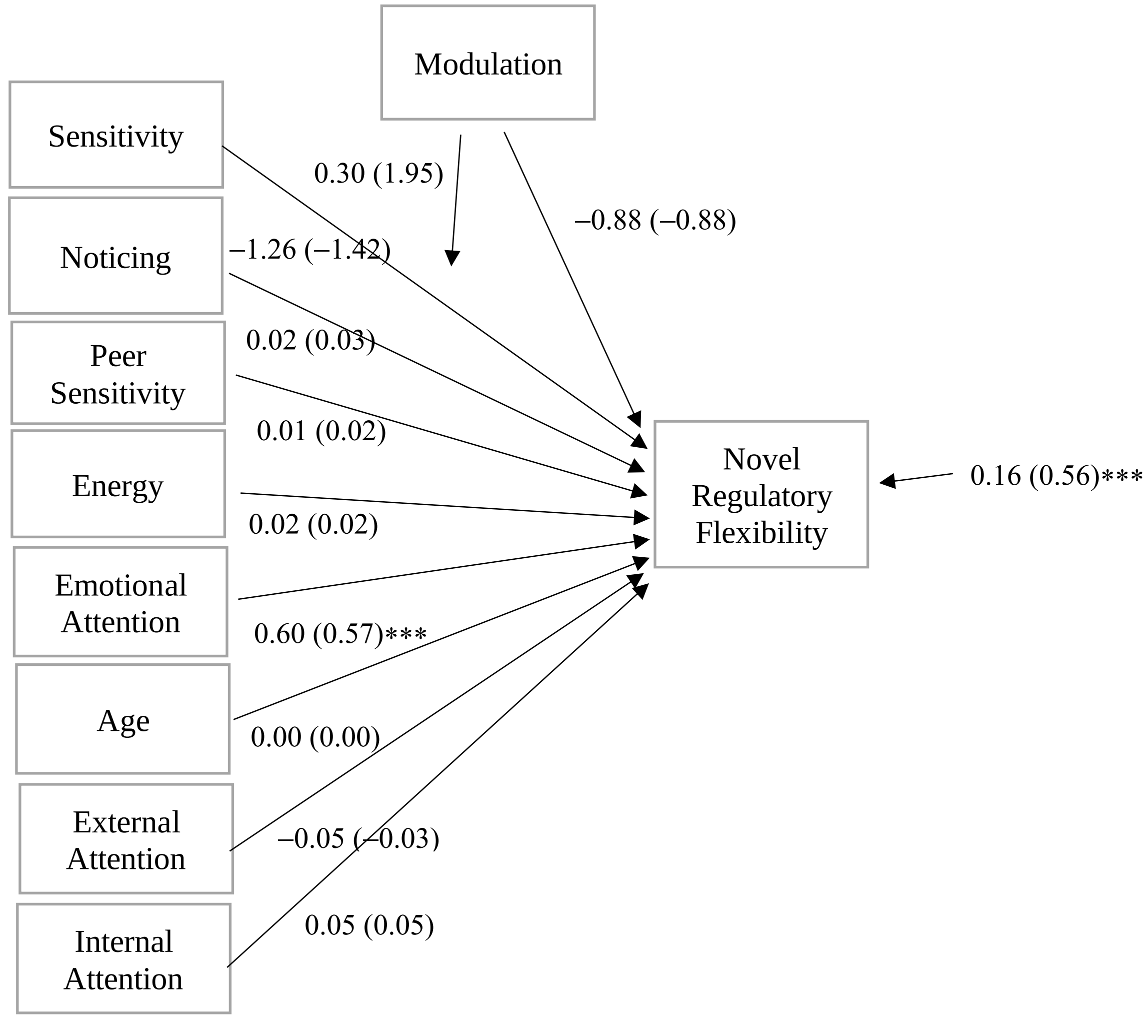

Figure 21.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Sensitivity and Modulation of Activity Level in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

