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Preface

This graduate thesis was written from January 2021 to January 2022, and is my last academic work of the Clinical Psychology program at the Norwegian University of Science and Technology. The process has been long and sometimes frustrating, but also exciting and rewarding. Throughout this period, I have learnt a lot about developmental psychology, statistical analysis and academic writing. I have also gotten the opportunity to immerse myself in a topic I am deeply interested in, namely on how early relationships affect and interact with developmental outcomes. I consider myself fortunate to have gotten the opportunity to carry out a research project I find highly relevant for future clinical work, and for the opportunity to analyze such a comprehensive source of data as the Trondheim Early Security Studies (TESS).

There are many people I would like to thank. First of all, I would like to thank my supervisor, Jolene Van der Kaap-Deeder, for giving me valuable feedback, much needed assistance and support during the whole process. I would also like to thank my co-supervisor, Silje Steinsbekk, for insightful feedback and for pointing me in the right direction early in the process. I highly appreciate that I got to be a part of the TESS project. Also, I would like to thank Håkon Eide for proofreading this thesis. My friends at campus deserves a thanks for making this whole year brighter and more enjoyable. I am grateful for all the laughs, coffee breaks and supportive conversations during this period. Last, but certainly not the least, I want to thank Emil Eysler Grip for his encouragement, love and support (both technical and emotional) during this project and generally in life.

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Abstract

Parenting stress and children's emotion regulation (ER) are considered to be two related concepts, which mutually affect each other. However, there is less research on how these concepts interact and develop over time, especially beyond early childhood years. The purpose of this study was to examine the assumed reciprocal relation between parenting stress and adaptive ER in middle childhood. Parenting stress was reported by the parents, and children's adaptive ER was reported by both parents and teachers. Responses were collected from a community sample of Norwegian children at four time points, from the children were 6 to 12 years old ($n = 605-760$). Applying the Random Intercept Cross-lagged Panel Model, the results showed a negative bidirectional relation between parenting stress and adaptive ER from age 10 to 12. Additionally, parenting stress related to both parental and child characteristics was negatively related to ER. The relation between parenting stress and ER was mainly evident when parents reported children's ER. The findings of this study suggest that parenting stress and children's ER interact and develop in a bidirectional process, where the role of parents continue to play a key role for children's ER in middle and late childhood.

Keywords: Parenting stress, emotion regulation, middle childhood, longitudinal

Sammendrag

Foreldrestress og barns emosjonsregulering (ER) er ansett å være to relaterte konsepter som gjensidig påvirker hverandre. Det er likevel mangel på kunnskap om hvordan konseptene interagerer og utvikler seg over tid, spesielt utover tidlig barndomsår. Formålet med denne studien var å undersøke den antatte gjensidige relasjonen mellom foreldrestress og adaptiv ER hos barn i barneskolealder. Foreldrestress ble rapportert av foreldrene, og barns adaptive ER ble rapportert av både foreldre og lærere. I denne studien er det samlet inn data fra et normalutvalg bestående norske barn i Trondheim. De ble målt på fire tidspunkter, fra barna var 6 til 12 år gamle ($n = 605-760$). Analyser ble gjort ved bruk av Random Intercept Cross-lagged Panel Model, og resultatene viste en negativ bidireksjonal sammenheng mellom foreldrestress og adaptiv ER fra alderen 10 til 12 år. Foreldrestress relatert til både foreldrenes og barnas karakteristikk var begge negativt assosiert med adaptiv ER. Denne sammenhengen var hovedsakelig til stede når foreldrene rapporterte barnas ER. Funnene fra denne studien indikerer at foreldrestress og barns ER interagerer og utvikler seg i en gjensidig prosess, hvor foreldrene fortsetter å utgjøre en viktig rolle i barnas utvikling av ER, også i senere barndom.

The Reciprocal Relation Between Parenting Stress and Emotion Regulation in Middle Childhood

Emotion regulation (ER) is regarded to play a crucial role for several developmental outcomes, including social functioning, mental health and cognition (Gross & Thompson, 2007; Thompson, 1990). The ability to regulate emotions develops from infancy, through childhood and adolescence and continues into adulthood (Cole, 2014; Eisenberg & Sulik, 2012). ER is a complex phenomenon that is influenced by biological, psychological and social factors. Infants and young children are highly reliant on external regulation and become increasingly able to regulate emotions themselves as they grow older (Kopp, 1989). Hence, the social environment, and especially parents, have been considered to play a critical role in supporting this development (Morris et al., 2007). Parenting stress, referring to parents' perceived stress in the child-parent-dyad (Abidin, 1992), is related to a broad spectrum of child functioning and developmental outcomes (Deater-Deckard, 1998). Due to children's reliance on their parents to regulate emotions, it is hypothesized that parents who experience high levels of parenting stress, may have reduced capacity and less resources available to assist their children in regulating their emotions, which may negatively impact children's development of ER. Simultaneously, children with less adaptive ER skills may require more resources and support from their parents to regulate their emotions and thus may be perceived as more demanding and difficult. This may result in a reinforcing circle where the parents experience increased stress in their role as parents and the child does not receive the support required for an adaptive ER development, processes that may negatively fuel each other.

The relation between ER in children and parenting stress is supported by previous research (Feldman et al., 2004; Mathis & Bierman, 2015; Spinelli et al., 2021; Williford et al., 2007). However, previous research on the relation between these two constructs has mainly focused on early childhood years, and mostly employed cross-sectional or short longitudinal design. Hence, there is a scarcity on longitudinal studies investigating the assumed reciprocal relation between parenting stress and children's adaptive ER over time, and further, how these constructs develop and interact through middle childhood. As it is possible that both parenting stress and children's ER can be affected by the same underlying factors (e.g., common genes), this study employs a statistical analysis which account for such possible confounders. Thus, this study aims to broaden the understanding of the direct link between children's ER and parenting stress, and how these two concepts assumably reciprocally influence each other over the course of middle childhood. Based on previous

studies on ER and parenting stress in early childhood, and the notion that ER continues to develop through the whole lifespan, still under the influence of the social environment (Cole, 2014), it is expected that ER and parenting stress will be bidirectionally and negatively related to one another across middle childhood. As parenting stress can stem from both characteristics within the parent and the child (Abidin, 1997), and children's ER is affected by the child-parent-interaction (Morris et al., 2007), this study seeks to examine whether different sources of parenting stress relate to ER by distinguishing between parenting stress related to parental characteristics and parenting stress related to child characteristics. It is hypothesized that both sources of parenting stress (i.e., parent-related and child-related stress) will bidirectionally relate to children's ER.

Emotion Regulation

Emotions are in many ways crucial to human function, playing a significant role in social interaction, personality function, cognitive processing and goal achievement (Thompson, 1990). For instance, when people face obstacles that prevent them from reaching their goals or having their needs met, the feeling of anger can promote actions to overcome these obstacles. Similarly, if a person experiences a loss, the feeling of sadness can promote comfort seeking and closeness to other people (Cole et al., 1994). Thus, emotions are subjective experiences that can facilitate how individuals act (Gross & Thompson, 2007). Additionally, each emotion serves specific functions and promotes different actions and needs (Cole et al., 1994). To illustrate, anger can promote actions to stand up for oneself, whereas happiness motivates the individual to seek more of what they need.

While emotions on one side are adaptive, organizing and essential for human behaviors, goals and social interaction, they can also be disorganizing and engender negative social, cognitive and psychological outcomes (Thompson, 1990). It is suggested that ER is essential in this regard, and can contribute to enhancement and disruption, promotion and interference, and strengthening and weakening of functioning in social, cognitive and psychological domains (Cole et al., 2004).

Conceptually, it is somewhat difficult to separate ER from emotion. While emotions are the initial activated state or reaction, ER encompasses several complex regulatory processes that in some way change or impact the features of the initial emotional state (Cole et al., 2004). These changes can target the qualities of the emotion, such as intensity, duration and latency (Gross, 1998; Thompson, 1994), as well as changes in other psychological processes such as attention, memory or social interaction (Cole et al., 2004). For ER to take place, it is required that an emotional state has been activated, and that one or several

regulatory processes occur independently of the initial emotion (Cole et al., 2004). A person that expresses or reports intense emotions, does not necessarily display poor ER abilities. It might as well be that this person has a higher degree of emotionality and *feels* the initial emotion stronger (Eisenberg & Sulik, 2012). However, individuals who display stronger emotional arousal and reactivity compared to others, will perhaps need stronger ER abilities to manage the arousal, compared to those who are less emotionally aroused (Denham et al., 2003; Morris et al., 2007). Due to this notion, it has been argued that ER is best understood by attending to what mechanisms and processes are involved in the regulation of emotion, rather than the magnitude of the underlying emotion itself (Eisenberg & Sulik, 2012).

Defining ER

ER has been defined in various ways, and there are some disagreements on what the concept encompasses and how it should be defined (Cole et al., 2004; Eisenberg & Spinrad, 2004). One of the main discussions focuses on whether ER is mainly an intrinsic process, where ER refers to self-regulating processes (Eisenberg & Spinrad, 2004; Gross, 1998), or whether it also includes the regulation, impact and intervention of others (Cole et al., 2004; Thompson, 1994).

