“How Can I Help You Learn?” Incorporating Emotions into Parents’ Support of Young Children’s Self-Regulated Learning at Home and School During Prolonged Crisis

1. **INTRODUCTION**

Knowledge acquisition drives human development from a very young age as children seek to organize and understand the world around them (Gopnik, 1996). Parents use knowledge about how learning transpires to support their children’s development. This form of knowledge about learning or cognitions is defined as *metacognition* (Flavel, 1979). Current work has expanded this form of knowledge to incorporate emotions (i.e., metaemotion) and behaviors (i.e., metabehavior). Parents may draw on this “meta” knowledge base when supporting their children, especially during emotionally charged circumstances (e.g., the COVID-19 pandemic). Recently, children have been compelled to remain in social isolation and engage in remote learning. When educators are not physically present, the responsibility for supporting a child’s learning shifts to parents. Parents become responsible for bridging gaps between what their child knows and can do, and what their child needs to learn to complete their educational tasks, known as scaffolding (Vygotsky, 1978). The current study focused on how parental knowledge of metaprocesses shapes the learning support for young children during prolonged crisis. We examined the notion that parents’ knowledge shapes parent-child dynamics by considering how parent’s *metaprocesses* (knowledge about learning) shape their dynamics in supporting their young children’s learning (see Figure 1). We consider parents’ metacognitive knowledge to include emotional and behavioral knowledge and proficiency (i.e., metaemotion and metabehavior).

**1.1. *Theoretical background: An integrated self-regulated learning (iSRL) approach***

Self-regulated learning (SRL) refers to a range of strategies learners use to set goals, monitor, and execute actions to complete their learning tasks (Pintrich, 2004; Winne & Hadwin, 1998; Zimmerman, 2000). SRL is conceptualized as the cognitions, emotions, and behaviors that advance learners toward learning goals set by the learner or by caring adults such as parents and teachers (Perry et al., 2002). For example, learners may sense when they are unfocused on the task and intentionally shift their attention to maintain their learning; *attention regulation* is a type of *cognitive SRL*. Similarly, learners may plan what, where, and when to study certain topics, thereby shaping their behaviors; *planning* is a type of *behavioral SRL*. Emotion regulation is also engaged when completing learning tasks (Harley et al., 2019). *Emotion SRL* may take the form of *reappraisal* or *suppression* (Ben-Eliyahu & Linnenbrink-Garcia, 2013). Reappraisal refers to reframing the task, such as when a learner tells themselves that a frustrating task will be over soon to alleviate negative emotions. Suppression refers to inhibition of emotional response, such as when a learner diminishes their anger concerning a mundane task the teacher assigned. The ability to monitor, shift, and adjust each of these components to calibrate to the ongoing trajectory of learning tasks is an integral part of SRL.

The knowledge of when and how to apply SRL strategies is critical. The integrated self-regulated learning model (iSRL; Ben-Eliyahu & Linnenbrink-Garcia, 2015) proposes that such knowledge––i.e., metaprocesses––contributes to SRL strategies that develop with time as learners grow and mature. Therefore, providing support for knowledge building and SRL strategy use in childhood is especially critical.

**1.2. *Metaprocesses: Knowledge about learning***

*Metaprocesses* is a general term that refers to one’s knowledge about how to shape a range of outcomes. The work on metaprocesses initially focused on metacognition (Flavel, 1979) and its substantial impact on academic achievement (Dent & Koenka, 2016). *Metaemotion* was initially defined and measured as a component of parental dynamics and parental coaching (e.g., Gottman et al., 1996) but emotional competencies also assist learners in regulating their emotions and cognitions during learning. Drawing on metaemotion may be especially critical in emotionally fraught contexts, such as learning during a global pandemic or in volatile households. Knowledge about behaviors is termed *metabehavioral knowledge*, encompassing understanding of how to shape behaviors. For example, planning when and where to execute a range of behaviors enables better learning performance and outcomes (Bronson, 2000; Zimmerman, 2006).

Applying these complex forms of perspective-taking requires maturity and experience, which young children are just developing. To this end, caring adults have a crucial role in scaffolding children’s development (Mermelshtine, 2017; Vygotsky, 1978). Adults can consider the influences and adjustments needed to enhance learning strategies as part of the forethought phase and ongoing monitoring, especially in response to possible barricades to learning. Adults’ knowledge of these strategies serves as external regulation that facilitates children’s learning, as delineated below.

**1.3*. Parents’ role in their children’s learning: Applying a regulation internalization model***

Parent-child dynamics play a primary role in supporting and guiding young children, often determining a child’s achievement outcomes (Patall et al., 2008). Usually, children do not regulate effectively on their own. Parents may provide experiences that prompt internalization of self-regulation through a family of dynamics broadly termed *external regulation* (Shonkoff & Phillips, 2000). External regulation has been described as an act of others directly controlling the child (Kopp, 1982), as well as engaging in a scaffolding dialogue such as verbal support by others, to foster self-regulation (Rojas-Drummond & Mercer, 2003). By providing external regulation aligned with the child or task, parents can foster self-regulation in children (e.g., Karreman et al., 2006).However, when external regulation is misaligned with the child’s learning needs, it can undermine the development of adaptive self-regulation.Identifying and defining prompts of external regulation to enhance children’s self-regulation becomes particularly beneficial when education shifts to the home through remote learning, such as during a pandemic. In extreme circumstances such as these, emotions and their regulation are critical for learning.

