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Testing reciprocal associations between child anxiety and parenting across early interventions for inhibited preschoolers

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Abstract

Background: Given the robust evidence base for the efficacy of evidence-based treatments targeting youth anxiety, researchers have advanced beyond efficacy outcome analysis to identify *mechanisms* of change and treatment directionality. Grounded in developmental transactional models, interventions for young children at risk for anxiety by virtue of behaviorally inhibited temperament often target parenting and child factors implicated in the early emergence and maintenance of anxiety. In particular, overcontrolling parenting moderates risk for anxiety among highly inhibited children, just as child inhibition has been shown to elicit overcontrolling parenting. Although longitudinal research has elucidated the temporal unfolding of factors that interact to place inhibited children at risk for anxiety, reciprocal transactions between these child and parent factors in the context of early interventions remain unknown.

Method: This study addresses these gaps by examining mechanisms of change and treatment directionality (i.e., parent-to-child vs. child-to-parent influences) within a randomized controlled trial comparing two interventions for inhibited preschoolers ($N = 151$): the multicomponent Turtle Program ('Turtle') and the parent-only Cool Little Kids program ('CLK'). Reciprocal relations between parent-reported child anxiety, observed parenting, and parent-reported accommodation of child anxiety were examined across four timepoints: pre-, mid-, and post-treatment, and one-year follow-up (NCT02308826).

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article:

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Results: Hypotheses were tested via latent curve models with structured residuals (LCM-SR) and latent change score (LCS) models. LCM-SR results were consistent with the child-to-parent influences found in previous research on cognitive behavioral therapy (CBT) for older anxious youth, but only emerged in Turtle. LCS analyses revealed bidirectional effects of *changes* in parent accommodation and child anxiety during and after intervention, but only in Turtle.

Conclusion: Our findings coincide with developmental transactional models, suggesting that the development of child anxiety may result from child-to-parent influences rather than the reverse, and highlight the importance of targeting parent *and* child factors simultaneously in early interventions for young, inhibited children.

Keywords

Early intervention; parenting; temperament; anxiety

Introduction

Debilitating and chronic, anxiety disorders are among the most frequently occurring childhood psychological disorders (Egger & Angold, 2006). The early onset of anxiety and its adverse long-term consequences (Dougherty et al., 2013) have prompted investigation into early risk factors. Specifically, decades of research have established behavioral inhibition (BI), a temperamental style that manifests as wariness, withdrawal, and avoidance in the context of novel stimuli, as a robust risk factor for later anxiety, particularly social anxiety disorder (Bishop, Spence, & McDonald, 2003; Clauss & Blackford, 2012). However, most children with elevated BI do not go on to develop clinical levels of anxiety (Hirshfeld et al., 1992), indicating that certain factors have the potential to strengthen or weaken the pathway from BI to later anxiety.

Extensively studied theoretical models have highlighted how risk for later anxiety ensues through dynamic transactions between children and their environments. Specifically, overcontrolling, overprotective, and intrusive parenting behaviors have long been documented as fundamental to the emergence and continuity of child anxiety (Duchesne, Larose, Vitaro, & Tremblay, 2010). These behaviors contrast with flexible, sensitive parenting that is responsive to child needs and facilitates child exploration, autonomy, emotion regulation, and social competence (Rubin, Coplan, & Bowker, 2009). The developmental literature largely recognizes that *bidirectional and transactional interactions* between child factors (i.e., BI) and these parenting styles shape the developmental cascade toward later anxiety (Kiel & Buss, 2009, 2011; Liu, Kryski, Smith, Joanisse, & Hayden, 2019). That is, just as parent behaviors have been shown to predict child anxiety and the stability of BI, child inhibition has also been shown to simultaneously elicit overprotective parent responses (Rubin, Nelson, Hastings, & Asendorpf, 1999).

In keeping with this developmental transactional model, targeting parent behaviors as well as child coping and social skills has become a hallmark of early interventions for children at risk for later anxiety. However, despite the efficacy of these interventions in reducing child anxiety disorders, little is known about *how* such interventions operate (i.e., mediation). Although studies have elucidated the temporal unfolding of factors that mutually

interact to put children at risk for anxiety, the transactions between these parent/child factors within the context of *treatment* remain unclear. It may be that changes in parenting influence child anxiety in treatment, yet it is also possible that child responses to treatment produce subsequent changes in parenting. However, in accordance with the developmental transactional models that inform anxiety treatment, it is likely that *both* processes unfold simultaneously.