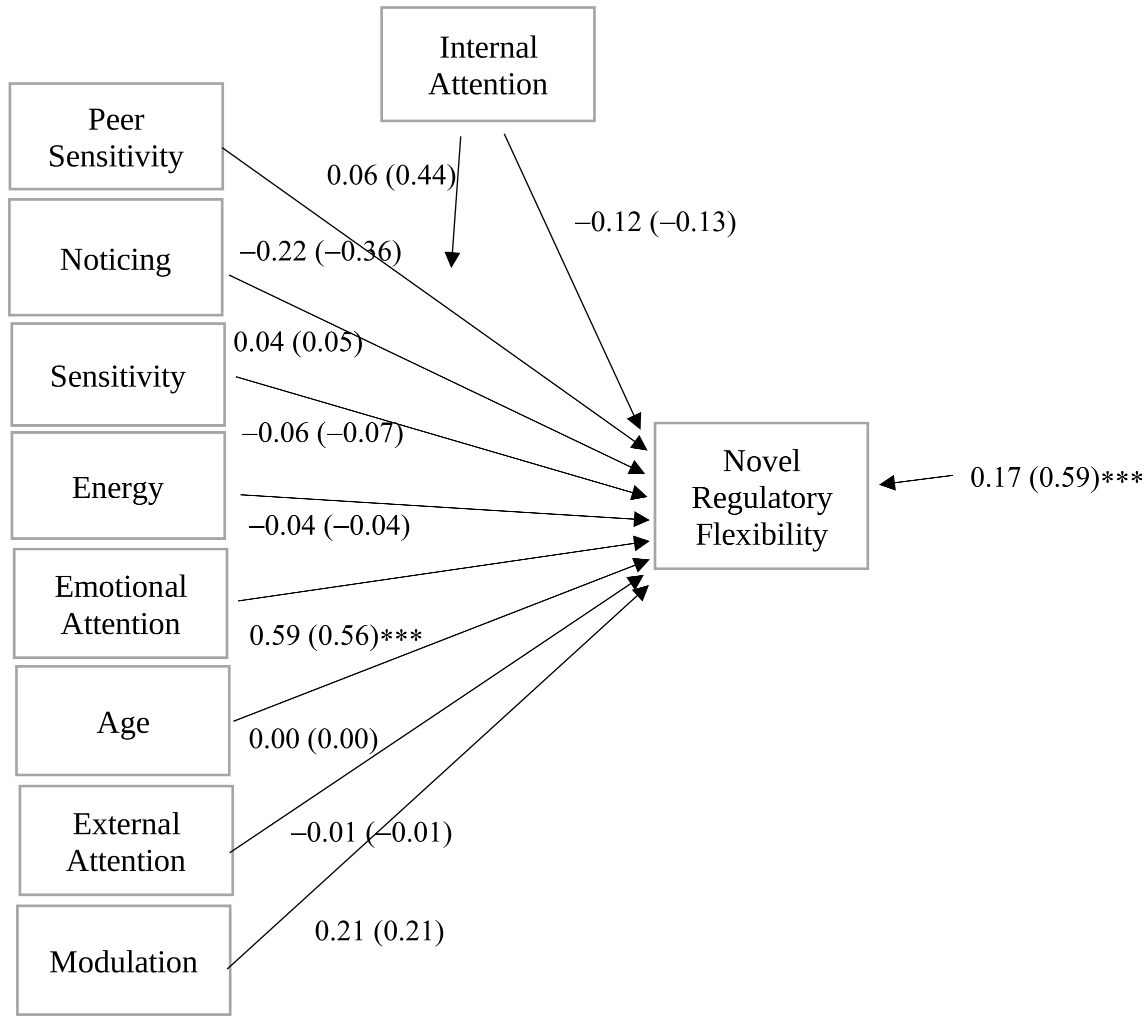

Figure 22.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Peer Sensitivity and Internal Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