To conceptualize and measure parent supports for their child’s learning through a developmental lens, we propose a regulation internalization model (RIM: see Figure 2): RIM presents a synergetic relationship (Greene, 2022) between the developmental scholarship on self-regulation (e.g., Sameroff, 2011) and learning strategies (e.g., Hadwin & Oshige, 2011). *Self-regulation* theories derive from a developmental perspective, focusing on control abilities such as executive functions, effortful control, and adjustment of thoughts, feelings, and actions for attaining personal goals and exhibiting appropriate behavior (Zachariou & Whitebread, 2019; Zimmerman, 2000). A developmental perspective describes an active process of ongoing interchanges between the child's self-regulation and external regulation through the intervention of others (e.g., family, peers, and teachers). The dynamic of other-regulation and self-regulation was initially unpacked in Sameroff's (2010) regulatory model. Sameroff’s model suggests that people external to the self are crucial for the development of self-regulation. We broaden this conceptualization of external regulation by applying a lens from the SRL framework to consider different types of supports in a parsimonious model (Greene, 2022). This engagement occurs within an interaction and can include asking questions, providing feedback, or offering guidance to help learners reflect on their thinking, using metacognitive questions and suggestions. Therefore, an educational (and sociocultural) perspective highlights adults’ role in shaping young children’s metacognitive development through verbal interaction.

 Thus, *external regulation* is an umbrella term for the various dynamics that regulate the child from external resources––i.e., *other-regulation*, *co-regulation*, and *shared regulation––*whereby adults actively help children build and cultivate self-regulation skills (e.g, Bronson, 2000; Grolnick & Farkas, 2002; Landry et al., 2000). It is critical, therefore, to differentiate between these three primary dynamics. Other-regulation and co-regulation occur in one-on-one interaction, whereas shared regulation occurs within a group setting. Briefly, shared regulation refers to groups working together on tasks by continually self-regulating each other, all seeking to attain the group’s goals (e.g., Hadwin et al., 2018; Panadero & Järvelä, 2015). We focus on one-on-one external regulation in RIM to unpack the nuances relevant to the dynamics between adults and young children learning. To this end, we confined our focus to other-regulation and co-regulation prompts that parents use to support their young children’s learning.

When caregivers elicit knowledge formation about regulation from their children, they foster self-regulation. They assist in its internalization by applying metaprocesses, a dynamic we labeled *co-regulation*. In co-regulation, the interaction advances knowledge about how one functions by way of adult-child dynamics. Co-regulation prompts differ from other forms of verbal communication, where the adult instructs the child what to do or how to adjust their emotions or cognitions. In other-regulation, a person external to the child acts or advises them what to do to achieve regulation (Sameroff, 2010).

In contrast, other-regulation refers to an adult telling a child how to adjust and monitor; thus, regulation is guided by another person. Caregivers traditionally rely on other-regulation to impart practical-didactic support such as “please put your books in your bag” (Bindman et al., 2013). Parents act on behalf of their children, especially very young children, who cannot act independently (Bronson, 2000; Kopp, 1982; Sameroff, 2010). As children gain self-regulation skills, adults take a step back, utilizing language over actions to support children’s emerging responsibility (Grolnick & Farkas, 2002; Sameroff, 2010).

Co-regulation involves the dynamics that emerge within an interaction between two people regulating each other toward a joint goal or task. They may work together at any point of the regulatory cycle: jointly setting goals or planning, tracking progress, applying strategies, and considering effectiveness while regulating each other (Hadwin et al., 2018; McCaslin & Vriesema, 2018). The co-regulation dynamic comprises two components during which there is a back-and-forth between adult and child: adult prompts and child’s enactment (Hadwin et al., 2005). The prompt is aimed at inculcating the child with knowledge of how to self-regulate, considering the child's zone of proximal development (Hadwin & Oshige, 2011; McCaslin, 2009; McCaslin & Vriesema, 2018; Vygotsky, 1978). The child's response demonstrates their adoption of part of the self-regulation. Without this second component of child enactment, there is only partial co-regulation dynamic in which the adult uses co-regulation prompts. *Co-regulation prompts* are the conscious efforts of others to support the child's metaprocesses and internalization of regulation skills. The self-regulated adult leads the interaction, teaching the child how to internalize regulation and become independent – hence, the *regulation internalization model*. In RIM, we focus on the nuances that differentiate other-regulation from co-regulation events and moments that advance the child’s thinking about their learning strategies and, as such, manifest the origins of higher psychological processes that foster the internalization of regulatory capacity (Hadwin & Oshige, 2011; McCaslin, 2009).