Studies that have sought to clarify how child and parent factors influence one another during and following treatment have largely focused on cognitive behavioral therapy (CBT) for *school-age youth and adolescents*. Recently, Bertelsen, Himle, and Håland (2022) utilized a multilevel bivariate auto-regressive cross-lagged panel model (CLPM) to examine directional relations between youth anxiety and family accommodation across 10 sessions of CBT for anxious youth (M_{age} = 15.4 years). Results revealed a bidirectional relation between accommodation and youth anxiety, highlighting the importance of targeting *both* accommodation and child anxiety to achieve optimal treatment outcomes. Furthermore, child anxiety at one session produced a stronger influence on accommodation at the following session than vice versa, consistent with previous studies indicating that youth may indirectly influence their parents in CBT for anxiety (Settipani, O'Neil, Podell, Beidas, & Kendall, 2013; Silverman, Kurtines, Jaccard, & Pina, 2009). However, it is unclear if the processes by which CBT works will translate to *early* interventions for *young* children with or at risk for anxiety, for which parenting is theorized to play an even more critical role. Though evidence is mixed regarding the benefits of including parents in CBT for school-age youth and adolescents (Breinholst et al., 2012), the preschool developmental period is marked by significant child reliance on parents, underscoring the importance of interventions that directly target early parenting risk factors implicated in the development of anxiety. Such programs target these key risk factors via varying delivery formats. Specifically, systematic review data specify that Family-Based CBT and Group Parent CBT (which may include concurrent Group Child CBT) are Well-Established and Probably Efficacious treatments for anxiety in younger children, respectively (Comer et al., 2019). Group Parent CBT involves delivering treatment to a group of parents without children present. Standard components include psychoeducation regarding the emergence and maintenance of child anxiety, development and implementation of child exposure hierarchies, and between-session assignments to generalize skills across settings. Alternatively, Family-Based CBT and Group Parent CBT with concurrent child groups involve addressing a greater number of early parenting and child (i.e., coping/social skills) risk factors simultaneously. Nevertheless, no study to our knowledge has examined directional patterns of change between child and parent factors during and following treatments for young inhibited children, including how anxiolytic parenting and child anxiety may operate to bring about change in one another.

Thus, we addressed these gaps in the literature by conducting a secondary examination of bidirectional and transactional relations between parent-reported child anxiety and parent-reported and observed parenting behaviors across two *early* interventions for inhibited *young* children at risk for later anxiety and their parents: The multicomponent Turtle Program ('Turtle'; Chronis-Tuscano et al., 2015) and the parent-only Cool Little Kids program ('CLK'; Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005). Cool Little Kids

(Rapee et al., 2005, 2010) is comprised of six parent-only group sessions and includes the aforementioned Group Parent CBT components. Conversely, the 8-session Turtle Program is comprised of Group Parent CBT and concurrent Child Group CBT to target the peer context. The child component of the Turtle Program is an adaptation of Social Skills Facilitated Play program ('SSFP'; Coplan, Schneider, Matheson, & Graham, 2010) and the parent component is an adaptation of group parent–child interaction therapy (PCIT; Eyberg, 1988), an evidence-based intervention initially developed to target child externalizing behaviors. Parents are provided in vivo coaching to decrease anxiogenic parenting and implement exposures to reduce child anxiety and avoidance, including within the peer context.

We aimed to examine the directionality of links between parenting and child anxiety (i.e., parent-to-child vs. child-to-parent influences) within the two *active* treatment groups across four timepoints: pre-(T1), mid-(T2; after four therapy sessions), and post-treatment (T3), as well as a one-year follow-up (T4). We employed a multimodal, repeated measures design to examine how one variable predicted another variable later in treatment (and vice versa) and to explore whether mechanisms of change differed across treatment *formats*. Similar studies of older anxious youth have often fit traditional CLPMs to examine these relations between parent/ child factors across treatment. However, criticisms of the CLPM include an inability to parse between- and within-person effects, which can result in biased estimates (Hamaker, Kuiper, & Grasman, 2015). We thus utilized latent curve models with structured residuals (LCM-SR; Curran, Howard, Bainter, Lane, & McGinley, 2014) to separate state-like fluctuations over time (i.e., within-person) and variability that remains stable over time (i.e., between-person). Furthermore, we sought to not only capture dynamic processes across treatment but also examine bidirectional changes in parent/child factors. Thus, in attempt to even further match our statistical analyses to our research questions, we also fit latent change score models with a changes-to-changes extension (LCS-CC; Grimm, Mazza, & Mazzocco, 2016) to examine whether changes in parenting (between two timepoints) predict subsequent *changes* in child anxiety (between the next two subsequent timepoints), and vice versa.