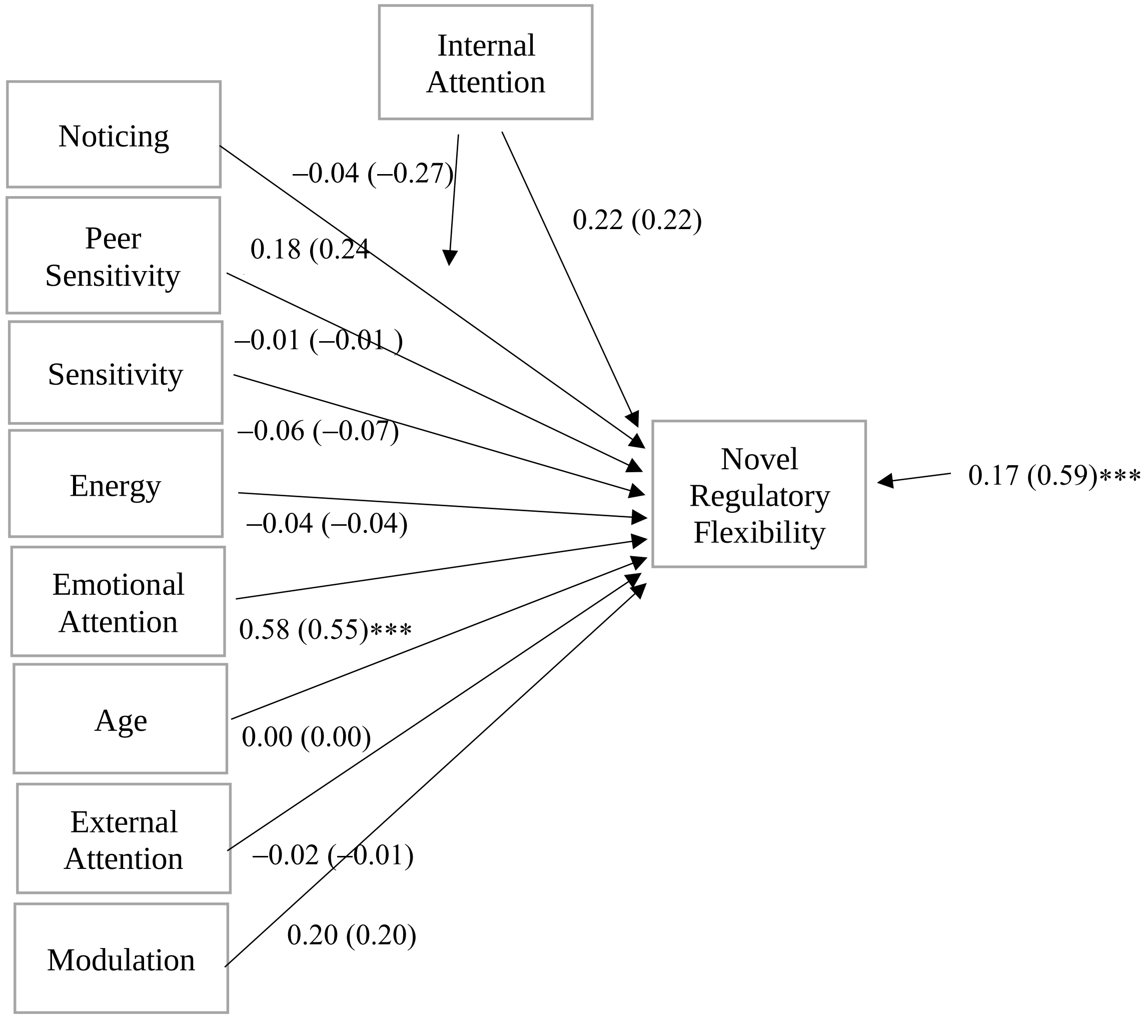

Figure 23.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Noticing and Internal Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

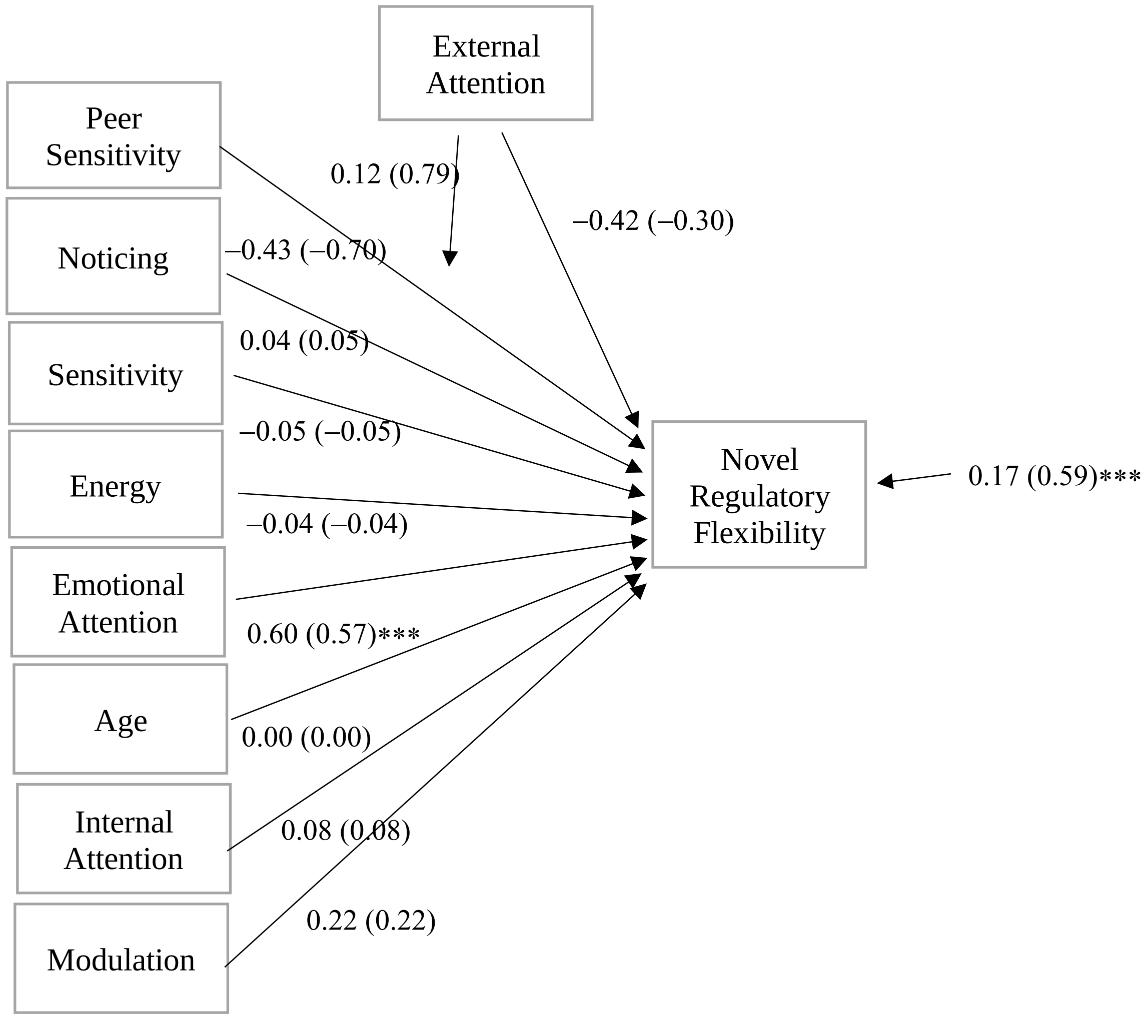

Figure 24.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Peer Sensitivity and External Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