**1.4. *The current studies***

In two studies, we investigated parents’ external regulation of their child’s learning across contexts by identifying specific accompanying emotional strategies. We utilized the unique learning context imposed by the COVID-19 pandemic to consider how parents’ metaemotion contributes to external regulation (Figure 1) to extend prior findings that parental beliefs are associated with their children’s achievements, behaviors, and SRL (Coleman & Karraker 2003; Roskam & Meunier 2012; Sroufe 1995),

The growing interest in young children’s SRL became especially relevant during the COVID-19 pandemic. More than 90% of students worldwide–about 1.6 billion youth–had to engage in distance learning (Erdmann & Hertel, 2019; Miks & McIlwaine, 2020). To understand the scale, about 25% of the world’s children confront some type of passing crisis (REF). Given the widespread and long time-course of the pandemic, we examined how parental supports for learning shifted due to the social isolation that consigned distance learning to be a personal and parental responsibility (see Table 1 for methodology and COVID-19 timeline). In Study 1, initial measures were administered to mothers of children in grades 1-3 in May 2019 (Time 1 - T1) during routine at-school learning. The second wave measures were administered during a government-mandated COVID-19 lockdown (April 2020: Time 2 – T2). Of particular interest at T2 were changes that occurred during the pandemic’s onset, accompanied by uncertainty and stress. Schools reopened in May 2020 through the end of the school year (July 1st). The third wave took place in June 2020 (Time 3 – T3) during the return to school after lockdown was lifted.

In Study 2, we included fathers, mothers, and child reports during two-time points (February 2021 during the third COVID lockdown and July 2021 after return to normal schooling) using a repeated measures methodology. The two studies recruited different samples of participants, but to avoid confusion, we refer to these data collection phases as T4 and T5.

***1.5 Research questions and hypotheses***

 We focused on the associations among (a) parents’ metaprocesses, (b) their regulation support, (c) their children’s SRL, and (d) learning outcomes. Our primary research question regarded the association of parents’ knowledge about learning (metaprocesses) with their child’s SRL. We expected that these associations would change due to the contextual change as parents’ roles transformed into face-to-face educators, subject to the chronology of the pandemic. In this way, distance learning resulting from the pandemic was considered a moderating variable.

**Hypotheses:**

H1. Parents’ metaprocesses will predict their children’s use of SRL: (a) Parents’ metaemotion will be associated with emotional SRL, (b) parents’ metabehavior will be associated with behavioral SRL, and (c) parents’ metacognition will be associated with cognitive SRL.

H2. Parents’ use of external regulation will be associated with their child’s SRL: (a) Given the parents can observe their child’s behaviors, other-regulation will shape behavioral SRL; (b) Co-regulation will be associated with more internal processes, such as emotional SRL and cognitive SRL.

H3. The associations noted in H1 and H2 will shift, subject to contextual changes (normalcy vs. pandemic) and types of learning (distance-learning vs. school-learning) so that associations during at-home learning (compared to baseline) will require parents to draw on their knowledge to be more active regulators.

**2.0. STUDY 1**

**2.1. METHOD**

**2.1.1. Participants**

Following approval by the [blinded for review] University’s Ethics Committee in [blinded for review], 357 mothers signed a consent form and completed online questionnaires concerning their 1st, 2nd, or 3rd grade offspring. If they had more than one child in these age groups, they were asked to focus on the youngest one. Eighty-eight mothers completed the questionnaires in May 2019 in a routine at-school learning condition (T1 - pre-COVID-19), 105 completed the questionnaires in April 2020 during the first lockdown of the pandemic (T2), and 164 at the end of June 2020 after children had returned to school for about two months (T3). All samples had comparable demographics. Most parents had higher education degrees. The mean age across sample groups ranged from 38.9 to 40.7 years (Table 1).

**2.1.2. *Measures***

All mothers completed a questionnaire regarding themselves and their child. All measures used a five-point Likert-type response scale, ranging from 1 (*never*) to 5 (*always*). See Table 2 for reliabilities and Appendix for all items.

**2.1.2.1. *External regulation***

Two scales assessed external regulation (co-regulation and other-regulation). We adapted the Teachers’ Self-Regulated Learning questionnaire (T-SRL; Adagideli et al., 2017). Three items assessed co-regulation (sample item: "During learning/games, I ask my child if he thinks he is doing progressing well//succeeding"), and three items assessed other-regulation (sample item: "I remind my child how to behave during the learning task/game. For example, ‘It’s your turn; pick up two cards.’"). A CFA on both scales for each measurement time showed good fit (T1: *χ*2(13) = 22.34, *p* = .050; CFI = .94; TLI = .90; RMSEA = 0.09; SRMR = 0.06; T2: *χ*2(11) = 30.14, *p* =.002; CFI = 0.93; TLI = 0.86; RMSEA = 0.13; SRMR = 0.09; T3: *χ*2(13) = 21.81, *p* =.059; CFI = 0.98; TLI = 0.96; RMSEA = 0.06; SRMR = 0.06).