One influential definition is offered by Thompson (1994), who states ER to be “the extrinsic and intrinsic processes responsible for monitoring, evaluating, and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals” (pp. 27-28). This definition refers to both extrinsic and intrinsic processes, which indicates that ER encompasses self-regulation of emotions, as well as interventions and actions from others aimed to regulate one's emotions. Indeed, ER often occurs in a social setting, and especially children manage their emotions through the external influence of others (e.g., parents soothing or distracting the child to regulate the child's emotional arousal). Further, this definition includes the term “modifying” which can include both processes of enhancement or inhibition of negative and positive emotions. Taken together, this definition views ER as a variety of internal and external processes that intensify or inhibit both positive and negative emotions (Thompson, 1994).

Cole et al. (2004) take a similar stand on the issue of whether ER should include external influences in addition to internal processes. They argue, similar to Thompson (1994), that ER consists of more than only intrinsic processes, and that changes in activated emotions can be rooted in either the individual's own actions or other people's actions. In addition, they argue that ER involves two types of regulatory phenomenon, namely emotions being *regulated* and emotions as *regulating*. Emotions as regulated refers to changes that occur to

or in an activated emotion and can be rooted in either the individual's own actions (e.g., self-soothing behaviors such as thumb-sucking in young children) or other people's actions (e.g., parents providing support to the child). Emotions as regulating refers to changes that stem from the activated emotion, where for instance a child's emotional expression (e.g., crying) influences the actions of a caregiver (e.g., hugging the child) (Cole et al., 2004). This view expands the concept of ER to not only include the influence of others, but also to include the influence an individual's emotions can have on the social context.

A contrasting view to this is offered by Eisenberg and Spinrad (2004) and Gross (1998). Gross (1998) defines ER as "the process by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (p. 275). According to this point of view, ER refers to intrinsic processes in regulating one's own emotions and does not include regulation by others or the influence emotions can have on others. Eisenberg and Spinrad (2004) offer a similar perspective, where they emphasize that the concepts of self-regulation and other-regulation should be separated. They define emotion-related self-regulation as the following:

The process of initiating, avoiding, inhibiting, maintaining, or modulating the occurrence, form, intensity, or duration of internal feeling states, emotion-related physiological, attentional processes, motivational states and/or the behavioral concomitants of emotion in the service of accomplishing affect-related biological or social adaptation or achieving individual goals. (p. 338)

While recognizing that the support and influence of others is an important part of children's development of ER, they claim that ER is an intentional and goal-oriented process from and within the person themselves (Eisenberg & Spinrad, 2004).

To summarize, there are disagreements concerning how to define ER and which processes (i.e., internal or external) should be captured by the concept. Despite the ongoing debate regarding whether ER as a concept should include the regulation by others, it is acknowledged by different theorists that the regulation of others is especially important in the development of ER through childhood and adolescence (Eisenberg & Spinrad, 2004; Thompson, 1994). There is also a broader agreement regarding other aspects of ER. For example, the competing definitions seem to agree on the notion that ER does not only involve regulation of negative emotions, but also of positive emotions. Furthermore, ER does not only refer to reducing, inhibiting or minimalizing emotions, but also to the enhancement, strengthening and maintaining of emotions. Overall, positive and negative emotions can both be enhanced or inhibited. Despite the disagreement about the influence of others in

Thompson (1994) and Eisenberg and Spinrad (2004) point of view, these two definitions are similar in their view on ER as a goal-orientated construct, meaning that it is functional and related to a goal in a specific situation.

Although ER is acknowledged to be essential in adaptive functioning, as well as achieving one's goal or having one's needs met, several theorists agree on the notion that ER also can be maladaptive and dysregulated (Cole et al., 1994; Thompson, 1994). In the discussion of ER, it is often divided into adaptive ER and maladaptive ER, to capture when ER serves its regulatory purpose and when it can be disruptive, unhelpful or destructive (Aldao et al., 2010; Bridges et al., 2004). Adaptive ER generally refers to individuals' ability to adaptively express and regulate their emotions in a situationally appropriate manner, which in turn promotes achieving goals and having needs met. ER can on the other hand also be maladaptive when regulatory processes are inflexible or the individual is not able to sufficiently and adaptively respond to changes in the environment (Bridges et al., 2004). According to Bridges et al. (2004), ER and different ER strategies are not inherently adaptive or maladaptive, as it depends on the individual's needs and goals, in addition to the social context and the demands from the environment.

Mechanisms, Strategies and Processes of ER

A further question regarding the concept of ER is what mechanisms, strategies and processes are involved in the regulation of emotions. Theorists agree on the notion that ER includes both enhancing and reducing emotions (Cole et al., 2004; Eisenberg & Spinrad, 2004; Gross, 1998; Thompson, 1994), but what exact strategies do individuals employ in order to do this? ER strategies are multiple and highly variable, including biting one's lips, looking away, crying in a pillow, aiming to understand the situation from a different perspective, avoiding a person, eating one's favorite food, taking a nap, calling a friend, or choosing to display or hide different emotions (Gross, 2015). In an attempt to organize the large number of strategies people use to regulate their emotions, a process model of ER has been suggested by Gross (1998). According to the process model of ER, emotions can be regulated at five different points of time through different processes and actions, namely 1) situation selection, 2) situation modification, 3) attentional deployment, 4) cognitive change, and 5) response modulation. First, situation selection refers to individual's ability to regulate their emotions through selecting which situations, people, places, objects, thoughts or memories they approach or avoid. Situation selection can regulate whether or not an emotion is activated in the first place, and the strategies can be both external (e.g., approach or avoid certain places or people) and internal (e.g., deliberately think about or suppress certain

thoughts). Second, situation modification refers to how individuals proactively can modify the situation and thereby alter the emotional impact a situation may have on them. For instance, a child stepping back if someone is starting a fight in the school yard, instead of joining in. Third, attentional deployment refers to how emotions can be regulated by directing one's attention and focus on or ignore some aspects of a situation, for instance to focus on a friendly face when holding a presentation. Attentional deployment can also refer to self-distraction, for instance to think about a pleasant memory when feeling sad. Fourth, cognitive change refers to how individuals can change the emotional impact a situation may have on them by altering their evaluation and interpretation of a situation. A person can for example reevaluate the importance of an undesired situation (e.g., "I did not get the job, but it was not really that important to me") or change how they interpret social situations ("He might be quiet because he has a lot to think about, that does not necessarily mean he does not like me"). These strategies of cognitive change are often referred to as reappraisal. Fifth and finally, when an emotional state has been activated, emotions can be regulated through response modulation, referring to how people can engage in a behavior to influence and modify emotional responses and expressions. Examples include taking a deep breath to calm oneself, comforting oneself with food, or to overtly display and express emotions in front of another person. Response modulation has most commonly been studied in the context of the suppression of emotional expressions and behaviors, for instance by holding back emotional expressions or inhibiting emotionally driven behaviors. ER strategies are numerous and highly variable, but can, according to Gross (1998), all be organized within this framework.

The Impact of ER

The ability to regulate emotional expressions and experiences is important for individuals' functioning across numerous domains (Gross & Thompson, 2007), which underscores the importance of identifying modifiable factors influencing the development of ER. ER is believed to be crucial in children's development, and is related to psychological (Keenan, 2000), social (Eisenberg et al., 1995) and cognitive (Gross, 2002) outcomes. The strategies people use to regulate their emotions change throughout the lifespan (Kopp, 1989; Zimmermann & Iwanski, 2014). In addition to differences in strategies throughout a person's lifespan, there are also individual differences in what strategies individuals mainly employ. Which ER strategies individuals apply has been found to generate different outcomes in several domains, such as social functioning, cognition and psychological and physical health (Aldao et al., 2010; Gross, 2015). For instance, suppression of emotional responses has been

associated with interference with memory, whereas reappraisal has no such negative effect on memory (Gross, 2002; Richards & Gross, 2000).

In addition to different outcomes based on choice of strategies, individual differences in general abilities to regulate emotions has been found to impact several developmental domains and aspects of functioning. For instance, children's emotional disposition, including ER abilities, has been linked to school performances, where stronger ER abilities relates to greater academic achievements and performances (Gumora & Arsenio, 2002). Individual differences in ER are also associated with individual differences in social competence, where greater ability to regulate emotions relates to higher social function (Eisenberg et al., 2000). Emotional competence, which includes ER, is related to both concurrent and later social competence among young children (Denham et al., 2003). The ability to regulate emotional experiences, emotion-evoking situations and emotionally driven behaviors, has been found to be associated with children's sociable behavior, such as display of socially appropriately behavior, prosocial behavior, popularity among peers and low social insecurity (Eisenberg et al., 1995). ER skills have been found to be related to later friendship quality. Children with higher score on ER at age 7, are more likely to experience positive friendship quality at age 10, and experience fewer negative interactions in friendship, than children with poorer ER skills (Blair et al., 2015). Children who are both poorly regulated and high in negative emotional intensity may be particularly prone to social problems, which suggests that ER is more important for more negatively emotional children to avoid negative social outcomes (Denham et al., 2003; Eisenberg et al., 1995). However, although children's ER is likely to have an impact on social competence, it can also be plausible that the relation is bidirectional, and that social competence simultaneously may impact the development of ER. For instance, children who have high social competence, may spend more time with peers and receive more opportunities to practice and develop ER skills in interaction with others.