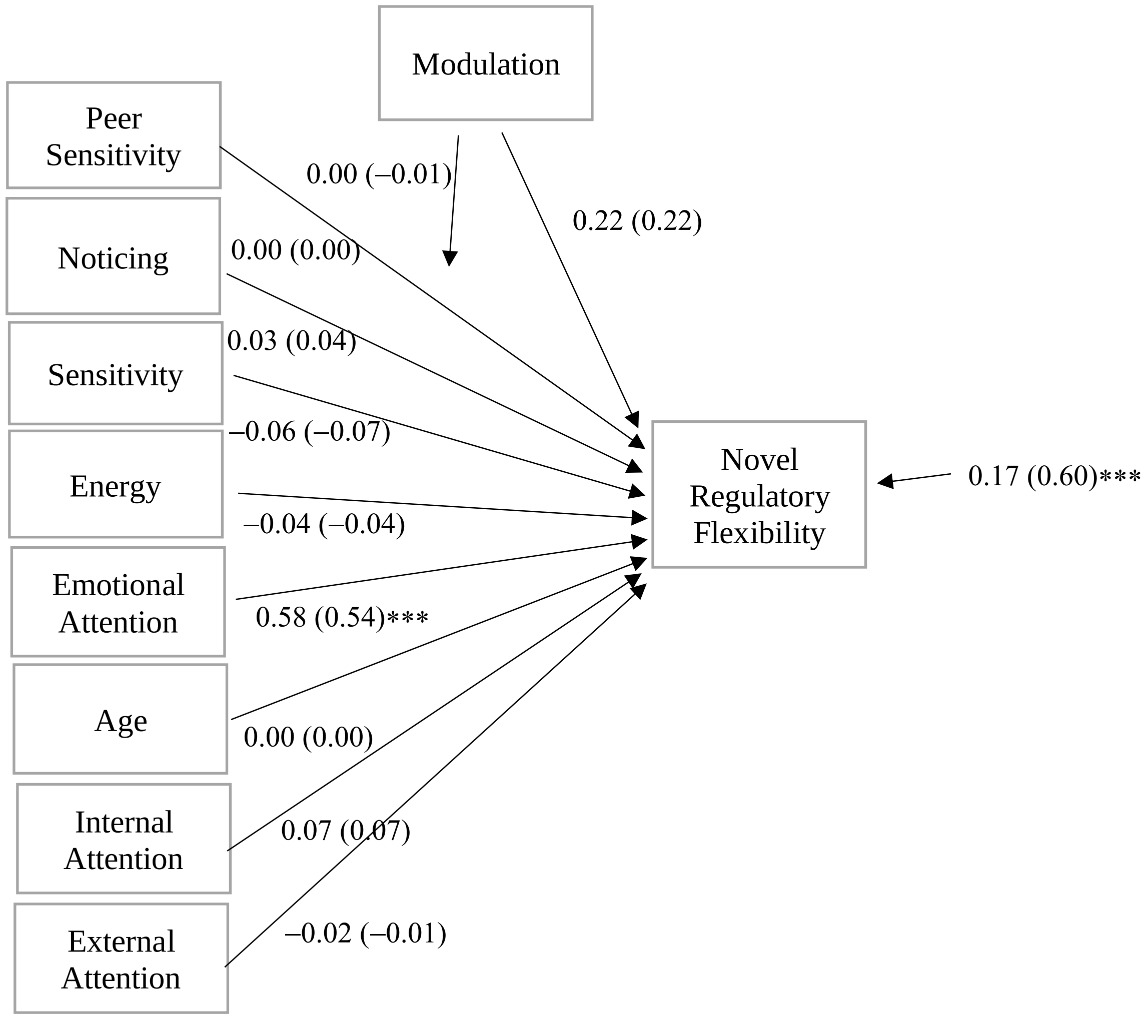

Figure 25.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Peer Sensitivity and Modulation in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