Although the investigation of child/parent mediators in early interventions for inhibited young children is virtually unexplored, we hypothesized that parenting would mediate child anxiety outcomes and that child anxiety would mediate parenting outcomes. A previous examination of primary treatment outcomes revealed that Turtle parents demonstrated significantly more observed positive affect and less negative control at post-treatment relative to CLK parents (Chronis-Tuscano et al., 2021), indicating that pathways from child anxiety to treatment outcomes via observed parenting mediators may differ across treatment formats.

Method

Participants

151 families were block randomized to Turtle or CLK (Table 1; Figure 1). Eligible families had a child 45–64 months old who (a) fell at/above the 85th percentile on the Behavioral Inhibition Questionnaire (BIQ; Bishop et al., 2003); (b) attended a structured school program; (c) did not have a prior autism spectrum disorder diagnosis; (d) did not meet diagnostic criteria for selective mutism; (e) did not receive outside anxiety treatment

during the study's treatment phase. See Chronis-Tuscano et al. (2021), for further details regarding study sample/recruitment and Novick et al. (2020), for a more detailed description of patterns in treatment engagement.

Procedures

After establishing inclusion criteria via a telephone screen, qualifying families completed a laboratory visit, where they participated in an observation of parent–child interaction. The same laboratory assessment was completed at T2 and T3. Questionnaires were completed online at all timepoints. Families received $50 and $75 for T3 and T4 assessments, respectively. T2 assessments occurred after the fourth treatment session for both groups. T3 assessments occurred 4–5 weeks after the mid-treatment assessment. All study procedures were approved by the University of Maryland Institutional Review Board. All parents provided written informed consent. The current sample size is grounded in the expected dropout rate across a longitudinal study and assumption of a moderate effect size. Data collection occurred between 2015 and 2020. ClinicalTrials.gov registration: NCT02308826.

Measures

Child anxiety.—At all timepoints, parents completed the Preschool Anxiety Scale (PAS; Spence, Rapee, McDonald, & Ingram, 2001), which assesses ratings of child anxiety disorder symptoms. The sum of the social anxiety, general anxiety, specific phobia, and separation anxiety symptom subscales were used in the current study. Children in the current sample had a very low incidence of obsessive–compulsive symptoms. Consequently, this subscale was not included. The measure has demonstrated good construct validity with the internalizing scale of the Child Behavior Checklist (Spence et al., 2001). Cronbach alpha ranged from .86–.89 for the total PAS score.

Accommodation of child anxiety.—At each timepoint, parents completed the Family Accommodation Scale-Anxiety (FASA; Lebowitz et al., 2013), which assesses parent participation in child anxiety-related behaviors and modification of routines due to child anxiety. The Participation and Modification subscales have been shown to demonstrate strong reliability and validity (Lebowitz et al., 2013). Cronbach alpha ranged from .83–.86 for the total FASA score.

Observed parenting.—During a parent–child free play task at the T1–T3 assessments, observers masked to treatment randomization coded parent positive affect (PA) and negative control (NC) using an adaptation of the Maternal Warmth and Control Scale (Rubin, Cheah, Smith, & Wagner, 2016). Parents were ascribed a global score ranging from 1 (low) to 5 (high). Each coder reached reliability on 22% of cases, achieving ICCs of .75+ with a lead coder for each global parenting category.

Interventions

Within each cohort, 5–7 families participated in each treatment group. Both the Turtle Program and CLK parent groups were implemented by two parent group leaders. SSFP and parent group leaders participated in weekly supervision with a licensed clinical psychologist. See Figure 2 for a description of session content for both CLK and The Turtle Program.

Turtle Program.—Turtle comprises eight concurrent 90-min parent and child group sessions (Chronis-Tuscano et al., 2015). The parent component is an adaptation of group parent–child interaction therapy (PCIT; Eyberg & Funderburk, 2011) and consists of three phases. In the Child Directed Interaction (CDI) phase, Turtle parents received psychoeducation regarding BI, the etiology of anxiety, and anxiolytic parenting behaviors. Parents learned/practiced CDI skills (i.e., following the child's lead in play via use of differential attention, planned ignoring, and refraining from questions, commands, and criticism) through in-session activities, in vivo coaching (via a bug-in-the-ear device), and daily 5-min playtime homework ('Special Time'). In the Bravery Directed Interaction (BDI) phase, parents built exposure hierarchies, implemented exposures, learned skills to manage parent anxiety, and discussed plans for managing future transitions. Parents practiced BDI skills through live in vivo coaching, insession activities, and between-session homework. In the Parent Directed Interaction (PDI) phase, parents learned to manage disruptive behaviors (e.g., effective commands, time out sequence). Turtle children simultaneously participated in a modification of the Social Skills Facilitated Play program (SSFP; Coplan et al., 2010) to learn problem solving, emotion regulation, and social skills via games/stories. SSFP group leaders facilitated approach behaviors (e.g., making eye contact, sharing, initiating play) and social interactions. Treatment fidelity ratings indicated 98.99% and 91.40% adherence for the parent and child groups, respectively.