The ability to regulate one's emotion does also have implication for mental health and psychopathology. Regulation of emotions, or more specifically, emotional dysregulation, is widely thought to be the core aspect of many psychological disorders (Cole & Deater-Deckard, 2009; Gross & Jazaieri, 2014; Keenan, 2000), and is also targeted in many therapies and treatments (Cole et al., 1994). Individual differences in ER are apparent from childhood, and children who have greater difficulties with regulating emotional activation are also more at risk for developing later psychopathology, including both internalizing and externalizing difficulties (Keenan, 2000). For instance, Suveg and Zeman (2004) found that emotional lability and adaptive ER were related to anxiety disorder in childhood. More specifically,

emotional lability and negativity was positively related to anxiety disorder, whereas adaptive ER was negatively related to anxiety disorder. Findings from a meta-study by Aldao et al. (2010) indicates that ER is a transdiagnostic factor in psychopathology, where maladaptive ER positively relates to several psychological disorders, and adaptive ER is negatively related to the same disorders (Aldao et al., 2010).

Psychopathology often involves several different emotion-related difficulties associated with emotional intensity, duration, frequency and type. For instance, depression is characterized by the absence of positive emotions, as well as problematic intensity and duration of negative emotions. Problematic emotional patterns may be partially influenced by emotion dysregulation, where the individual has difficulties with using ER strategies in situations where it would be helpful, or rather, by using a type of ER that is not well suited in the situation (Gross & Jazaieri, 2014). For instance, a person with social anxiety may frequently use the regulation strategy of avoidance in social situations, when it instead would be more helpful to use other regulation strategies to manage the anxiety. Some ER strategies are positively associated with psychopathology (e.g., suppression and avoidance), whereas other strategies are negatively associated with psychopathology (e.g., problem solving) (Aldao et al., 2010). This indicates that individual differences in ER abilities and choice of regulatory strategies are linked to the development of psychopathology. Although there is a relation between ER and psychopathology, the direction of causality is not fully known. Maladaptive ER may impact the development of psychopathology, and simultaneously, maladaptive ER may be a consequence of, or an overlapping phenomenon with psychological disorders. Further, the possibility of other unmeasured confounders, for instance genes' impact on both ER and psychopathology, cannot be excluded.

Development of ER

ER capabilities develop throughout life, with the most significant changes occurring from infancy to adolescence (Eisenberg & Sulik, 2012). Although infants need a high level of external support in order to regulate emotions, several early indicators of self-regulation and effortful control are already present in infancy (Eisenberg & Sulik, 2012). According to Kopp (1989), for instance, humans have innate biological mechanisms or action systems, such as vocalization, self-distraction and retreating, which contribute to changing or reducing heightened arousal levels when facing stress.

In infancy, caregivers respond to the infants' expressed emotions and offer support to regulate their emotional arousal. These efforts provide information and learning experiences for the children, who later can use the same strategies and actions they have learnt from the

caregiver to regulate their own emotions. Consequentially, children gradually expand their repertoire of ER techniques (Kopp, 1989). Throughout childhood, children become increasingly able to regulate their own emotions. This development is not only fostered through learnt behaviors, facilitated by the social context, but also by the development of more advanced executive functioning and effortful control (Eisenberg & Sulik, 2012) and of better social, cognitive and motoric functioning (Kopp, 1989). Overall, the development of ER throughout childhood can be seen as a pathway from more biological, automatic and preprogrammed responses, with a strong dependence on others to regulate emotions, to later include more socially learned and advanced cognitive processes, being more able to engage in self-regulation (Kopp, 1989). Although infants and young children are especially dependent on their caregivers to achieve regulation, Cole (2014) argues that the contribution of others continues to play a significant role in ER beyond infancy and early childhood. Despite ER becoming more self-regulating with age, it is still affected by the social context later in childhood, as well as in adolescence and into adulthood.

The development of ER is influenced by a variety of factors, including both individual characteristics and the social context that surrounds the child (Eisenberg & Sulik, 2012; Kopp, 1989; Morris et al., 2007). The social context and individual characteristics interact in a bidirectional process, and mutually influences each other throughout development (Morris et al., 2007). Individual characteristics that can influence individuals' development of ER include, among other factors, individuals' neurophysiology, genetics, temperament and emotional reactivity (Goldsmith & Davidson, 2004; Rothbart & Sheese, 2007). For instance, some infants are more likely to react physically to frustration and show less capacity to regulate their own physiological reactivity, suggesting that individual differences in the ability to regulate their own physiological and emotional state is apparent already in infancy (Calkins et al., 2002). Taken together, the development of ER is affected by a variety of internal and external influences and can be seen as the result of an interaction between the child's neurophysiology, temperament, and personality, as well as the social environment they grow up in, particularly the familial climate and the characteristics and behaviors of their caregivers, as detailed below.

Parental Influence on Children's ER

Acknowledging that there are individual differences in ER, and that these differences have implications for several developmental outcomes, an imperative question is how these differences emerge. As previously stated, ER develops throughout childhood and adolescence, and infants and young children are especially dependent on external regulation

from their caregivers (Kopp, 1989). The social context is thus essential to children's development of ER, and the role of parents has been widely acknowledged to be critical (Denham et al., 1997; Eisenberg et al., 1998; Morris et al., 2007).

Morris et al. (2007) argue that three main processes capture how the family context impacts the development of ER, namely through: 1) observation/modeling, 2) specific parenting practices and behaviors related to the socialization of emotion, and 3) the overall emotional climate in the family. Regarding the first process, *observing and modeling*, children will learn about emotions by observing parents' emotional expressions, observing which situations elicit certain emotions, and how the parents respond to these emotions. The parents serve as models for their children, giving them information about emotions and how to respond to emotion-provoking situations, thus teaching children about emotional expression and ways to respond to emotional situations that can be more or less effective (Denham et al., 1997).

The second process, *specific parenting practices and behaviors*, refers to how parents can help their children label and become aware of emotions, how they respond to the children's emotions, and to which degree they teach children about ER strategies (Morris et al., 2007). Parents' punitive or negative responses to children's emotional display have been associated with poorer emotional competence in children. In contrast, supportive and accepting attitudes toward children's emotions are associated with a greater ability to express emotions in an appropriate way, and are linked to more positive emotional outcomes for the child (Eisenberg et al., 1998).

The third process is the *emotional climate of the family*, referring to the quality of relationships within the family (such as attachment relationship between parents and children, marital relationship and parenting style) and positive and negative emotional expressiveness within the family (Morris et al., 2007). The overall affective environment has been related to children's emotionality, suggesting that emotions are "contagious". For instance, parents' negative emotional expressions have been linked to children's negative emotion, and similarly, their positive emotional expressions have been linked to children's positive emotions. Thus, the emotions parents have and express affect the emotions of their children (Denham et al., 1997). Attachment quality in the parent-child-relationship has also been found to have implications for ER in childhood. For instance, children with an ambivalent/insecure attachment to their caregivers tend to mask their emotional expressions, despite being emotionally activated (e.g., being upset, angry or scared). This masking even takes place in situations where it would be more adaptive to express emotions in order to

obtain care, closeness and support to regulate these emotions. In contrast, secure infants are more likely to display negative emotions such as anger, fear and frustration, as well as expressing positive emotions compared to insecurely attached infants (Cassidy, 1994). This may indicate that a positive, secure relationship between parents and the child helps the child to develop adaptive emotional expression and ER, whereas less secure attachment may hinder such adaptive regulation. In addition to the parent-child-relationship, the quality of relationships between other people within the family affects the child as well (Morris et al., 2007). The quality of adult relationships in the family, such as the parental relationship, contributes to the emotional climate that the child grows up in, and conflict in these relationships has been linked to dysregulation in children, and heightened risk for developing internalizing and externalizing difficulties (Cummings & Davies, 2002).

To summarize, parents are essential in children's development of ER. However, it is not only the familial influence that affects the children's development of ER. The influence is thought to be bidirectional, where the child's ER and other characteristics interacts with familial influence (Morris et al., 2007). For instance, parental support, comfort and sensitivity toward the children's emotions are likely to promote adaptive ER, but children's ER (or dysregulation) may elicit certain reactions, behaviors or attitudes from the parents as well (Eisenberg et al., 1998). This is in accordance with the transactional model (Sameroff, 2009), which suggests that children's development takes place in a continuous and reciprocal process, where the child is influenced by their environment, simultaneously to the child mutually affecting their environment. This reciprocal interaction may lead to a reinforcing cycle between children's ER and parental characteristics, which may fuel each other over time. Similarly, in accordance with developmental cascade models (Masten & Cicchetti, 2010; Patterson, 2016; Patterson et al., 1992), changes in one domain may cause a cascade of influence, affecting functioning in the same domain over time or other developmental outcomes. For instance, children's difficulties with ER may negatively affect the parent-child-interaction, which again may reinforce the child's difficulties with ER, and simultaneously cause a cascade of influence on other domains within the child and their surroundings. Developmental cascade models and the transactional model exemplify how functioning and change in certain domains may be reinforcing and affect several other aspects of functioning through continuous and complex transactions between several developmental domains (Masten & Cicchetti, 2010; Patterson et al., 1992; Sameroff, 2009). Hence, the contribution of the child's own characteristics should not be overlooked when

investigating the development of ER and the relation between children's ER and their social environment.

Parenting Stress and Children's ER

The experience of enhanced stress in parenthood is likely to affect parents' behaviors towards their child, possibly leading to less positive child-parent-interaction, and is therefore important for the quality of this relationship (Deater-Deckard, 1998). Parenting stress is suggested to be caused by a mismatch between perceived demands of parenting and the ability and resources the parents have available to meet these demands (Abidin, 1995), and is viewed as an important concept in the study of parent-child-interaction, parental behaviors and child outcomes, including children's ER. The concept refers to stress that is specifically related to the demands of parenthood, and therefore distinct from other general stressful life-events and circumstances (Deater-Deckard, 1998). Parenting stress, dysfunctional parenting and child outcomes are intertwined domains, and changes in one domain are likely to cause changes in the other domains. The parent-child system takes place in a complex interaction between variables related to the parent, the child and the situation (Abidin, 1990). For instance, higher levels of externalizing behavior problems and emotion dysregulation in children, as well as parental psychopathology and single parenthood, have been found to relate to higher parenting stress, indicating that parenting stress is influenced by both child and parental characteristics (Williford et al., 2007).