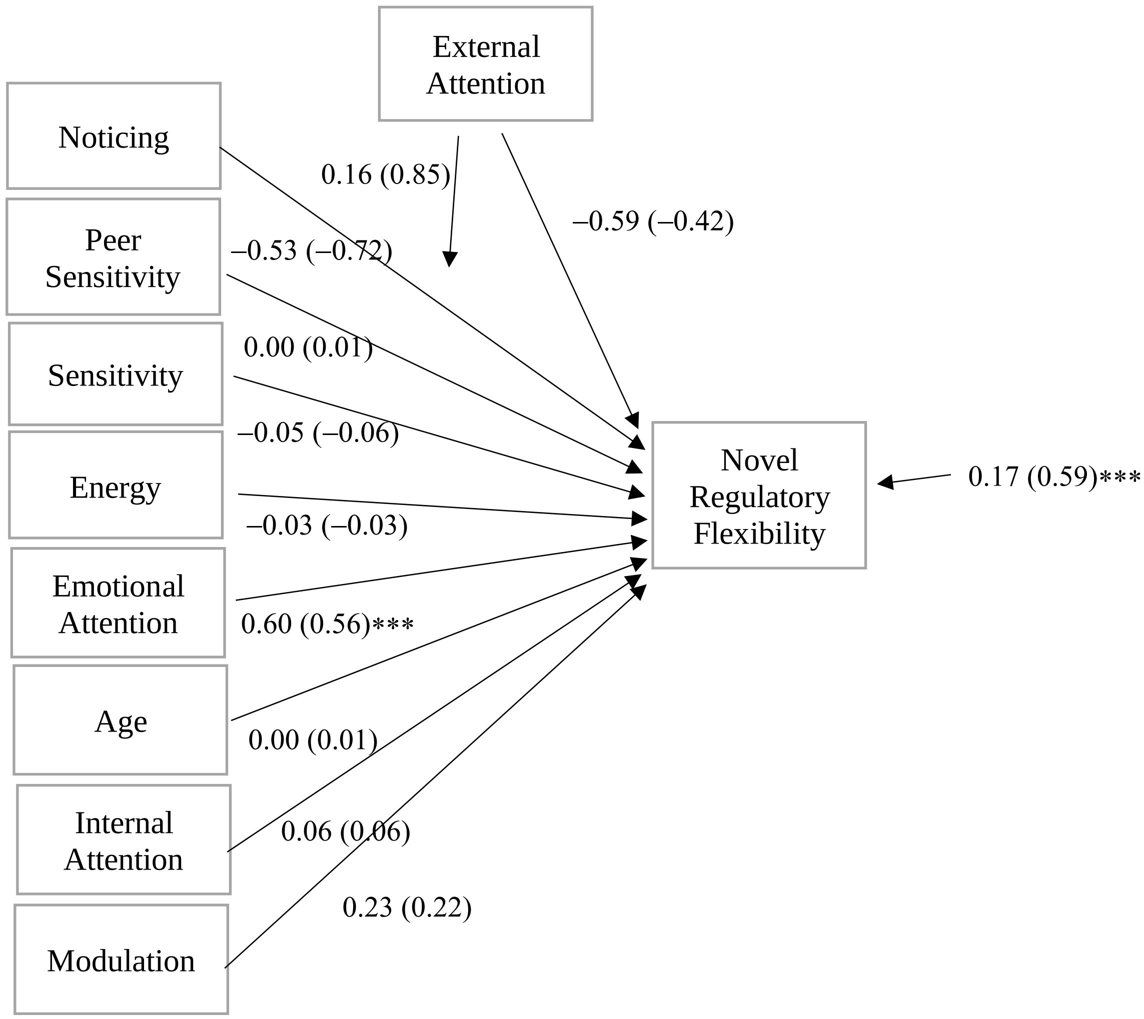

Figure 26.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Noticing and External Attention in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

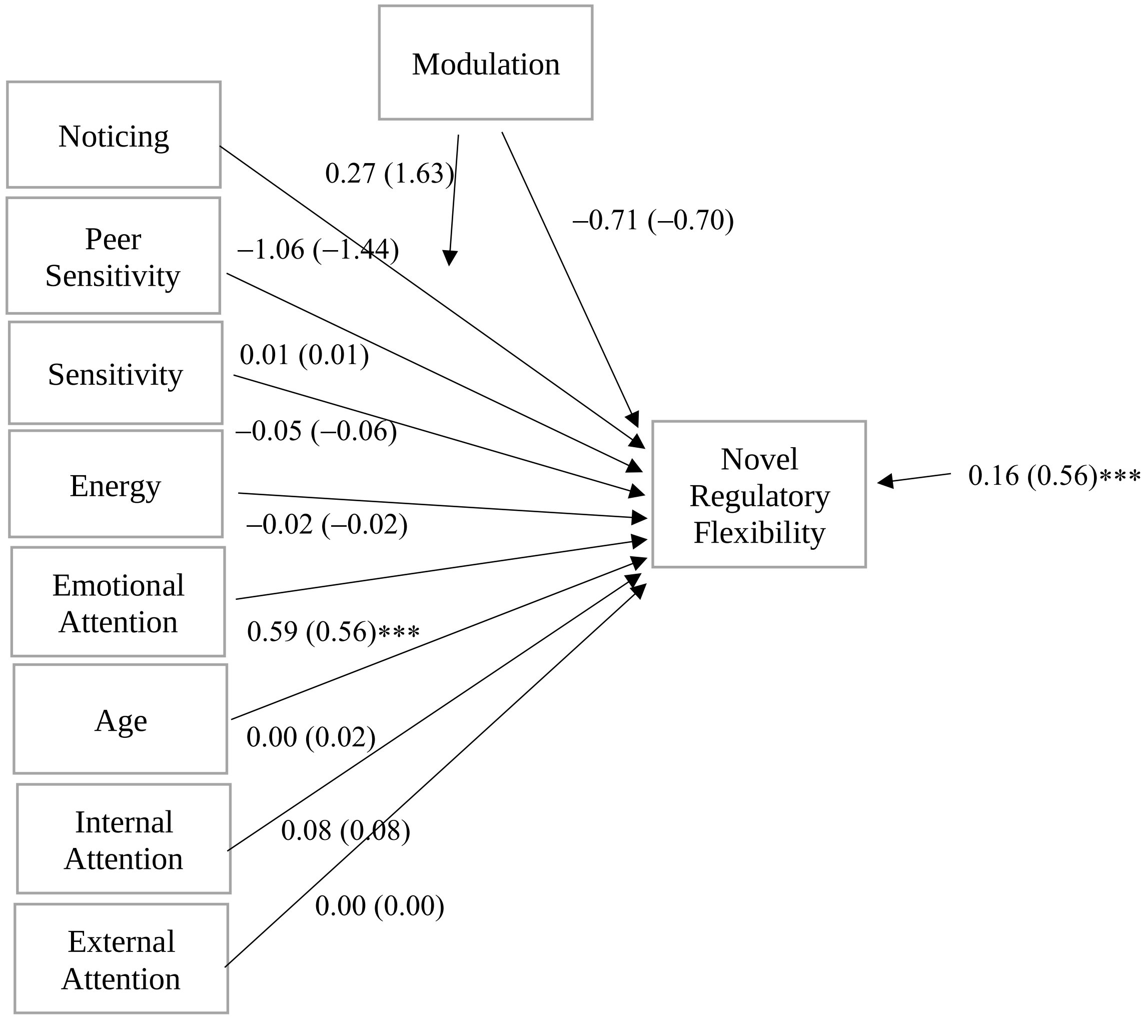

Figure 27.