**2.1.2.2. *Metaprocesses***

The Metaprocess Questionnaire (Ben-Eliyahu et al., 2024) assessed parents’ metaprocesses in three subscales: metaemotion (five items; sample: "While dealing with a task, I set myself the emotion that will promote me"), metabehavior (four items; sample: "When studying, I try to determine which actions will be hard for me to do"), and metacognition (four items adapted from Pintrich et al., 1991; sample: "While doing a task, I try to determine or figure out which concepts or ideas I don’t understand well"). A CFA on all three subscales for each measurement time showed good fit (T1: *χ*2(62) = 89.11, *p* < .014; CFI = 0.95; TLI = 0.93; RMSEA = 0.07; SRMR = 0.07; T2: *χ*2 (62) = 94.61, *p* < .005; CFI = 0.96; TLI = 0.94; RMSEA = 0.07; SRMR = 0.06; T3: *χ*2 (62) = 73.32, *p* < .104; CFI = 0.99; TLI = 0.98; RMSEA = 0.04; SRMR = 0.05).

***2.1.2.3. Child academic outcomes***

Mothers reported their child’s math, language, and social performance by rating their child’s level as *at*, *below*, or *above* their peers for each domain. This rating was adopted because, for younger children, schools provide only verbal non-numeric evaluations, thus aligning the question with the child’s report card evaluations (Kujahinoff, 2019).

***2.1.2.4 Child Self-Regulated Learning***

Four learning strategies were measured: *reappraisal* (four items; sample item: "When my child wants to feel less negative emotion (such as sadness or anger), he changes the way his thoughts, for example, he finds a different game or compromises."); *suppression* (three items; sample: "My child controls his emotions by not expressing them."); *attention regulation* (four items; sample: "My child has a hard time concentrating on tasks."); and *planning* (four items; sample: "My child sets a plan for how to go about completing his assignments."). A confirmatory factor analysis (CFA) on all four scales for each time showed good fit (T1: *χ*2(72) = 88.42, *p* = .092; CFI = 0.96; TLI = 0.94; RMSEA = 0.05; SRMR = 0.08; T2: *χ*2(72) = 81.16, *p* = .215; CFI = 0.98; TLI = 0.98; RMSEA = 0.04; SRMR = 0.07; T3: *χ*2(72) = 102.30, *p* = .011; CFI = 0.96; TLI = 0.94; RMSEA = 0.05; SRMR = 0.07).

**2.2. *Data analysis***

Moderated mediation models in SPSS 27 (Hayes PROCESS, 2013; Model 59) were used to investigate how parent knowledge shapes their parent-child dynamics toward outcomes over time (Figure 3). Time was entered as a moderation effect of the direct and indirect effects of the mediation models. For each model, co-regulation (M1) and other-regulation (M2) were the mediators for a total of 24 models. Within this modeling framework, we estimated direct and indirect effects subject to varying time categories (T1[pre-COVID-19]; T2 [1st lockdown]; T3 [back to school]). Thus, the mediating role of external regulation (M1 and M2) was tested in interaction with time, where T1 was used as the reference for times T2 and T3. We tested for the main effect of the independent variable, parent’s metaprocess, and the outcome variable, children's SRL, math and language achievement, and social skills (slope c) as well as the mediation effect of slope a \* slope b. **2.3. Results**

Overall, we found differences in how parents drew on metaprocesses to support their children’s distance learning during the pandemic (T2) and routine at-school learning (T1 & T3). Correlations, means, and standard deviations showed consistent findings across the three-time points (see supplementary materials). However, during T2 and T3 there were more significant associations with external regulation. Notably, during T2 lockdown, co-regulation prompts were positively correlated with most child SRL strategies, math, and social skills, but there were fewer significant associations with other-regulation. These findings suggest that young children require more metaprocesses support that matches their learning during distance learning as compared with at-school learning. The dynamics between parents' metaprocesses, external-regulation, and children's SRL strategies may vary depending on the ~~time point and~~ learning setting (e.g., distance learning vs. in-school learning).

We used the PROCESS procedure (Hayes, 2013; Model 59) to estimate regression and mediation coefficients (Figure 3). Table 3 presents modeling results for all metaprocess (i.e., metacognition, metabehavior, and metaemotion). The first two columns present the associations between the metaprocess and external regulation (slope a). These mediation equations (independent variable to mediator) were identical for all outcomes. Subsequent columns show the association from metaprocess to the child outcome (slope c’). Table 4 presents results from external regulation to SRL (slope b) and the indirect paths (slope a\*b). The significance of the indirect path provides evidence for mediation.

The simple slope *a,* indicating the association between the IV and mediator (Table 3), shows that metacognition was positively associated with co-regulation (b=0.50, *p* < .001) and other-regulation (b=0.31, *p* < .01). The association between metacognition and other-regulation was higher at T3 than at T1 (b=1.28, *p* < .05, respectively). The association between metabehavior and co-regulation was positive (b=0.61, *p* < .001), and it was higher at T2 and T3 than at T1 (b=1.59, *p* < .05; b=1.16, *p* < .05, respectively). Similarly, a positive association was found for metaemotion with co-regulation (b=0.52, *p* < .001); this association was stronger at T2 (b=1.17, *p* < .01) than at T1. Metacognition was consistently positively associated with co-regulation, but this positive effect was stronger at T1 (T1: b=0.50, *p* < .001; T2: b=0.25, *p* < .05; T3: b=0.28, *p* < .05). Similarly, the association between metaemotion and co-regulation was stronger at T1 (T1: b = 0.52, *p* < .001; T3: b=0.37, *p* < .001). From metabehavior to co-regulation, the effect was positive at T1 (b=0.61, *p* < .01). As for other-regulation, metacognition was positively associated only at T1 (b=0.31, *p* < .01).