One model by Abidin (1992), suggests that parenting stress, parental behaviors and child adjustment are influenced by a large number of different sociological, environmental, behavioral and developmental variables. The model suggests that variables related to the parent (e.g., characteristics and personality), variables in the surroundings (e.g., work, life events, marital relationship, everyday hassles) and variables within the child (e.g., temperament and personality) all serve as potential stressors for the parent. Characteristics within the child, the parent and the situation, all serve as potential stressors in the child-parent-dyad and can be associated with experienced parenting stress and dysfunctional parenting (Abidin, 1997). However, whether these factors lead to increased parenting stress or not, is moderated by the parents' set of beliefs, motivation and cognition, that in turn determines whether or not these factors are perceived as irrelevant or as a threat for their self-view as parents. Further, there is not a simple linear relationship between stress level and dysfunctional parenting behaviors. To what extent increased parenting stress causes dysfunctional parenting may be moderated by other factors that serve as resources, such as

social support, parenting skills, material resources and cognitive coping strategies (Abidin, 1992).

Previous research has demonstrated that parenting stress is related to ER. One study found that children's emotional dysregulation, anger proneness and externalizing behaviors at age 2 related to heightened parenting stress when the child was 4 and 5 years old (Williford et al., 2007). Another study examined the relation between parenting stress and the ER of children in prekindergarten, using a cross-sectional design. The findings indicated that children of parents who experienced distress and high levels of stress in their role as parents, displayed more difficulties with ER, suggesting that parenting stress and ER in early childhood are associated (Mathis & Bierman, 2015). A longitudinal study on infant ER, infant's cognitive development and the impact of parenting, found a negative relation between infancy ER (measured when newborn) and parenting stress (measured when newborn, 3, 6 and 12 months old), suggesting that infants' ER is related to later parenting stress (Feldman et al., 2004). Examining ER in children between the age of 2 to 14 during the Covid-19 lockdown using a cross-sectional design, Spinelli et al. (2021) demonstrated that high levels of parenting stress were negatively associated with adaptive ER and positively associated with maladaptive ER, and further, that these relations were mediated by parent involvement.

Overall, these studies exemplify how ER and parenting stress are two related concepts which can impact each other, in addition to interact with and impact other domains related to children's and parents' outcomes. Although the studies suggest that there is indeed an existing relation between parenting stress and ER, the studies employing a cross-sectional design (Mathis & Bierman, 2015; Spinelli et al., 2021) are not able to detangle the direction of the relation. Therefore, it is unknown whether parenting stress leads to a reduction in ER, if children's difficulties with ER increase parenting stress, or if the relation is bidirectional. Further, the studies applying longitudinal designs (Feldman et al., 2004; Williford et al., 2007), only measure ER at the first assessment. The findings suggest that ER in infancy and toddlerhood is related to subsequent parenting stress, but it is not known whether parenting stress impacts subsequent ER, as ER is not further measured. In addition, the possibility that predominant parenting stress have had an impact on ER when it was first assessed, cannot be excluded.

Summary and Aim of the Present Study

As detailed above, a few studies investigate the relation between parenting stress and ER. There is, however, a scarcity of longitudinal studies examining the assumed reciprocal

relation between parenting stress and children's ER in middle childhood. To the best of our knowledge, only a handful of studies directly examine the relation between parenting stress and ER exists, and none of these investigates the bidirectional relation between the constructs over a longer developmental period (Feldman et al., 2004; Mathis & Bierman, 2015; Spinelli et al., 2021; Williford et al., 2007). Additionally, only one study (Spinelli et al., 2021) examines the relation between ER and parenting stress beyond infancy and early childhood. The present inquiry is, to my knowledge, the first study to investigate the possible reciprocity between parenting stress and ER over a longer developmental period, and beyond early childhood. In addition, this inquiry will contribute to the existing knowledge on the topic by accounting for time-invariant unmeasured confounders. Possible confounders (e.g., common genes, parent's ER or common personality traits) may impact both children's ER and parenting stress, and to my knowledge, this study will be the first to investigate the bidirectional relation between parenting stress and ER using a statistical analysis method which accounts for such stable time-invariant factors.

Hence, this study aims to investigate the bidirectional relation between parenting stress and children's adaptive ER from the age of 6 to 12 years. Based on previous research, it is hypothesized that a higher level of parenting stress would negatively relate to children's ability to adaptively regulate their emotions. Similarly, as children with less adaptive ER skills may require more resources and support from their parents, it is expected that this can increase parents' experienced level of stress when raising their child.

As parenting stress is related to both parental and child characteristics (Abidin, 1990), this study will also examine whether both parenting stress in the parent-domain (e.g., low sense of competence in the role as parent or having health issues affecting the parenting role) and in the child-domain (e.g., the child being perceived as demanding or not as hoped for) relate to ER. As children's ER is affected by the child-parent-interaction, including both parental and child characteristics (Morris et al., 2007), it is hypothesized that both parent-related and child-related parenting stress will bidirectionally relate to children's ER.

Method

Sample and Procedure

The Trondheim Early Secure Study (TESS) is a community study using a broad variety of methods to gather data on children and youth's mental health and psychosocial development (Steinsbekk & Wichstrøm, 2018). Data is gathered through interviews, tests, questionnaires, objective measurements and observations. The aim of TESS is to identify

factors that may affect children's psychological and social development, and to identify risk and protective factors for mental health and developmental outcomes. All children born in the 2003 and 2004 birth cohorts ($N = 3456$) living in Trondheim, Norway, were invited with their parents to participate in the study. An invitation letter was sent to the parents prior to a routine health check for children at age 4. Along with the invitation letter, they also received the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), a screening assessment for emotional and behavioral problems. The SDQ was filled out by the parents and brought to the health check. Parents were informed about the study by the health nurse, who also obtained a written participant consent. Almost all children attended the health check (97.2%). Parents lacking proficiency in Norwegian (therefore not being able to fill out the SDQ) ($n = 176$) were excluded. The health nurse missed asking 166 of the parents to participate. Of the parents asked to participate ($n = 3016$), 82.2% gave consent ($n = 2477$). To increase statistical power, children with emotional and behavioral problems, as assessed by the SDQ, were oversampled (i.e., capturing mental health as one of the main aims of TESS). The children were divided into four strata according to their SDQ-score (cut-offs 0-4, 5-8, 9-11 and 12-40). A subsample was drawn to participate ($n = 1250$), where higher scores on the subscale of total-difficulties of the SDQ increased drawing probability (.37, .48, .70 and .89, respectively) (Steinsbekk & Wichstrøm, 2018). Characteristics of the overall TESS sample are depicted in Table 1.

The sample is comparable to the Norwegian population in terms of parents' level of education, parents' occupational status and family situation. Drop-out did not differ across SDQ-score or gender (Steinsbekk & Wichstrøm, 2018). Attrition rates are low and could not be explained by factors such as behavioral functioning, social competence, attachment, ER, parental mental health or socioeconomic status (Skalicka et al., 2015; Viddal et al., 2017; Viddal et al., 2015; Wichstrøm et al., 2013). The TESS is currently ongoing, and data have been gathered biennially since the children were 4 years old (Steinsbekk & Wichstrøm, 2018). This present study uses data from the second to fifth wave, when the children were 6, 8, 10 and 12 years old, respectively.

Measures

Emotion Regulation Checklist (ERC). The Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997) was used to assess children's emotion regulation when they were 6, 8, 10 and 12 years old. The ERC is a 24-item questionnaire completed by an adult who knows the child well. In the present study, both parent- and teacher report was used. The ERC consists of two subdimensions, namely adaptive emotion regulation (adaptive ER; 8

items; e.g., “Is a cheerful child” and “Can say when he/she is feeling sad, angry, mad, fearful or afraid”) and lability and negativity (L/N; 15 items; e.g., “Exhibits wide mood swings” and “Is easily frustrated”). One item is excluded from both subdimensions, as it did not load on either adaptive ER or L/N (Kim-Spoon et al., 2013; Shields & Cicchetti, 1998). The dimension of adaptive ER refers to adaptive regulative processes, such as constructive and appropriate emotional expressiveness, emotional self-awareness and empathy. Children scoring high on this dimension, have a greater ability to regulate and express their emotional arousal in an adaptive and situationally appropriate matter. The L/N dimension involves aspects such as emotional reactivity, sudden mood swings and a lack of flexibility. Children exhibiting an increased L/N, experience more dysregulated negative affect and display more frequently situationally inappropriate emotional expressiveness (e.g., being prone to angry outburst) Only the adaptive ER subscale was included here given the focus of inquiry, which sharpens the focus on regulatory processes of ER. The ER subscale of the ERC has in the original study been found to have internal consistency ($\alpha = .83$; Shields & Cicchetti, 1997).