Structural model with Regulatory Flexibility in Novel Contexts as the outcome variable and Noticing and Modulation in the interaction term. Each coefficient is followed by the standardized coefficient (β) in parentheses. The error variance indicates the amount of unexplained variance in Regulatory Flexibility in Novel Contexts. *p<.05, **p<.01, ***p<.001

Chapter 5: Discussion

The current study aimed to answer which of these building blocks of regulatory flexibility—Attention, Sensitivity, and Activity Level—adds significant variance in the prediction of Regulatory Flexibility in Novel and Routine situations in preschoolers. The goal of the study was to examine how novel and routine context might necessitate different temperament traits. It was hypothesized that the majority of the temperament traits that were examined—with the exception of Vigor/Energy—would be correlated with Routine Regulatory Flexibility, and that Novel Regulatory Flexibility would be correlated with fewer temperament traits. This difference was expected because it has been demonstrated that in novel situations with changing cues, preschoolers have difficulty being sensitive to those cues even when they are clear and consistent (Lee & Carlson, 2015). In addition, evidence points to the importance of sensitivity in routine situations, as sensitivity to social cues in routine situations has been demonstrated to be related to a greater social understanding for preschoolers (Cutting & Dunn, 2002).

It was also hypothesized that regulatory temperament traits—such as the Modulation of Activity Level and Attention—and Sensitivity temperament traits—such as Noticing and Peer Sensitivity—would contribute to the variance in predicting Novel Regulatory Flexibility. Novel contexts have been found to require a sensitivity to emotional cues in the environment (Cutting & Dunn, 2002) as well as an ability to modify behavior to a situation (Garner & Power, 1996). Regulatory traits—specifically External and Internal Attention—were predicted to explain substantial variance in regulatory flexibility in routine situations. Research has demonstrated that attention allows a child to remain focused on his or her goals in a routine situation, such as following the directions of an adult to reach the goal of playing with a desired toy (Marcelo & Yates, 2014). These hypotheses were partially supported, and the results of the path analyses conducted also highlighted the role of emotionally-driven attention in novel contexts. Explanations for these relationships as well as implications for early education are discussed below.

Routine Contexts

The current study supported the already-established importance of regulatory traits for flexibility in preschoolers. In addition, the importance of reactive traits such as sensitivity for flexibility was explored. The interaction of regulatory and reactive traits indicates that at higher levels of regulation, sensitivity becomes less important to a young child's adjustment to routine.

Regulatory Traits

In the current study, Internal Attention and Modulation of Activity Level each emerged as unique predictors of Routine Regulatory Flexibility when treated as a main effect. As expected, the subscales of Internal attention, External Attention, and

Modulation were also found to be significantly correlated with Routine Regulatory Flexibility. The prediction that regulatory traits would significantly contribute to the variance in Routine Regulatory Flexibility was also supported by the results of the path analyses. Other research with preschoolers has found that attention is implicated in the management of everyday situations such as waiting in a waiting room (Barragan-Jason & Attance, 2017). Similarly, the modulation of socially inappropriate behavior in a routine social interaction is related to everyday functioning and adaptability (Marcelo & Yates, 2014).

Sensitivity

The Sensitivity subscale significantly contributed to the variance in Routine Regulatory Flexibility in three of the interaction models of the current study, while Peer Sensitivity uniquely contributed to its variance in one of the models, and Noticing did not uniquely contribute to Routine Regulatory Flexibility. Each of these Sensitivity subscales were positively correlated with Routine Regulatory Flexibility (ranging from r=0.29 to r=0.45, p<.001).

While it was predicted that Sensitivity would contribute to Regulatory Flexibility, it is somewhat unexpected that it was only a strong predictor in routine contexts. Theoretically, sensitivity to adults and peers should not be required as much when a child is familiar with the context and when there are few changing cues in the environment. However, this finding does align with similar research that revealed that preschoolers' sensitivity to criticism from adults—as demonstrated in a vignette with puppets—is related to greater social understanding (Cutting & Dunn, 2002).

In fact, in the current study, the Sensitivity subscale is significantly related to Modulation of Activity Level—another predictor of Routine Regulatory Flexibility—indicating that there does seem to be a strong relationship between Sensitivity and regulatory traits that are also important for flexibility in routine. Items from the Sensitivity subscale ask for information about how sensitive a child is to praise or disapproval from adults, as well as sensitivity to falling short of others' expectations and picking up on cues that predict a negative consequence. It could be that it becomes easier for children to adjust and regulate behavior based on feedback when they are able to predict situational demands—in other words, in routine situations. The ability to anticipate and understand the reactions of others in relation to one's own behavior has implications that may be helpful for a child in modulating behavior and navigating routines like cleaning up toys at school or getting ready for bed, whereas taking note of one's surroundings—measured by the Noticing subscale—is likely not as important for everyday routines.