Next, we examined the direct effects of metaprocesses on child outcomes (slope c’). Positive effects were found for all three metaprocesses with reappraisal and behavioral SRL (Table 3). The association of metacognition with reappraisal was stronger at T2 than at T1. Looking at the interaction with time, metabehavior, and metaemotion revealed a positive association with reappraisal at T3. For behavioral SRL, metabehavior and behavioral SRL were positively associated at all three times, whereas metaemotion was positively associated with behavioral SRL at T3 and T1.

We then investigated associations between mediators and outcomes (slope b). Co-regulation and other-regulation were positively associated with children’s attention, reappraisal, behavioral SRL, math, and social skills for all three metaprocesses (Table 4). Regarding child attention, co-regulation revealed a positive effect only at T2, whereas negative effects were found for other-regulation at T2 and T3. Only co-regulation was positively associated with child reappraisal at T2 and T3. For child behavioral SRL, co-regulation revealed positive effects for metacognition and metabehavior models at T2 and T3, whereas the metaemotion model revealed a positive effect only for T2. Notably, other-regulation and child behavioral SRL were negatively associated at T2.

In the metacognition and metabehavior models, child math skills and co-regulation were positively associated only at T2, whereas in the metaemotion model, co-regulation revealed positive effects at T2 and T3. For all three metaprocess models, other-regulation was negatively associated with math skills at T2 and T3. Notably, for all metaprocesses, only co-regulation was positively associated with child social skills at T2 and T3.

Finally, we examined the indirect effects in the mediation path models (Figure 3; slope a\*b). Table 4 presents the results of these analyses. In looking at co-regulation as a mediator of the association of metacognition with child outcomes, metacognition was positively associated with child attention and math skills at T2, whereas reappraisal, behavioral SRL, and social skills were associated at T2 and T3. Co-regulation did not mediate the association between metacognition and outcomes pre-COVID T1. The mediation model for metabehavior on child outcomes through co-regulation revealed significant effects for child attention at T2; whereas reappraisal, behavioral SRL, and social skills revealed significant effects at T3. Therefore, only co-regulation mediated the associations between metabehavior and child attention at T2 (first lockdown) and the associations between child reappraisal, behavioral SRL, and social skills when children returned to school (T3). Metaemotion was associated with reappraisal and social skills through co-regulation only during T3. A summary of significant mediation paths appears in Figure 4.

**2.4. Discussion**

In Study 1, we investigated mothers’ reports of their children during three-time points that varied in learning formats, resulting in different expressions of parent involvement. We unpacked how parent metaprocesses shape child-parent dynamics regarding learning strategies and skills. Significant mediation paths were found at T2 when families went into survival mode during the COVID-19 lockdown. Parents drew mainly on their knowledge of cognitive and behavioral strategies to support their children’s at-home learning. Upon returning to school, still under pandemic restrictions, these dynamics were partially maintained, along with metaemotion as an additional factor shaping academic-emotional and social-emotional strategies. This carry-over effect is notable as it suggests that parents who use their knowledge to shape their interaction with their children may internalize new parenting strategies to match changing requirements. The role of metaemotion at T3 is of particular interest as it may indicate that when people are in survival mode, they may focus on functioning, adopting a behavioral-cognitive learning approach. However, the finding that metacognition was associated with reappraisal emotion SRL suggests that emotion regulation may play a critical role in learning.

These novel findings are somewhat limited in their generalizability, given the cohort data collection effort. Data collected in 2019 provided a unique opportunity to compare BASELINE xxx with COVID and post-COVID. Given changing global circumstances surrounding the pandemic, we were able to design a longitudinal study to follow parents in subsequent lockdown and post-lockdown contexts. A second limitation of Study 1 was that only mothers participated. During COVID-19 social distancing, both parents worked from home and had a role in their children’s learning. In Study 2, both fathers and mothers participated. An additional constraint of Study 1 was that there was no input from the children. In Study 2, after receiving parental consent, we asked children simple questions to receive direct indicators from the children.

**3.0. STUDY 2**

 As noted, the key changes in methodology for Study 2 included the participation of fathers and children, and the ability to use a longitudinal design. Only details that differ from Study 1 will be reported here.

**3.1. *Method***

**3.1.1. *Participants***

Following ethical approval, participants were recruited through an online panel. See Table 1 for detailed demographic information. After consenting to participate, 311 parents (49% fathers) completed online questionnaires in February 2021 during the third COVID-19 lockdown (T1-at-home learning) and 153 completed questionnaires again in July 2021, after the return to routine at-school learning (T2; 51% attrition). All samples were comparable in their demographics. Additionally, 143 children (38.6% first graders) of these parents responded to three questions regarding how they felt about their social, math, and language abilities. The survey measures were identical to those used in Study 1. The only change was the addition of three questions for children. See Table 1 for methodology and demographics.