Parents and teachers considered to what degree the different statements are characteristic for the particular child by rating the statements on a Likert-scale ranging from 1 (never) to 4 (almost always). In this study, the parent-reported ER was found to have moderately to high reliability (Age 6: $\alpha = .85$, age 8: $\alpha = .65$, age 10: $\alpha = .70$, age 12: $\alpha = .70$). Teacher-reported ER was also found to be reliable (Age 6: $\alpha = .78$, age 8: $\alpha = .78$, age 10: $\alpha = .79$, age 12: $\alpha = .80$).

Parenting Stress Index (PSI). Parenting stress was assessed by the Parenting Stress Index (PSI; Abidin, 1995), reported by the parents when participants were 6, 8, 10 and 12 years old. The PSI measures parenting stress in the child-parent-dyad stemming from characteristics of the child, the parent and the situation, and consists of seven parent characteristics scales, six child characteristics scales and one life stress scale (Abidin, 1997). Due to the multiple questionnaires, instruments and tests employed on the participants of the TESS, only six of the parent-domain scales and three of the child-domain scales were included in TESS and thus are applied here. Among the seven parent-domain subscales, the six subscales used in the present inquiry were: Competence (13 items; e.g., “Being a parent is harder than I expected”), Social Isolation (6 items; e.g., “I feel lonely and without friends”), Attachment (7 items; e.g., “I had expected to have warmer and stronger feelings for my child than I have, and this worries me”), Health (5 items; e.g., “Having children has changed my sleeping habits”), Role Restriction (7 items; e.g., “I feel trapped by my responsibility as a parent”) and Parenting Partner Relationship (7 items; e.g., “Having children has led to more

problems with my partner than I had expected”). These subscales relate to the stress stemming from parental characteristics, their role as parents or other aspects of their lives which affect their parenting. Among the six child-domain subscales, we included the three following: Child Demandingness (9 items; e.g., “My child demands more of me than most children”), Child Reinforcing Parent (6 items; e.g., “From time to time, I feel as if my child does not like me and do not want to be near me”), and Child Acceptability (7 items; e.g., “My child does not seem to learn as fast as most children”). These subscales refer to characteristics of the particular child. Items are rated on a Likert-scale ranging from 1 (strongly agree) to 5 (strongly disagree). In the analyses I used the scales Total parent stress (consisting of all parent-related stress scales) and Total child stress (consisting of all child-related stress scales). In the original instrument, both Total parent stress and Total child stress was found to be reliable (Total parent stress: $\alpha = .93$, Total child stress: $\alpha = .90$) (Abidin, 1995). In this study, Total parent stress (Age 6: $\alpha = .90$, age 8: $\alpha = .89$, age 10: $\alpha = .90$, age 12: $\alpha = .90$) and Total child stress was found to be reliable (Age 6: $\alpha = .84$, age 8: $\alpha = .86$, age 10: $\alpha = .86$, age 12: $\alpha = .87$).

Statistical Analysis

The relation between parenting stress and children’s adaptive ER was examined employing the Random Intercept Cross-Lagged Panel Model (RI-CLPM; Hamaker et al., 2015). Compared to the standard Cross-Lagged Panel Model (CLPM), the RI-CLPM enables researchers to investigate relations between constructs in longitudinal data, while distinguishing between within-person effects and between-person effects (Hamaker et al., 2015). Within-person effects refer to fluctuations within the same person over time (e.g., changes in experienced stress at different timepoints within the same individual), whereas between-person effects refer to relatively stable and time-invariant differences between people (e.g., stable differences in parenting stress). Hamaker et al. (2015) argue that the standard CLPM fails to account for this stable between-person variance and may therefore lead to inaccurate conclusions about causality. If the between-person variance is not accounted for, it can incorrectly be interpreted as a change over time. For instance, a parent may experience overall high levels of stress (i.e., between-person effects), for a variety of reasons (e.g., personality traits, cognitive style, genes etc.), regardless of changes in their child’s ER. Therefore, to be able to examine change in ER and parenting stress, and how these constructs interact over time, the within-person effects are separated from time-invariant between-person effects (i.e., stable individual differences), including all unmeasured confounders (e.g., genes and personality traits). By accounting for the between-

person variance, these stable, predominant individual differences are less likely to incorrectly be interpreted as causality and effects due to change in other variables.

The RI-CLPM splits variance into a stable between-person component (latent random intercept loading on parenting stress and ER, across all time-points) and a within-person component (latent factor at each wave). The within-person component captures changes in one's own mean level (e.g., parenting stress) during the whole assessment period as a function of change in one's own level of the other variable (e.g., child's ER) and the autoregressive effect (e.g., parenting stress) from earlier points of measurement.

In this study, a total of 4 models were analyzed. Half of the models represented parent-reported ER, and the other half represented teacher-reported ER. A total of 2 PSI scales were analyzed, referring to Total parent stress and Total child stress. By employing the RI-CLPM, it was possible to identify both within-time correlations (e.g., relation between ER and parenting stress at age 6) and cross-lagged paths (e.g., relation from ER at age 6 to Total Parent Stress at age 8, and from Total Parent Stress at age 6 to ER at age 8). Thus, the model identifies stability and change in the same construct over time, as well as the reciprocal effect of one variable to another across time.

Results

Preliminary Analyses

Table 2 displays the descriptives of and the correlations between parent-reported ER and the two general scales of parenting stress, namely Total parent stress and Total child stress. As can be seen, both total parent stress (range: [-.22] – [-.43]) and Total child stress (range: [-.28] – [-.56]) showed moderately strong correlations with ER.

Table 3 displays the descriptives of and correlations between teacher-reported ER and parenting stress. Similarly, as with parent-reported ER, the associations between parenting stress and teacher-reported ER were negative, but the correlations were weaker and several of the correlations were found to be non-significant. Total parent stress had weak negative correlations to ER, and some correlations were non-significant (range: [-.04 ns] – [-.26]). Total child stress was negatively correlated with ER, and all correlations were found to be significant but small (range: [-.09] – [-.25]).

Means are displayed in both Table 2 and Table 3. Adaptive ER was found to be overall moderately high, both when it was reported by parents (range: [3.42] – [3.48]) and by teachers (range: [3.26] – [3.40]), as the measure ranges from 1 (minimum ER) to 4 (maximal ER).

Primary Analyses

To test whether the association between parenting stress and ER was driven by developmental within-person processes or stable between-person differences, the RI-CLPM was employed. Figure 1 displays the within-person effects between parent-reported ER and parenting stress from timepoint 2 to 5 (child age: 6 to 12), including across and within-time correlations, as well as stability paths for each of the constructs. Figure 2 displays the within-person effects between teacher-reported ER and parenting stress. Both figures display and distinguish between the two general stress scales (Total parent stress and Total child stress).

Bidirectional Relations Between Parenting Stress and Parent-Reported ER.

Across Time Correlations. Parenting stress at age 10 was negatively related to parent-reported ER at age 12. Similarly, parent-reported ER at age 10 was negatively related to parenting stress at age 12, indicating that parenting stress and ER are negatively related in late childhood, and that the relation is bidirectional (see Figure 1). This pattern was evident for both general stress scales (i.e., Total parent stress and Total child stress), which were all bidirectionally related to parent-reported ER measured at age 10 to 12 years old. However, parenting stress and parent-reported ER did not relate to one another across time from age 6 to 8, and 8 to 10, respectively. Thus, the bidirectional relation was first evident in later childhood, and not earlier.

Within-Time Correlations. The within-time correlations showed a negative relation between parenting stress and parent-reported ER at all time points, except time point 3 (child age: 8 years). This was the case for both Total parent stress, and Total child stress.

Stability. Total parent stress at age 6 and 8 did not relate to subsequent Total parent stress at age 8 and 10, respectively, but correlated from age 10 to 12. In contrast, Total child stress related to subsequent Total child stress at all time points, with the relation becoming stronger with increased age. ER at age 6 did not correlate with ER at age 8, but ER at age 8 and 10 correlated with subsequent ER at age 10 and 12, respectively. Thus, both parenting stress and children's ER became somewhat more stable with time.

Relations Between Parenting Stress and Teacher-Reported ER.

Across-Time Correlations. As can be seen in Figure 2, neither Total parent stress nor Total child stress were significantly related to teacher-reported ER across time. Also, teacher-reported ER did not relate to parenting stress across time, suggesting that teacher-reported ER and parenting stress are not bidirectionally related. Overall, compared to parent-reported ER, there were non-significant correlations between parenting stress and teacher-reported ER.

Within-Time Correlations. Within-time correlations showed that parenting stress in the parent-domain (i.e., Total parent stress) was not significantly correlated with ER at any time-points. In contrast, parenting stress in the child-domain (e.g., Total child stress) was negatively related to ER when the children were aged 10 and 12.

Stability. Total parent stress was only significantly related to later Total parent stress from age 10 to 12, and no other timepoints. Total child stress at age 8 and 10 was related to subsequent stress at age 10 and 12, respectively. Further, ER was related to subsequent ER at all timepoints.

Discussion

The present study is the first to investigate the assumed bidirectional relation between parenting stress and ER in middle childhood. Children's ER and parenting stress were assessed biennially from the age of 6 to 12 years old. Furthermore, this study has aimed to disentangle the effects of different types of parenting stress, by separating between parenting stress related to the parent's characteristics and parenting stress related to children's characteristics.

Drawing on the findings of this study, several points of discussion emerge. As expected, parenting stress and children's ER were found to be bidirectionally related, but surprisingly, the relation was mainly evident from age 10 to 12. Further, the findings revealed that parenting stress in the parent-domain (i.e., Total parent stress) and parenting stress in the child-domain (i.e., Total child stress) were both bidirectionally related to children's ER. This suggests that both parent- and child-related stress are relevant for the development of adaptive ER, and, simultaneously, that greater adaptive ER abilities in children are associated with lower parenting stress.