Interaction

The interaction of the Sensitivity subscales and the Regulatory traits in the current study underline the importance of regulation of attention and activity level for adjustment in preschoolers. A general finding was that at higher levels of regulation, sensitivity variables did not affect flexibility, but at lower levels of regulation sensitivity leads to higher flexibility. In each of the significant interaction terms in the current study, the regulatory trait in the interaction—whether that was the Regulatory composite, Internal Attention, or Modulation of Activity Level—moderated the relationship between Sensitivity and Routine Regulatory Flexibility in a similar pattern. Regulatory traits are particularly important for the navigation of routine situations, whereas sensitivity may only impact regulatory flexibility when a child has lower levels of regulatory traits. The importance of regulatory traits is unsurprising given that an abundance of research has found that regulatory traits such as modulation of behavior (Kieras et al., 2005; Barragan-Jason and Attance, 2017) and attentional control (Acar et al., 2015) contribute to adjustment in preschoolers. While sensitivity to others is clearly an important contributor to Routine Regulatory Flexibility, to put information gleaned from being sensitive to cues from others into action requires attentional control and modulation of activity level.

Vigor/Energy

When controlling for other temperament variables, there is a significant inverse relationship between Vigor/Energy and Routine Regulatory Flexibility. A significant, negative, bivariate correlation was also found between Vigor/Energy and Modulation of Activity Level, while Vigor/Energy was also demonstrated to be significantly and positively related to Noticing. Originally it was predicted that there would be no relationship between this temperament trait and regulatory flexibility after controlling for traits thought to be more closely linked to adjustment (Teglasi et al., 2009). However, as noted in the same study, if high levels of energy are expressed in extraneous or repetitive activity, it can interfere when a situation demands regulation. Based on the results of the path analysis, when controlling for regulatory traits, having high levels of energy may interfere with a preschooler’s flexibility.

Novel Contexts

Children’s adjustment in novel situations has been understudied in relation to temperament. While patterns in the current study regarding routine contexts are in line with previous findings, somewhat unexpectedly, the only temperament trait that uniquely predicted Novel Regulatory Flexibility was Emotional Attention. Emotional Attention is a new construct that was introduced in this study as part of a more comprehensive and multi-faceted view of attention.

Emotional Attention

Emotional Attention refers to the control that a child has over his or her emotion-driven attention, with higher scores indicating that a child is not easily distracted by emotions. The Emotional Attention scale of the STI asks parents for information about a child's general quality of interest in activities, absorption in chosen activities, and ease of changing attention to solve a problem. Questions assessing Regulatory Flexibility in Novel situations on the STI ask how the child reacts to departure from expectation or handles changes in expectations. Given the content of the items in both scales, one explanation for Emotional Attention being the unique significant predictor of Novel Regulatory Flexibility is that both subscales seem to be linked by a central theme of control and flexibility in emotional situations. For example, in a situation in which there is departure from expectation, a preschooler must have the control to direct his or her attention away from thinking about the change despite the emotional nature of the situation. Relatedly, Emotional Attention in the current study was found to be significantly correlated with Internal (r=0.48, p<.01) and External (r=0.42, p<.01) Attention. Novel situations seem to be more likely than routine situations to evoke emotions , and thus children who do not have control over their emotion-driven attention will struggle to adapt to new contexts.

Although it was surprising that Emotional Attention was the only significant unique predictor of Regulatory Flexibility in Novel situations, the idea that emotionally-driven attention is related to overall adjustment is not new. For example, in one study by Kertz and colleagues (2016), researchers found that deficits in shifting attention from emotional stimuli in preschool are associated with difficulties in adjustment and greater depression severity up to 5.5 years later. Other researchers have pointed out that while strong associations have been established between attentional control and cognitive ability, an emerging understanding of individual differences in attention highlights the function of attention as it interacts with other systems, particularly with emotions (Chang & Burns, 2005). Derryberry and Rothbart (1997) for example, conceptualize attention as being a multi-faceted construct that incorporates different domains such as the social, cognitive, and emotional aspects of a child. Even constructs that may seem to be purely related to cognition such as attention often have underlying components related to the social or emotional functioning of a child, particularly during development. The findings of the current study support the importance of conceptualizing attention as being multi-faceted and dynamic.

Another interesting finding related to Emotional Attention in the current study is that preschool girls were rated as being significantly higher in Emotional Attention than were boys. In other words, girls were rated as better able than boys to have control over their attention and to change focus when required by the situation. This is not completely surprising given that significant differences have been found between parent ratings of boys and girls for other related areas of temperament. For example, boys were found to be rated as higher than girls in the area of Vigor/Energy, while girls were found to be rated as higher in the area of Modulation (Teglasi et al., 2009).

At this stage of development, girls may be able to demonstrate higher levels of attentional control in emotional situations than boys.

Sensitivity

As predicted, none of the Sensitivity subscales correlated significantly with Novel Regulatory Flexibility. The lack of a significant relationship between Regulatory Flexibility in Novel situations and Sensitivity aligns well with other available research which suggests that preschoolers have difficulty changing behavior based on feedback from others in new situations (Lee & Carlson, 2015). For example, research has demonstrated that asking a preschooler to delay gratification to receive a treat and then changing the rules of earning a treat—in effect, creating a novel context—results in only about between 25 and 50 percent of preschoolers being able to adjust their behavior based on adult feedback. It is therefore unsurprising that the Sensitivity subscale was not related to Novel Regulatory Flexibility given that it taps into sensitivity to praise and disapproval from adults. Peer Sensitivity—which taps into sensitivity to praise and disapproval from peers—as well as Noticing—which taps into sensitivity to sensory stimuli—seem to also not add much to novel situations for preschoolers in that there was no significant relationship between Peer Sensitivity or Noticing and adapting to novel contexts. Sensitivity and Novel Regulatory Flexibility may not have a strong relationship at this developmental stage.