Cool Little Kids.—CLK (Rapee et al., 2005) included 6, 120-min parent-only group sessions. CLK parents received psychoeducation regarding the etiology of anxiety, identification of anxious child behaviors, and unhelpful parent responses to child anxiety. Sessions focused on behavior management techniques, building exposure hierarchies, and troubleshooting barriers to between-session exposure homework practice. Sessions included parent anxiety management skills and discussions regarding plans for future developmental transitions. Treatment fidelity ratings indicated 91.40% adherence.

Data analytic plan

Analyses were conducted using the *Lavaan* package (Rosseel, 2012) of the R statistical software (R Core Team, 2019). Our modeling approach included each variable measured at each timepoint (i.e., T1, T2, T3, T4), allowing each variable to serve as a potential predictor, mediator, and outcome. Given the aforementioned concerns with the traditional CLPM, we employed two related, yet distinct modeling approaches to test reciprocal within-person level-to-future level and change-to-future change links between all parenting/child anxiety variables at T1–T4. Specifically, we examined transactional relations between parent/child variables via a series of LCM-SRs (Curran et al., 2014), which adjusted for autoregression and separated within- and between-person effects. We also fit a series of LCS-CC models (Grimm et al., 2016) to examine bidirectional *changes* in parent/child factors. We explored whether reciprocal associations were moderated by treatment group (CLK vs. Turtle) using a multigroup approach. Please see Appendix S1 for further details regarding our model building strategy, including our process of imposing model constraints.

Nonnormality and missing data were accounted for via robust full information maximum likelihood. Indirect effects were estimated as the product of relevant path coefficients, and

Monte Carlo-approximated confidence intervals were used to infer significance (Tofighi & MacKinnon, 2011). Theoretically relevant covariates were included if they were found to predict the variables of interest at any timepoint. The comparative fit index (CFI > .95 for very good fit; CFI > .90 for adequate fit) and root-mean-square error of approximation (RMSEA < .05) were used to evaluate model fit (Bentler, 1990; Hooper, Coughlan, & Mullen, 2008; Kline, 1998).

Results

Child anxiety and accommodation of child anxiety

Latent curve models with structured residuals (LCM-SR).—The unconstrained LCM-SR examining reciprocal relations between child anxiety and accommodation fit the data well (χ^2 (67) = 74.043, p = .259, RMSEA = .035, CFI = 1.00). The constrained model exhibited good fit (χ^2 (104) = 105.816, p = .432, CFI = .992, RMSEA = .015). The final constrained model did not fit significantly worse than the initial unconstrained model ($\Delta\chi^2(37) = 33.505$, p = .634). Between-person effects for all models are described in Appendix S2.

All direct paths are presented in Figure 3. Estimates of the direct and indirect effects are presented in Tables 2 and 3, respectively. No indirect effects emerged in the LCM-SR for CLK. In Turtle, lower levels of T1 accommodation predicted lower levels of T4 accommodation via lower levels of T2 and T3 child anxiety. Lower levels of T1 child anxiety predicted lower levels of T4 accommodation via lower levels of T2 and T3 child anxiety. As such, results revealed a transactional path between parent accommodation and child anxiety that ultimately produced lower levels of T4 parent accommodation.

Latent change score model with changes-to-changes (LCS-CC).—The unconstrained bivariate LCS-CC model containing accommodation and child anxiety fit the data well ($\chi^2(41) = 36.695$, p = .662, CFI = 1.00, RMSEA = .00). The constrained model exhibited good fit ($\chi^2(48) = 41.070$, p = .750, CFI = 1.00, RMSEA = .00). The final constrained model did not fit significantly worse than the initial unconstrained model ($\Delta\chi^2(6) = 3.433$, p = .753). A description of random intercept factor, coupling, and proportional growth (i.e., autoregressive coupling effects) findings is presented in Appendix S3.