Bidirectional Relation Between Parenting Stress and ER. As expected, and in line with previous studies (Feldman et al., 2004; Mathis & Bierman, 2015; Spinelli et al., 2021; Williford et al., 2007), this study revealed an overall negative association between parenting stress and ER, both within-time and across time. However, previous research mostly employed cross-sectional or short longitudinal designs, thereby providing limited knowledge on the possible reciprocal relations between parenting stress and ER and on how these constructs develop over time. Thus, this study adds to previous research by not only showing that parenting stress and children's ER are negatively related, but also reciprocally influence one another over time. Even further, the findings indicate that parenting stress and ER are not only related in early childhood, as supported by previous studies (Feldman et al., 2004;

Mathis & Bierman, 2015; Williford et al., 2007), but continue to reciprocally relate throughout middle and late childhood, a developmental period which has gained little attention in this domain of research. The role of parents has been well acknowledged for being essential in children's development of ER (Denham et al., 1997; Eisenberg et al., 1998; Morris et al., 2007). However, in accordance with Sameroff's (2009) transactional model, children's development is not only a result of their social environment or caretakers. Children's developmental outcomes are also influenced by children's own personality, characteristics, and behaviors, that serve as important contributors to the quality of the interaction with their caretakers. Hence, the development of ER takes place in the interaction between children and parents, where both children's and parents' characteristics mutually influence each other over the course of childhood (Morris et al., 2007). Children are reliant on external support to regulate their emotions throughout childhood (Eisenberg & Spinrad, 2004; Kopp, 1989; Thompson, 1990), and parents who experience high levels of stress in their role as parents, may be more inclined to have negative interactions with their children (Deater-Deckard, 1998), which in turn is likely to affect children's developmental outcomes, including ER (Morris et al., 2007). In addition, children with less adaptive ER abilities may require more attention and support, and may elicit certain negative reactions, attitudes and behaviors from their parents (Eisenberg et al., 1998). Subsequently, children's characteristics and behaviors can affect parents' experience of stress in their role as parents (Abidin, 1992). Hence, as expected, the findings of this study support this bidirectional negative relation between children's ER and parenting stress.

The association between parenting stress and ER was mainly evident across time in late childhood. These findings are somewhat surprising, because in early childhood, ER is more other-regulated and children are more dependent on their parents (Thompson, 1994). Thus, one would expect parenting stress to be more influential in early as compared to middle childhood. The lack of significant reciprocal relations between parenting stress and ER in earlier childhood is also surprising, as this association has been supported by previous research (Feldman et al., 2004; Mathis & Bierman, 2015; Williford et al., 2007). There has not been found any immediate explanations for this pattern, but possible hypotheses may include that parenting stress and ER can be more strongly affected by other unmeasured factors in early childhood, that older children's difficulties with ER may be perceived as more stressful to parents, compared with younger children's ER, or that older children may be better at detecting parents' stress in the child-parent-interaction, and therefore be more vulnerable to parenting stress. Also, parenting stress and ER was within-time related when

the child was 6, which may indicate that ER and parenting stress do coincide, but that the constructs do not necessarily affect one another over a longer time interval in younger years. However, this finding needs to be replicated in other studies and examined further before any conclusions can be made.

The findings from this study indicate that parenting stress and children's ER are indeed negatively related. Parent-child-interaction takes place in a complex and bidirectional transaction, where, for instance, an increase in parenting stress may trigger a cascade of negative outcomes in the child such as a decrease in adaptive emotion regulation skills, which in turn affects the parents' stress level. This possible reciprocal and cascading effect between parenting stress and children's emotion regulation is in accordance with developmental theories on how change in one domain may lead to a chain of influence, affecting both development in the same domain as well as other developmental outcomes (Patterson et al., 1992; Sameroff, 2009). However, it is premature to conclude if this transactional and cascading effect is the case for parenting stress and ER, since the reciprocal relation was first evident from age 10 to 12, the two latest timepoints that were measured.

There were overall fewer significant correlations between parenting stress and ER when ER was reported by the teacher compared to when it was reported by the parents. Because children can behave differently in different settings (De Los Reyes et al., 2015), one explanation could be that children employ different ER strategies at home than at school or that different people evaluate the same behaviors or emotional displays differently. Additionally, parents may be better at determining children's ER, because they observe the child in several different situations (e.g., at home, with family, playing with peers or siblings) than teachers do. A possible explanation may also be that parenting stress and parent-reported ER were both reported by the same informant (i.e., the parent), which may have inflated the correlation.

Parent-Related Parenting Stress and ER. Parenting stress in the parent-domain, measured as Total parent stress, was bidirectionally related to ER from age 10 to 12. Parent-related stress refers to characteristics within the parent, such as the parents' perception of themselves as a parent (e.g., competence as a parent) or other factors related to their lives (e.g., partner relationship), which may affect their parenting. These findings may indicate that children's ER both affects and are affected by aspects of parenting stress which is linked to parents' own characteristics. As hypothesized earlier, children with lower scores on adaptive ER may require more attention and support, and may lead to more challenges in the role as parent. Therefore, one possible explanation for the association may be that children with less

adaptive ER can negatively affect the parents' perception of themselves as capable parents. In addition, having children with less adaptive ER abilities may have negative impact for other aspects of the parents' lives which is not directly linked to the child-parent-relationship, such as partner relationship or other social relationships. For instance, parents who have children who require much attention, may have less capacity for other important aspects of their lives, leading to increased stress. Simultaneously, parents who experience high levels of stress, either related to their relationship with their children or other aspects of their lives, may have less capacity to support children's ER, which can negatively affect their development of ER. In addition, parents who experience high levels of stress in their lives, may have a lower threshold for when they perceive their children's emotional and behavioral displays as maladaptive or problematic (Deater-Deckard, 1998), which may strengthen the relation between parent-related parenting stress and ER.

Child-Related Parenting Stress and ER. Parenting stress in the child-domain, measured as Total child stress, was bidirectionally related to ER from age 10 to 12. This suggests that child-related stress is relevant for the development of adaptive ER, and, simultaneously, that greater adaptive ER abilities in children are associated with lower child-related parenting stress. High child-related parenting stress indicates that parents find their child demanding, needy, impatient, that the child does not meet their expectations and that the parent-child interaction is perceived as less positive by the parent (Abidin, 1995). The association between adaptive ER and child-related stress may be, at least partly, caused by resembling or partly overlapping concepts. The child-stress subscales of the PSI, such as Reinforcing the Parent, Child Demandingness and Child Acceptability, might be related to aspects of children's ER abilities. Several of the items of ER in the ERC are referring to adaptive, prosocial and appropriate emotional displays (Shields & Cicchetti, 1997), which may be perceived as more acceptable expressions and behaviors for the parents. Hence, children with high scores on adaptive ER may be easier to accept for parents, the parents may perceive their interaction with the child as more rewarding, and the child may be perceived as less demanding. In addition, children with less adaptive ER abilities may require more support and resources from their parents, also beyond infancy and toddlerhood, which can affect how demanding the parents perceive their child. Moreover, the ERC contains items related to positive or neutral responses to other people's approaches, as well as empathic responses towards others (Shields & Cicchetti, 1997). If children tend to respond in a hostile matter, show a lack of empathy or generally lack adaptive emotion expressions, this can impact the child-parent-interaction, and potentially reduce how positive and reinforcing the

parent perceives the interaction with the child. Simultaneously, parents who experience less child-related parenting stress may have a more positive view of their child, more resources available to support their child's ER and may have a higher threshold for when they perceive their child's behaviors or emotional displays as problematic or maladaptive (Deater-Deckard, 1998). In addition, it has been hypothesized that parents who experience high levels of stress may be more inclined to exhibit reactive, authoritarian, less responsive, and more adult-centered behaviors, in contrast to parents who experience less parenting stress (Deater-Deckard, 1998), which ultimately can affect child-outcomes. Parents who experience high levels of stress may have less available mental resources and coping strategies, and may perceive their child as less acceptable, less reinforcing and more demanding than a parent who experienced less stress would have perceived the same child.

Implications and Further Research

The findings of this study contribute to knowledge on the relation between child-parent-interaction and children's development of ER. For clinical implications, as ER is acknowledged to play a pervasive role in several developmental outcomes (Gross & Thompson, 2007; Thompson, 1990), this study contributes to identify aspects related to parenting stress which may increase the risk for a less optimal adaptive ER development. Simultaneously, the study contributes to identify aspects related to the child which may negatively affect parenting stress, and thus, possibly lead to a negative reinforcing circle in the child-parent-dyad (Abidin, 1992; Patterson et al., 1992; Sameroff, 2009). The results reported suggest that stress related to the child-parent-interaction, the perception of the child or the perception of oneself as a parent, both affects, and are affected by, children's ER. Further, the findings indicate that parents continue to play a key role in children's development, also beyond infancy and early childhood, suggesting that the parent-child-relationship in middle to late childhood should not be overlooked when working with families where stress and/or ER are issues. Reducing parenting stress may have a positive impact on children's ER, although intervention studies will be needed to test these assumptions. Due to the possible cascading effect (Patterson et al., 1992; Sameroff, 2009), both children's ER and parenting stress needs to be addressed and worked on simultaneously, as it indicates that this may contribute to a negative parent-child-interaction which has undesired effects on both the parents' well-being and the children's development. Thus, the results reported here provide knowledge concerning children and families that may be at particular risk for developing negative parent-child-interaction – information valuable to researchers and clinicians working with children and parents.