**3.2. *Results***

Some associations between parents' metaprocesses and child SRL strategies remained consistent across time, but others varied by context (see supplementary materials). The consistent positive associations of metaprocesses and external regulation with child behavioral SRL and reappraisal highlight the importance of these strategies for children's learning. Notably, negative correlations between child reports and mother reports for math and social skills were found at T2.

To investigate the associations during (T1) and back to school (T2), we examined a mixture of within- and across-time effects using path models in structural equation modeling that incorporates autoregressive effects and time-lagged associations (Little, 2013). These models are detailed in Figure 5, using different arrow types: Narrow arrows for within-time direct effects, dashed arrows for indirect effects, double-line arrows for autoregressive association over time, and bold arrows for cross-lagged cross-time associations. Two types of mediation effects are presented using dashed arrows: (a) at each time point, external regulation mediates the effect of metaprocesses with child outcomes (mediation-T1 and mediation-T2); (b) longitudinal mediation, whereby external regulation at T1 or T2 mediates the effect of the metaprocesses at T1 with child outcomes at T2, either directly or through their association with T1 child outcomes.

 Table 5 shows the direct effects of each of the metaprocess models. Outcome indicators are presented in columns labeled T1 and T2. Autoregressive effects were assessed for co-regulation, other-regulation, and child outcomes, showing a strong positive association. Cross-lagged associations were estimated between metaprocesses and co-regulation and other-regulation; all were non-significant except for metabehavior and co-regulation, which were positive. Similarly, cross-lagged effects were estimated between co-regulation and other-regulation with the child outcome. These effects were non-significant except for the metabehavior model, which revealed significant negative cross-lagged associations between other-regulation with reappraisal and other-regulation with suppression.

All metaprocesses (metacognition, metabehavior, and metaemotion) at T1 were associated with other-regulation, but only metacognition and metaemotion were positively associated with co-regulation. Note that some cross-lagged effects were set to zero (β = 0) to reduce the model’s complexity based on preliminary tests of these cross-lagged associations. Shaded cells in Table 5 reveal consistent model correlations for all models: co-regulation-T1 with other-regulation-T1; other-regulation-T2 with co-regulation-T1 and T2; other-regulation-T1 was found not to correlate with co-regulation-T2. In addition to these effects, auto-regressive mediation was found for metabehavior-T1 through metabehavior-T2 predicting child behavior SRL-T2 (effect = .06 [.01,.18] *p* <.05) and social skills-T2 (-.07, [-.22,-.02] *p* <.05), and metaemotion-T1 through metaemotion-T2 predicting child behavior SRL-T2 (.15,[.05,.25] *p* <.01).

Table 6 presents the significant mediation effects. Our focus was on the association between metaprocesses exogenous variables at T1 and child outcomes as dependent variables at T2. Overall, all three forms of metaprocesses-T1 were positively associated with both forms of external regulation to reappraisal-T1 and T2. However, only metaemotion-T1 was found to be associated with suppression-T2, mediated through suppression-T1. Notably, only metacognition-T1 was associated with attention SRL-T2 through external regulation-T1 or attention SRL-T1, whereas metacognition-T1 to behavior SRL-T2 was mediated through co-regulation. These findings suggest that parents draw on their knowledge about cognitions to share with their children, discussing with them how to regulate their attention. The way parents express these supports shapes the children’s later attention regulation. However, parents’ knowledge about cognitions is applied through co-regulation prompts to shape behavioral SRL. In contrast, social skills were predicted by metabehavior and metaemotion, whereas language skills required parents to draw on all of the metaprocess forms.

Examining the direct and indirect effects of parental metaprocesses on children's self-reported math and language achievements, we found six positive mediations (Figure 6). Parents' metaprocesses during the third lockdown (T1) were associated with their use of other-regulation at T1, which significantly predicted other-regulation at T2, ultimately influencing children's math and language achievements upon returning to school (T2). These findings suggest that parents with higher levels of metaprocesses during the lockdown provided more directive support for their children's learning, which, in turn, predicted their children's achievement upon return to school. Notably, three negative mediations were found between parents' metacognition and metabehavior at T1 and children's achievement through parents' metaprocesses at T2. Metacognition at T2 mediated the association between parent metacognition at T1 and math achievements (β = -.10, SE= .04, p= .019, 95% CI [-.20, -.03]). Conversely, metabehavior at T2 mediated the associations between parent metabehavior at T1 and both math (β = -.08, SE=.04, p= .028, 95% CI [-.18, -.02]) and language (β = -.07, SE=.04, p=.04, 95% CI [-.16, -.02]) achievements. High levels of parent metacognition and metabehavior are associated with lower levels of their respective metaprocesses, yet still predict children's achievement. The correlations and cross-lagged results varied somewhat for each metaprocess model from the models that examined child outcomes based on parent reports and are presented in the supplementary materials.