In Turtle, the changes-to-changes regression of accommodation change on child anxiety change was positive (B = .507, SE = .244, p = .038), indicating that a *decrease* in child anxiety from one timepoint to the next predicted a *subsequent decrease* in accommodation across the following two timepoints. The changes-to-changes regression of child anxiety change on accommodation change was also positive in Turtle (B = 1.533, SE = .466, p < .001), indicating that a *decrease* in accommodation from one timepoint to the next predicted a *subsequent decrease* in child anxiety across the following two timepoints. These results suggest that there was *bidirectional change* in child anxiety and accommodation in Turtle. Neither of the changes-to-changes regressions were significant in CLK.

Child anxiety, observed parent negative control (NC), and parent positive affect (PA)

LCM-SR.—The unconstrained LCM-SR containing child anxiety, PA, and NC fit the data well (χ^2 (84) = 115.713, p = .012, RMSEA = .066, CFI = .972). The constrained model exhibited good fit (χ^2(121) = 117.268, p = .579, CFI = 1.00, RMSEA = .00). The final constrained model did not fit significantly worse than the initial unconstrained model ($\Delta\chi^2$(37) = 9.356, p = 1.00).

All direct paths are presented in Figure 4. Estimates of the direct and indirect effects are presented in Tables 4 and 5, respectively. No indirect effects emerged in the LCM-SR for CLK. Three indirect effects were found in Turtle that suggest child-to-parent influences. Higher levels of T1 child anxiety predicted lower T3 NC via greater T2 PA. Higher levels of T1 child anxiety predicted higher T3 PA via (a) greater T2 PA and (b) greater T2 child anxiety. Interestingly, observed parenting did not predict child anxiety at any timepoint in either group.

LCS-CC.—The LCS-CC containing NC, PA, and child anxiety (and bivariate versions of the model) did not converge. We describe findings from the bivariate models without the changes-to-changes component in Appendix S3.

Discussion

Despite progress in the development of effective interventions for anxious youth and their families, little is known about the mechanisms underlying their positive outcomes and directionality of the relations between child and parent treatment targets. Accordingly, the current study examined reciprocal within-person level-to-future level and change-to-future change relations between parenting (accommodation of child anxiety, observed PA and NC) and child anxiety across two early interventions for inhibited young children: (1) the Turtle Program ('Turtle'), an adaptation of PCIT comprised of concurrent parent and child groups (and in vivo coaching); and (2) Cool Little Kids ('CLK'), a parent-only intervention. In partial support of our hypotheses, LCM-SR results revealed transactional links between child anxiety and parenting, *but only in Turtle*. Similarly, results of our LCS-CC analyses revealed bidirectional effects of changes in parent accommodation and child anxiety during and after the intervention, *but only in Turtle*. Findings, clinical and methodological implications, and recommendations for future directions are discussed.

Interestingly, our LCM-SR models revealed transactional paths in Turtle, both of which indicated potential increases in parent attunement. In one model, an indirect path emerged whereby lower levels of T1 accommodation predicted lower levels of T4 accommodation via lower levels of T2 and T3 child anxiety. Given that this LCM-SR included *parent-reported* accommodation and child anxiety, this indirect path suggests that a relationship developed between Turtle parents' impressions of their children's anxiety and their own parenting approach (in terms of parent accommodation). These findings suggest that parents in Turtle may have become more attuned to their own and their children's behaviors/emotions and, as such, may have become more accurate reporters over the course of treatment, which has important implications for methods of testing intervention effectiveness. The LCM-SR containing observed parenting revealed a similar path, whereby Turtle parents responded

to their children's elevated levels of T1 anxiety by increasing their use of PA in their play at T2, which subsequently prompted decreases in T3 NC. Results across these two models suggest that, between T1 and T2, Turtle parents became especially attuned to their own and their children's emotions and behaviors. Although prior work has established links between parent accuracy in predicting inhibited children's fearful behaviors (i.e., attunement) and the use of more intrusive parenting behaviors (Kiel & Buss, 2011), this may not necessarily represent a negative pattern within the context of treatment. Indeed, our findings indicate that increased parent attunement to child anxiety ultimately resulted in *lower* parental NC at post-treatment. Additionally, parents attuned to their children's anxiety may be well-poised to identify opportunities to implement skills learned during treatment.