In addition to clinical implications, the findings suggest several topics for further research. The results indicate that parents play a key role in children's ER especially in late childhood, adding to previous knowledge on the relation in earlier childhood. That is, the results reported herein indicate that the bidirectional relation was first evident from age 10 to 12, the two latest timepoints of measurements in this study. Therefore, further studies on this relation, and how it develops into adolescence, will be needed in order to further examine whether this bidirectional relation leads to a cascading effect which persists into adolescence.

Strengths and Limitations

This study has several important strengths. First, this study employed a large and representative community sample. Moreover, attrition rates could not be explained by factors such as behavioral functioning, social competence, attachment, ER, parental mental health or socioeconomic status (Skalicka et al., 2015; Viddal et al., 2017; Viddal et al., 2015; Wichstrøm et al., 2013), again indicating the representativeness of this sample. Additionally, this study employed a longitudinal design over middle childhood, a developmental period which has gained less attention in the study of ER, compared to earlier childhood (Cole, 2014). With respect to the analyses, the analytic technique accounts for stable between-person effects, which rules out the possibility for predominant individual differences to be incorrectly interpreted as causality and effects (Hamaker et al., 2015). Therefore, this study accounts for possible unmeasured factors, for instance common genes, parents' and children's personality traits, parenting styles and parents' ER, which could have been possible confounders for both ER and parenting stress. Further, children often display different behaviors and mental health concerns across different contexts and arenas (e.g., behave differently at school compared to within the family) (De Los Reyes et al., 2015). Thus, the use of multiple informants (parents and teachers) is an additional strength, as it allows for a broader examination of children's ER in different social settings (Adrian et al., 2011), and in this study, more specifically home and school.

However, this study has several important limitations. The use of the same informant (parent), when examining the relation between parent-reported ER and parenting stress, can have induced some challenges in regard to respondent biases. For instance, aspects related to parental characteristics, such as maternal depression (Fergusson et al., 1993) and parenting stress (Youngstrom et al., 2000), have been linked to negative biases in parents' reports of children's emotional and behavioral problems. High levels of stress may affect parents to perceive their children's emotional expressions and behaviors as more problematic (De Los Reyes & Kazdin, 2005), which subsequently may lead to negative biases when assessing

children's ER. Potentially, the use of the same informant may have increased the risk of respondent bias and inflated the correlation between parent-reported ER and parenting stress.

Moreover, it would have been beneficial to use multiple methods, in addition to multiple informants, to assess ER (Adrian et al., 2011). ER is a complex phenomenon, and there has been no "gold standard" in how to assess it, making it challenging to know if different studies on ER are measuring the same phenomenon (Cole et al., 2004). The ERC, which is applied here, is a quite limited assessment of children's ER, and does not necessary capture the internal and underlying self-regulatory processes that may take place within the individual, as the ERC is an other-rated instrument. Ideally, ER should have been assessed through observations or by children's own self-report, in addition to the ERC completed by parents and teachers (Adrian et al., 2011). This would, however, have been too time- and resource consuming given the sample size and because the TESS already applies a wide range of instruments to measure multiple aspects related to children's development and their social and familial environment.

Further, the Norwegian translation of the ERC has been found to have validity issues and should therefore be used and interpreted with caution (Oseland, 2019). Specifically, the L/N subscale was found to have less optimal psychometric properties, and was therefore excluded from this study, meaning that this study only investigated adaptive ER, as is measured with the ER subscale of the ERC, and not maladaptive ER, as is measured with the L/N subscale. Maladaptive ER was therefore excluded from this study, but it could indeed be relevant in the study of the relation between ER and parenting stress.

ER has been argued to be a life-long developmental process that keeps changing and takes new forms into adolescence and adulthood, while still under the influence of familial and social factors (Cole, 2014). Although this study examines a critical developmental period, it is limited to the examination of parenting stress and ER in middle childhood and thus cannot say how this relation develops further into adolescence. Therefore, further studies on the relation between children's ER and parenting stress beyond childhood would be needed.

Conclusion

This study reveals that children whose parents experienced high levels of parenting stress were more likely to display less adaptive ER over time, even when time-invariant confounders (e.g., common genes) were accounted for. This adds to existing research showing parenting stress to negatively impact adaptive ER beyond the early childhood years and into middle and late childhood. A bidirectional relation was also revealed, indicating that

children's ER is not only affected by, but also affects the level of parenting stress. Children who are perceived to have less adaptive ER abilities are more likely to have parents who experience heightened levels of parenting stress. Notably, this direction of influence was mainly evident from age 10 to 12 years, and not at earlier timepoints. When distinguishing between different sources of stress, this relation was evident for parenting stress stemming from both parental characteristics and child characteristics. Finally, the relation between parenting stress and children's ER was mainly evident when the child's ER was assessed by the parents, and was to a lesser degree the case when ER was assessed by teachers.

Adaptive ER is related to healthy development and functioning in children. The present findings indicate that parents continue to play a crucial role in children's ER development, also beyond early childhood. Further, the findings indicate that reducing parenting stress may positively impact ER, although intervention studies are needed to test such an assumption.

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Table 1*Sample Characteristics (%) of Participants at the Time of Study Enrollment (T1).*

Category	Characteristics	%
Gender of child	Male	49.1
	Female	50.9
Gender of parent informant	Male	15.2
	Female	84.8
Ethnic origin of biological mother	Norwegian	93.0
	Western countries	2.7
	Other countries	4.3
Ethnic origin of biological father	Norwegian	91.0
	Western countries	5.8
	Other countries	3.2
Childcare	Official daycare center	95.0
	Other	5.0
Biological parents' marital status	Married	56.3
	Cohabiting >6 months	32.6
	Separated	1.7
	Divorced	6.8
	Widowed	0.2
	Cohabiting <6 months	1.1
	Never lived together	1.3
Informant parent's socioeconomic status	Leader	5.7
	Professional, higher level	25.7
	Professional, lower level	39.0
	Formally skilled worker	26.0
	Farmer/fisherman	0.5
	Unskilled worker	3.1
Parent's highest completed education	Did not complete junior high school	0
	Junior high school (10th grade)	0.6
	Some education after junior high school	6.1
	Senior high school (13th grade)	17.3
	Some education after senior high school	3.4
	Some college or university education	7.6
	Bachelor's degree	6.2
	College degree (3-4 years of study)	33.6
	Master's degree or similar	20.3
	PhD completed or in progress	4.4
Household gross annual income	0-225' NOK (0-40' USD)	3.3
	225'-525' NOK (40'-94' USD)	18.4
	525'-900' NOK (94'-161' USD)	51.6
	900'+ NOK (161'+ USD)	26.7
At least one parent received treatment for mental health problems	None	73.8
	Outpatient only	16.3
	Hospitalized	10.0
Parents received medical treatment for mental health problems	No	87.4
	Yes	12.6

Table 2*Descriptives of and Correlations between Parenting Stress and Parent-reported ER.*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Total parent stress T2	-	-	-	-	-	-	-	-	-	-	-	-
2. Total child stress T2	.67**	-	-	-	-	-	-	-	-	-	-	-
3. Adaptive ER T2	-.37**	-.43**	-	-	-	-	-	-	-	-	-	-
4. Total parent stress T3	.78**	.54**	-.28**	-	-	-	-	-	-	-	-	-
5. Total child stress T3	.47**	.70**	-.32**	.60**	-	-	-	-	-	-	-	-
6. Adaptive ER T3	-.33**	-.41**	.58**	-.35**	-.41**	-	-	-	-	-	-	-
7. Total parent stress T4	.70**	.51**	-.22**	.78**	.50**	-.32**	-	-	-	-	-	-
8. Total child stress T4	.44**	.64**	-.29**	.50**	.73**	-.38**	.67**	-	-	-	-	-
9. Adaptive ER T4	-.28**	-.35**	.52**	-.30**	-.35**	.65**	-.35**	-.49**	-	-	-	-
10. Total parent stress T5	.68**	.50**	-.23**	.76**	.50**	-.32**	.80**	.57**	-.33**	-	-	-
11. Total child stress T5	.44**	.60**	-.28**	.43**	.64**	-.35**	.52**	.73**	-.43**	.63**	-	-
12. Adaptive ER T5	-.30**	-.35**	.45**	-.28**	-.32**	.51**	-.34**	-.44**	.65**	-.43**	-.56**	-
<i>M</i>	105.24	79.38	3.42	97.78	72.74	3.48	97.43	73.05	3.48	96.57	72.38	3.43
<i>SD</i>	19.62	18.73	0.34	18.93	18.41	0.34	19.81	18.94	0.37	20.42	19.46	0.38

Note. ER = Emotion regulation. * $p < .05$, ** $p < .01$.