Implications for Routine Contexts

Overall, the current study demonstrates that routine and novel situations do require different temperament traits in early childhood. Routine contexts consist of situations in which a child has the ability to predict the demands of that situation based on experience, assuming that the child is able to regulate his or her attention and actions. A child's level of sensitivity and regulation predict how well he or she will be able to successfully navigate routine situations that are familiar. Sensitivity to feedback from adults and peers may be more useful to children in routine situations where cues that are picked up can be more easily incorporated into the child's behavior and are more likely to be repeated. On the other hand, cues picked up from feedback may not be quite as useful to a child in a novel situation in which emotions that capture attention interfere with uncertain task demands. Most importantly, to navigate routine flexibly, regulatory traits are necessary to help with the regulation of thoughts, feelings, and behaviors. Regulatory traits can help a child behave flexibly even with a more limited sensitivity to others. In addition, cues and other reminders are often repeated in routine situations to help children to understand what to do. Preschoolers who are learning the routines associated with an ever-growing social environment must be able to manage emotions, thoughts, and behaviors, and require regulatory processes in order to do so.

Implications for Novel Contexts

While regulatory traits and sensitivity are both important for navigating routine contexts, the strongest predictor of the successful navigation of novel contexts is a high emotional attention, a new construct that was introduced in this study to more comprehensively capture attention. The importance of emotional attention showcases the importance of understanding attention as a multifaceted construct that is related to cognition and learning as well as to socioemotional systems and processes (Chang & Burns, 2005). Novel situations seem to pull for a child to self-direct his or her attention even in the midst of an emotional context. This makes sense, given that the inherent uncertainty of novel contexts can increase feelings of fear or discomfort (Kagan, 1997) and can heighten other negative emotions such as sadness or anger (Bar-Anan, Wilson, & Gilbert, 2009). It is therefore logical that a trait which by definition allows a child to function under emotional stress would be particularly important in the inherent emotionality of novelty.

Conclusions

The results of the current study provide support for the idea that context matters in early childhood. Routine and novel contexts seem to pull for different temperament traits. The results of this study also support a more multi-faceted perspective of attention, in that separate elements of attention influence flexibility in different contexts. In particular, it introduced the concept of emotional attention as being important for unfamiliar situations, which often evoke emotional responses.

This study provides implications for early childhood education and intervention. Teachers of young children should be instructed on the differences in situational demands between routine and novel contexts as successful teaching may require different techniques based on the situation. To manage routine situations, children should be taught regulatory strategies which might include taking deep breaths to calm down. They can also be taught to recognize social cues from adults and peers to facilitate social interactions. Understanding the differences between routine and novel situations can also impact intervention and education with young children who often have many new experiences in school. Children and their teachers can be taught about the differences in the ways that new and familiar contexts affect their emotions. Psychologists and teachers can work to recognize and support children who regularly have difficulty regulating themselves during new situations, and these children can be provided with coping strategies specific to unfamiliar contexts.

Chapter 6: Limitations and Future Directions

There were several limitations to this study that are important to note. One limitation was the use of parent ratings to measure regulatory flexibility, attention, and sensitivity. Parents of preschoolers tend to be good informants of their children's behavior due to consistent close proximity and the vigilance with which they observe changes in their young children's mood and behavior (Teglasi et al., 2015). Additionally, while it is helpful to have data from several different informants, research suggests that when testing relations of different constructs, there is a higher likelihood of finding patterns within the same informant (Teglasi et al., 2015). For example, expectations for children may vary as a function of the type of informant, which can influence ratings On the other hand, using parent ratings does limit the conclusions about regulatory flexibility that can be made from the STI (Teglasi, 1998). For example, in some cases parents do not report behaviors that fail to fit with their conceptualization of their child. Parents often over- or under-report traits that are more or less relevant in the home setting. They may be more likely than a third-party observer to notice behaviors that contribute to the parent-child relationship (Teglasi, 2015). This limitation of using parent ratings will be addressed by keeping in mind typical patterns of parental reporting of children's behavior in the discussion about the population to which this study can generalize.

A second limitation to the study is that the division between novel and routine situations may not always be as binary as is implied by the division of the items on the regulatory flexibility scale of the STI into novel and routine categories. In fact, the preliminary analyses revealed that there was a modest significant correlation between the two scales on the STI (r=.369, p<.001). Many situations that a preschooler would face in real life have elements of both the novel and the routine. For example, following instructions that are clear and explicit may be an important part of meeting routine demands at home or in school. However, it is possible that those clear and explicit instructions may ask the child to do something that feels new or uncertain—such as the introduction of a new game or a change in schedule—adding an element of novelty in which the exact demands of the environment become more difficult to predict within the typical routine. It is important to keep this nuance in mind when interpreting the results of the study. At the same time, the distinct patterns of correlates between routine and novel situations in the current study suggest that context should continue to be explored in research, given that it has been vastly understudied in research relating temperament to child functioning.

A third and final limitation of this proposed study is that while the sample is somewhat ethnically diverse, most of the parents and children in the study came from middle-to upper-class backgrounds. Additionally, the data were collected at a school on a large University's campus attended by the children of faculty and staff members;

the average education levels of the parents for this sample is higher than average parent education levels across the United States. Therefore, the results of this study will most likely not be generalizable to children of lower socioeconomic status or whose parents have lower education levels.

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