This pattern of results is especially intriguing given that Turtle parents did not rate themselves as more or less accommodating than CLK parents at T3/T4, and there are several conceptual reasons why Turtle might have specifically cultivated such parental attunement. As an adaptation of PCIT, Turtle's initial CDI phase comprised differential attention techniques to encourage child autonomy. In order to implement these CDI skills, parents had to first be aware of their children's behaviors and how their own parenting might serve to impact their children's subsequent actions. This parental reflection may have been reinforced when Turtle parents received in vivo coaching to respond effectively and sensitively to their children both during play and in-session exposures. PCIT components such as CDI/Special Time and in vivo coaching may have encouraged the parental sensitivity and reflection on parent behavior underlying the transactional paths identified in our findings. Indeed, PCIT for child externalizing has been shown to produce improvements in parent self-reported reflective functioning (Zimmer-Gembeck et al., 2019), a parent's ability to identify, understand, and sensitively respond to their children's cues (Slade, 2005). Future research should elucidate the role of parents' reflective functioning as a potential mechanism underlying outcomes of early interventions for inhibited young children.

We also fit an LCS-CC to assess whether *changes* in (rather than levels of) parenting/child anxiety were predicted by previous *changes* in these variables across two or more timepoints. Our LCS-CC findings coincide with developmental transactional models, suggesting that the development of child anxiety may be the result of both child-to-parent and parent-to-child influences rather than just parent-to-child influences, as often assumed (Hastings, Rubin, Smith, & Wagner, 2019). Specifically, our LCS-CC results revealed reciprocal relations between *changes* in child anxiety and parent accommodation of child anxiety during and after treatment for Turtle families. This suggests that directly targeting *both* accommodation and child anxiety likely results in a positive feedback loop in early interventions for young inhibited children. These findings resemble the bidirectional relationship between family accommodation and youth anxiety symptoms found across CBT targeting adolescent anxiety (Bertelsen et al., 2022).

Though our findings supporting reciprocal change in accommodation and child anxiety are in accordance with our hypotheses, it is unclear why these paths only emerged within Turtle and not within CLK. Again, the growth model yielded significant slope for both accommodation and child anxiety, indicating that, on average, children and parents in both interventions exhibited significant reductions in anxiety and accommodation at T3 and

T4, respectively. Although there were no significant differences in parent accommodation outcomes between the two interventions, our findings demonstrate that, even in such cases, there may be *different paths* by which ultimate changes in parent accommodation come about, highlighting the importance of taking treatment condition into account in analyses examining two active treatment groups (rather than collapsing across groups). Though reciprocal effects between child anxiety and accommodation led to positive child/parent outcomes in Turtle, there may well be other parent factors not examined in the current study that are responsible for yielding these outcomes in CLK. For example, potential mechanisms to explore in future research may include parent cognitive reappraisal, parent tolerance of children's negative emotions, or parent anxiety symptoms. On the other hand, results may be attributable to using a parent-reported measure of child anxiety. Use of gold-standard semistructured interviews (e.g., Anxiety Disorder Interview Schedule for DSM-V-Child and Parent Version; ADIS-C/P; Silverman & Albano, 2020) and measures that capture impairment associated with child anxiety will be important to include in future studies replicating our findings (Creswell et al., 2021).

In contrast with our hypotheses, if we conceptualize parent-to-child influences as parenting behaviors that predicted T3/T4 child outcomes, parenting did not predict later child anxiety *at any timepoint* across the groups in either of the LCM-SR models. In accordance with the call for more frequent data collection points in RCTs examining interventions targeting childhood anxiety (Carper, Makover, & Kendall, 2018; Peris, Thamrin, & Rozenman, 2021), a greater number of data collection points *during the intervention* and between T3 and T4 may be necessary to capture parent-to-child influences. Furthermore, there are likely other parenting behaviors that need to be incorporated into future observational coding schemes to better examine these dynamic processes. In the current study, observed parenting was measured during a free play task. Higher levels of NC during free play, a context that does not inherently elicit controlling parent behaviors, may map onto similar behaviors during daily playtime outside of the laboratory and potentially imply even higher levels of NC in situations that require parental scaffolding. Research supporting such context effects suggests that parental oversolicitousness in lower stakes situations (i.e., free play) predicts greater levels of child social reticence (Kiel & Buss, 2012; Rubin, Cheah, & Fox, 2001). Nevertheless, the addition of further observational conditions may be necessary to sufficiently measure other observed anxiolytic parenting behaviors, including the specific parenting behaviors directly targeted in CLK and Turtle.