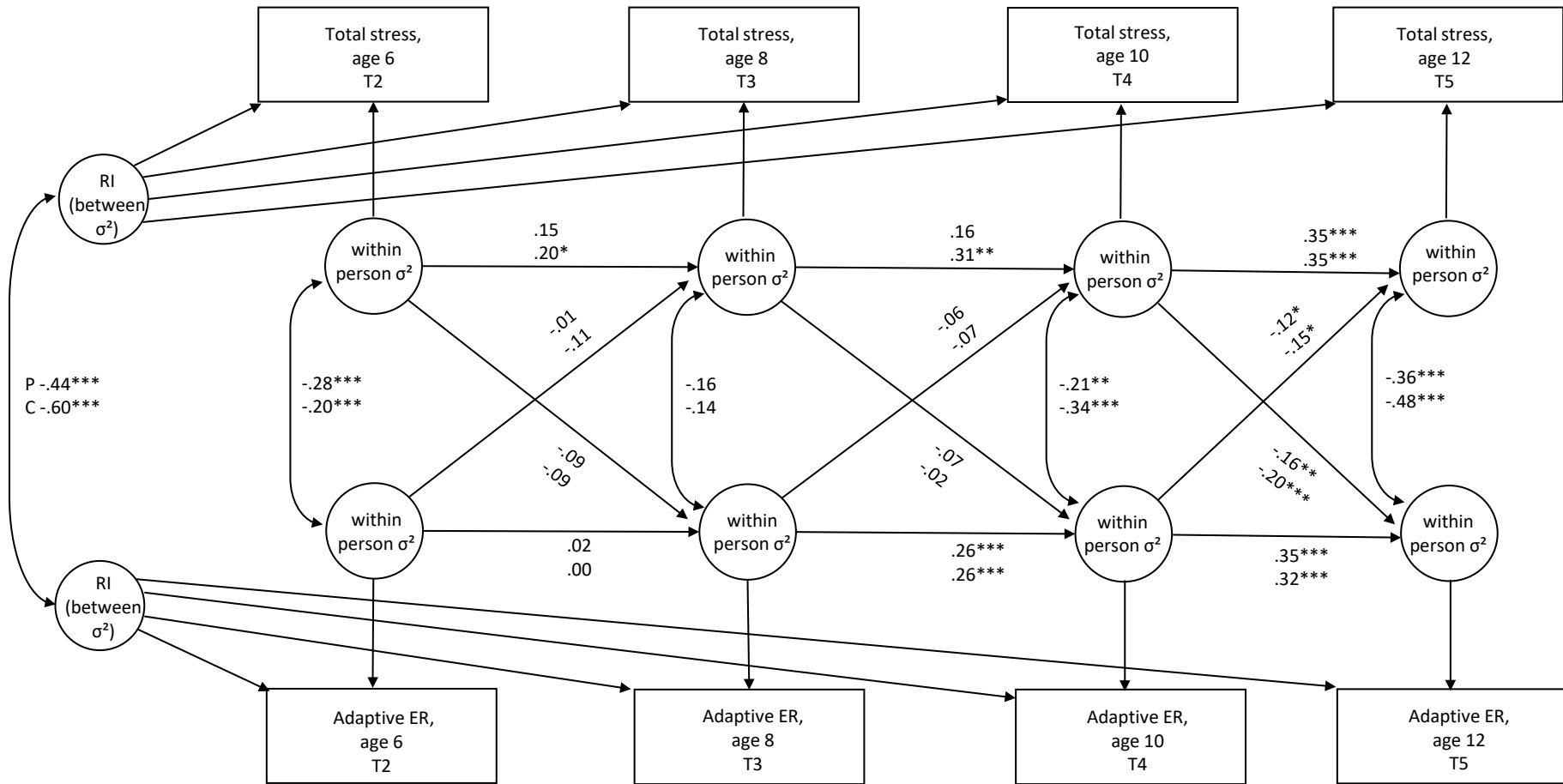
Table 3*Descriptives of and Correlations between Parenting Stress and Teacher-reported ER.*

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Total parent stress T2	-	-	-	-	-	-	-	-	-	-	-	-
2. Total child stress T2	.67**	-	-	-	-	-	-	-	-	-	-	-
3. Adaptive ER T2	-.14**	-.25**	-	-	-	-	-	-	-	-	-	-
4. Total parent stress T3	.78**	.54**	-.11**	-	-	-	-	-	-	-	-	-
5. Total child stress T3	.47**	.70**	-.20**	.60**	-	-	-	-	-	-	-	-
6. Adaptive ER T3	-.10*	-.18**	.45**	-.09*	-.13**	-	-	-	-	-	-	-
7. Total parent stress T4	.70**	.51**	-.07	.78**	.50**	-.10*	-	-	-	-	-	-
8. Total child stress T4	.44**	.64**	-.19**	.50**	.73**	-.17**	.67**	-	-	-	-	-
9. Adaptive ER T4	-.05	-.13**	.24**	-.04	-.09*	.40**	-.12**	-.23**	-	-	-	-
10. Total parent stress T5	.68**	.50**	-.12**	.76**	.50**	-.11*	.80**	.57**	-.08*	-	-	-
11. Total child stress T5	.44**	.60**	-.18**	.43**	.64**	-.16**	.52**	.73**	-.17**	.63**	-	-
12. Adaptive ER T5	-.08	-.13**	.24**	-.08	-.09*	.29**	-.15**	-.21**	.43**	-.26**	-.16**	-
<i>M</i>	105.24	79.38	3.33	97.78	72.74	3.40	97.43	73.05	3.31	96.57	72.38	3.26
<i>SD</i>	19.62	18.73	0.44	18.93	18.41	0.37	19.81	18.94	0.45	20.42	19.46	0.48

Note. ER = Emotion regulation. * $p < .05$, ** $p < .01$.

Figure 1

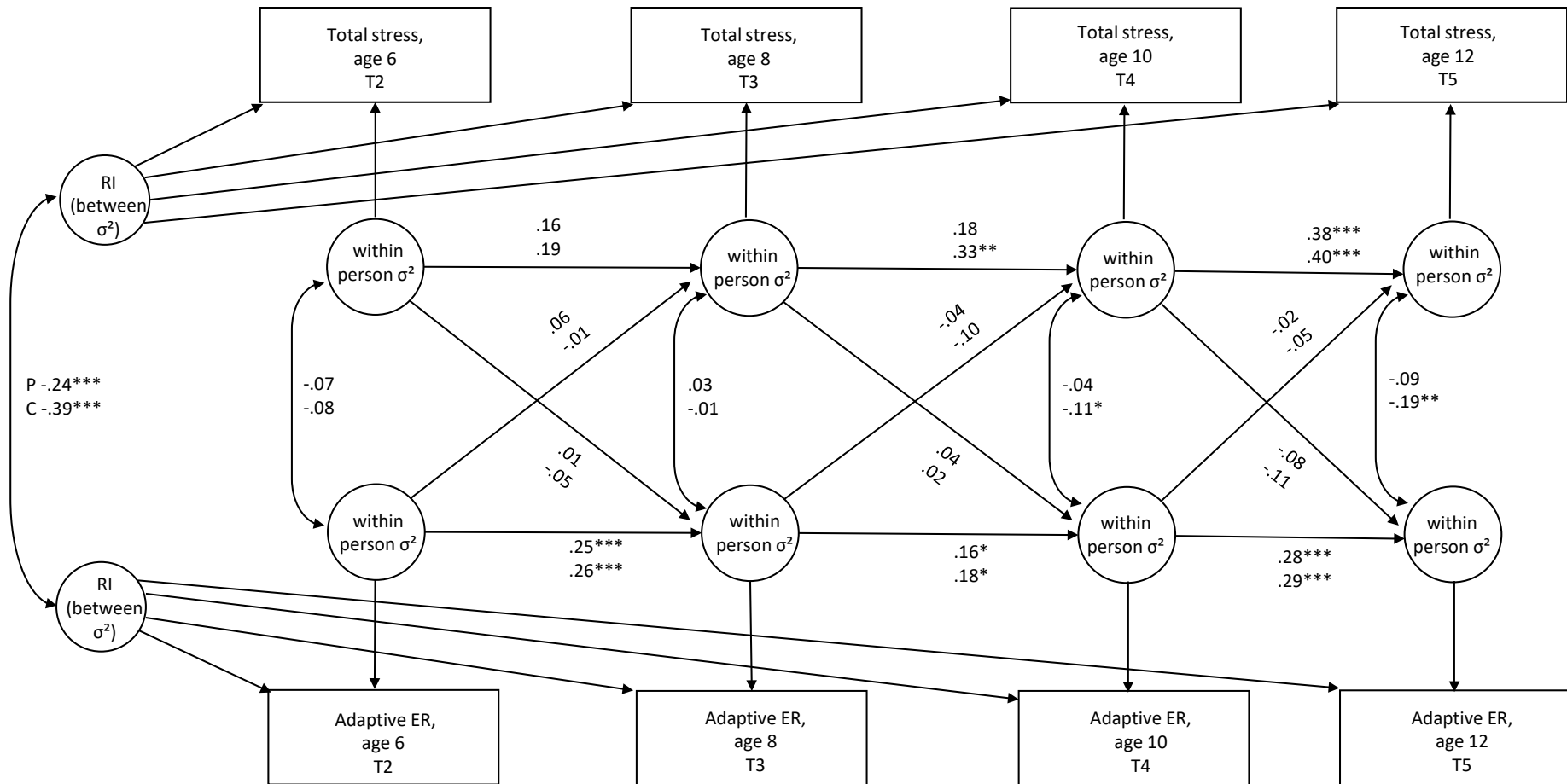
Random Intercept Cross-lagged Panel Model of Parenting Stress and Parent-reported ER.



Note. ER = Emotion regulation. P = Total parent stress. C = Total child stress. $*p < .05$, $**p < .01$, $***p < .001$.

Figure 2

Random Intercept Cross-lagged Panel Model of Parenting Stress and Teacher-reported ER.



Note. ER = Emotion regulation. P = Total parent stress. C = Total child stress. * $p < .05$, ** $p < .01$, *** $p < .001$.