**3.3. *Discussion***

To assist their children, parents use their knowledge about how to learn to support their children’s development from a young age and through their school years. Metaprocesses are expected to trigger parent conversations with their children about strategies rather than instructing the child what to do without explanation. In Study 2, parents’ metaprocesses fostered use of co-regulation prompts, which, in turn, promoted children’s use of regulation strategies and learning outcomes. Considering the emotional aspects of parent-child communication, it seems critical that parents support their children’s use of reappraisal SRL to adjust their emotions during learning, particularly when learning contexts are impacted by extreme situations such as crises. Notably, child suppression was not supported by parent co-regulation prompts but rather by the child’s suppression at T1. Similar patterns were found in children's self-reports. Parents predominantly relied on their knowledge of cognitive, behavioral, and emotional strategies to provide external regulation, which subsequently contributed to their children's academic achievements. These findings enhance our understanding of how extreme circumstances, such as lockdown, require directive support (other-regulation) for learning outcomes (Dignath & Veenman, 2021). Notably, the negative mediations observed between parents' metacognition and metabehavior at T1 and children's achievement through parents' metaprocesses at T2 suggest that when parents must support their children's learning as the main teaching source, they draw more from their knowledge to engage in ways not required before. Interestingly, metaemotion showed no negative mediations, possibly due to the increased need for parental involvement in children's social and emotional states following the return to school.

**4.0. General Discussion**

Emotion regulation has become a research topic in learning and instruction in recent years as the global atmosphere has become intense (Ben-Eliyahu, 2019; Harley et al., 2019). The current work aimed to add to the literature on emotion regulation strategy use as a component of learning and to ascertain how parents can support their young children’s learning during extreme learning conditions. In primary school, parents play an essential role in their children’s learning, and this role was augmented during the remote learning imposed by COVID-19. In Study 1, we reported on three cohort samples in different time-bound contexts: pre-pandemic at-school learning, at-home learning during lockdown, and after children returned to school. In Study 2, we used a longitudinal design to examine how parental support during lockdown shaped at-school learning when children returned to school two months later. Overall, we found that parent metaprocesses were especially relevant for young children in shaping parent-child dynamics when children began to learn at home during lockdown (Study 1 [T2] and Study 2). These dynamics were partially maintained when children returned to school, revealing consistency in some associations.

Focusing on emotional constructs, some cross-domain and within-domain associations were revealed. Notably, in Study 1, co-regulation prompts mediated the association of metacognition with reappraisal SRL, behavioral SRL, and social skills-T2 and T3, but not pre-COVID (T1). Interestingly, upon the return to school, the use of metabehavior was associated with reappraisal SRL, behavioral SRL, and social skills through co-regulation prompts. Metaemotion was associated with reappraisal SRL and social skills through co-regulation prompts only at T3. These findings suggest that parents draw on their metaprocesses to advance their conversation about learning strategies with their children. In turn, this conversation fosters children’s use of SRL strategies and enhanced social skills, especially post-crisis as they return to their routine. Study 1 was limited by cohort, however, requiring further investigation to discern the longitudinal effects as applied in Study 2.

The longitudinal associations in Study 2 suggested that some relationships were robust. All three forms of metaprocesses during the lockdown were positively associated with both forms of external regulation to reappraisal SRL, both as within-time associations during lockdown (T1) and across-time when children returned to school (T2). However, only parental metaemotion during lockdown (T1) was associated with suppression when children returned to school (T2), mediated through suppression-T1. This finding is interesting because it was not revealed in the cohort analyses (Study 1). When considered over time, suppression SRL may be beneficial, especially when coping with a crisis that requires withholding negative emotions during academic work. Prior work has shown that in aversive situations, there may be value in suppression SRL, at least within learning contexts (Ben-Eliyahu & Linnenbrink-Garcia, 2013).

Interpreting these findings necessitates the consideration of context. The COVID-19 pandemic required learners and their support networks to exhibit high flexibility in changing environments. Whereas teachers were required to reinvent their teaching, especially for younger students who require scaffolding, parents were required to take on new instructional roles. Cook et al. (2018) found that cooperation between parents and teachers (mesosystem) was associated with better academic outcomes for first-grade children. In the current work, we focused on how parents’ knowledge about learning strategies is associated with children’s use of SRL strategies. However, because learning exists within a zeitgeist, we considered the broader contextual influences as a precursor that may shape SRL, especially when viewed through the lens of the academic-emotional learning cycle (Ben-Eliyahu, 2019), according to which the relationships between different emotional constructs are shaped by factors external to learning.

Coupled with the finding that parents applied more metabehavior in 2020 (Study 1-T2), it appears that when learning under stressful conditions, parents assume the additional roles of planning and monitoring behaviors. Given that many families had to juggle the use of technology for parental work and remote learning for one or more children, parents had to make themselves available to help their children complete assignments while managing their tasks. Families relied on digital communication with the outside world for both online social and pedagogical communication. Applying the reasoning that SRL is a limited resource (Ben-Eliyahu, 2019; Schmeichel & Baumeister, 2004), children’s regulatory resources are freed from having to regulate behaviors when they are under social isolation, and in this way, they are more available for employing cognitive SRL.