Strengths, limitations, and future directions

The current study was conducted in accordance with recent recommendations for conducting and reporting on RCTs for childhood anxiety (Creswell et al., 2021) and offers important methodological advances informed by the seminal CBT studies for school-age youth and adolescents (Settipani et al., 2013; Silverman et al., 2009, 2019; Silverman, Marin, Rey, Jaccard, & Pettit, 2021). Indeed, many previous studies examining mediators of treatment response solely examined outcomes across two or three timepoints, due to study design. Even so, longitudinal intervention studies often fail to lever-age data collected across multiple timepoints and to examine putative mediators and outcome variables *at each timepoint*. Within transactional models of child development, child and parent factors are

not necessarily specified as predictors, mediators, or outcome variables, as there may be a number of ways that relations between parent and child behaviors change sequentially across development (Sameroff, 2010). By allowing all child/parent variables to serve as predictors and outcomes at each timepoint, we were able to establish causal, reciprocal relations *during and following* treatment (Carper et al., 2018). Furthermore, despite progress in identifying reciprocal change processes across interventions for anxious youth, previous studies have relied on models that conflate between- and within-person variance. Employing methodology that addresses *within-person variations* to answer *within-person questions* about dynamic change will be crucial in future studies examining similar change processes. Finally, most of the prior CBT mediation dynamics studies have utilized self-report measures of parenting, despite evidence that parents may be biased in reporting on their own behaviors (Althubaiti, 2016). Observations of parenting behaviors are less susceptible to such reporter bias (Lotzin et al., 2015). Thus, the current study was strengthened by our multimethod approach that included observed parenting. In sum, as one of the few studies to compare two *active* interventions for young children at risk for anxiety, our rigorous study design and analytical approach represent a unique template for future studies examining mechanisms underlying positive parent/child outcomes and how those paths may vary across treatment formats.

There are some limitations to the current study that highlight exciting directions for future research. Although our sample size is on the larger end of parent–child anxiety intervention studies, future studies with larger sample sizes are needed to test the robustness of our findings. Additionally, as an efficacy study, the current findings may not generalize to lower resourced, community-based settings where barriers to treatment engagement may serve as a primary limitation to optimal treatment outcomes (Mian, 2014). Future research in a community setting with a more socioeconomically diverse sample will be necessary to test the generalizability of our findings. Moreover, it is impossible to parse apart which treatment components were responsible for each effect due to the multicomponent nature of the Turtle Program. Future dismantling studies will be necessary to clarify which treatment components are necessary to produce positive child/parent outcomes, as well as the optimal sequencing of such components. Finally, we were limited in our ability to explore changes-to-changes processes in our observed parenting variables, as they were only collected at three timepoints. Moreover, given that we only had three timepoints, we could only include either autoregressive or cross-lagged processes in the model exploring the accommodation variable. As such, in line with our research questions, we chose to only fit the model including cross-lagged relations. Future research elucidating the optimal number of data collection points and time lags will be necessary to best understand changes in youth symptoms and parenting, while also considering participant burden and cost.

Conclusion

The current study provides novel insight into the directionality of parent and child factors across varying formats of early interventions for young children at risk for later anxiety. Our results revealed reciprocal relations between changes in child anxiety and parent accommodation of child anxiety during and after treatment for families in the Turtle Program. In accordance with previous research examining CBT for older youth with anxiety,

these findings highlight the importance of targeting *both* factors simultaneously in early interventions for young children and their parents. The current study also contributes to the literature supporting the inclusion of PCIT components in interventions for young children with/at risk for anxiety. Additionally, our findings emphasize the importance of matching our statistical models to the specific within-person inferences we hope to draw about intervention processes. Failure to do so could result in improper conclusions, which, in turn, could inform the development of invalid theory (Berry & Willoughby, 2017). Future research incorporating rigorous methodology will be crucial in identifying additional mechanisms underlying these interventions, with the hope of further individualizing treatment, and ultimately, improving treatment engagement and outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data availability statement

The dataset presented in this article is not readily available because of ethical and privacy restrictions. Requests to access the dataset should be directed to the corresponding author.

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Key points

- Though research has elucidated the temporal unfolding of factors that place inhibited children at risk for anxiety, reciprocal transactions between these factors in the context of early interventions remain unknown.
- The current study examined mechanisms of change and treatment directionality (i.e., parent-to-child vs. child-to-parent influences) within a randomized controlled trial comparing two early interventions for inhibited preschoolers ($N = 151$): the Turtle Program ('Turtle') and Cool Little Kids ('CLK').
- Given criticisms of traditional cross-lagged panel models, we tested hypotheses via a series of A) latent curve models with structured residuals (LCM-SR) and B) latent change score models (LCS).
- LCM-SR results were consistent with child-to-parent influences found in studies examining CBT for older anxious youth, but only in Turtle. LCS analyses revealed bidirectional effects of *changes* in parent accommodation and *changes* in child anxiety during and after the intervention, but only in Turtle.
- Findings coincide with developmental transactional models, suggesting that the development of child anxiety may result from child-to-parent influences rather than just the reverse, and highlight the importance of targeting parent *and* child factors simultaneously in early interventions for young inhibited children.