This suggests that stressful situations require fine-tuning to influence emotions, behaviors, and cognitions. Coleman and Karraker (2003) found that domain-specific parent self-efficacy was more predictive of child outcomes than general competence beliefs. We found that parent metaemotion was associated with child SRE and parent metabehavior was associated with children SRB, though only in 2020. When children feel a lack of control, they may need parental support to restore a sense of security (Sroufe, 1995) and structure. Our findings suggest that security and structure may be offered through other-regulation, whereby parents provide direct guidance on what the child should do. Parents who are attuned to their children may employ domain-specific strategies. In this sense, co-regulation, which emphasizes cognitive support via knowledge building, was positively associated with cognitive SRL; in contrast, other-regulation was negatively associated with cognitive SRL only in 2020. A similar contextualization was found by Pino-Pasternak and Whitebread (2010), who found that parental behaviors that encouraged children's autonomy and provided cognitive support were positively associated with children's self-regulated learning behaviors. Similarly, Neitzel and Stright (2003) reported that children of mothers who provided more cognitive support and less directive control exhibited higher levels of self-regulated learning during problem-solving tasks.

Study 2 found a within-domain association for metacognition-T1 associated with attention SRL-T2 through external regulation-T1 and attention SRL-T1. A cross-domain association was found for metacognition-T1 predicting behavior SRL-T2 through co-regulation. In both cases, parents' use of metacognition knowledge was positively associated with co-regulation prompts regarding SRL strategies. However, other-regulation was a mediator only with attention SRL. Parents drew on their knowledge about cognitions to instruct their children on how to regulate their attention; however, they discussed how to support behaviors through conversation that promotes the children’s internalization of learning strategies.

Children's reports on their social, math, and language abilities highlighted the significant role of metaprocesses and the use of other-regulation for children's academic outcomes during stressful situations. Parents predominantly relied on their cognitive, behavioral, and emotional knowledge to provide other-regulation, which subsequently contributed to their children's academic achievements. This [emphasizes](https://www.powerthesaurus.org/emphasizes/synonyms) how extreme circumstances, like lockdowns, stress the importance of directive support for learning outcomes (Dignath & Veenman, 2021). Notably, negative mediations were observed between parents' initial metacognition and metabehavior and children's later achievement through parents' later metaprocesses, suggesting that when parents become the primary educators, they draw more heavily on their knowledge, adapting their support when perceiving their children's academic struggles (Pomerantz & Eaton, 2001). Interestingly, metaemotion showed no negative mediations, possibly due to the increased need for emotional support when children got back to interacting with peers and teachers. Parental involvement should be adaptive and responsive to children's changing needs across different educational contexts (Grolnick & Slowiaczek, 1994), with the use of parental metaprocesses varying depending on whether learning occurs remotely or in traditional classroom settings. Contrary to the notion that metacognitive parents are more likely to promote autonomy in their children's learning (Joussemet et al., 2008; Roskam, 2015), our findings suggest that in different learning situations, there is more room and need for direct instructional support. This research supports the idea that enhancing parental metaprocesses could be a valuable target for interventions aimed at improving children's academic performance (Pino-Pasternak & Whitebread, 2010).

**4.1. *Limitations and future directions***

This study’s importance notwithstanding, several limitations need to be considered. Paradoxically, these limitations are the reasons that enabled us to conduct this study swiftly to enable a quasi-experiment for direct comparison of young children’s learning during normalcy and high-stress pandemic times. First, our Study 1 data were derived from mother’s reports of themselves and their children. Whereas children’s self-reports would have been valuable, this was not feasible due to social isolation and time constraints. Study 2 addressed these limitations by including father and child self-reports. Moreover, children’s ability ratings were provided by parents, whereas teachers’ reports of grades and children’s SRL could have provided a fuller picture of children’s SRL. These limitations notwithstanding, they do not detract from the importance of these studies for the field of SRL and for understanding how to support children’s learning during times of crisis when their primary educator becomes their parents.

A critical extension of the present work would be to investigate how SRL processes are supported in youth and adults. To prevent long-term negative repercussions of the crisis on children’s education it is critical to understand how to best support children’s growth and development of academic learning. Accommodating this crisis effectively will help maintain formal schooling benchmarks of skills, such as reading acquisition, reading comprehension, math skills, and following instructions, all internationally recognized skills, as reflected in the globally administered PISA exams (Schleicher, 2019). It is crucial that learning is maintained for children and youth, but also for adults, who are expected to adhere to new behaviors and who also comprise the workforce of scientists who seek to analyze and find solutions for such pandemics and health issues (Taubenberger & Morens 2006; Webby & Webster 2003).

The COVID-19 pandemic dramatically increased the number of children living in a prolonged crisis in their homes. Parents have become pivotal in maintaining necessary at-level learning, especially for young children who require assistance during the regular school year and even more with distance learning during uncertain times. Through the use of metaprocesses and by supporting SRL, parents can enrich their children’s learning and enhance the development of 21st-century skills in the hope that when crises strike, we will know not only how to deal with them but also grow as individuals, as families, and as a human race. ~~To prevent irreversible gaps in learning among different populations (Heckman, 2006), educators may provide aids to parents and children to support children’s learning in the face of the imposed situation.~~

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