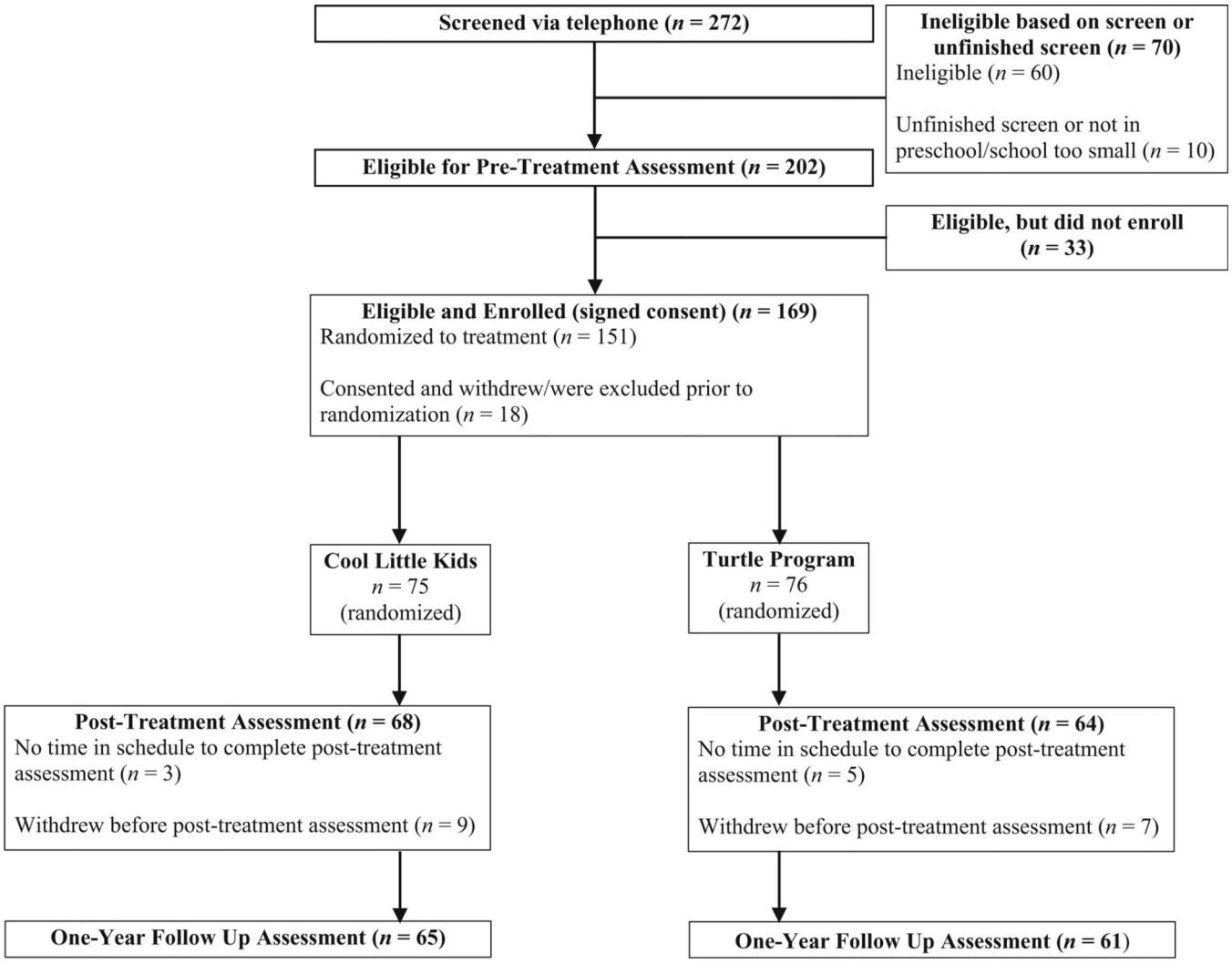

Figure 1.

CONSORT diagram. CLK, Cool Little Kids; Turtle, The Turtle Program. Five families who did not complete the post-treatment assessment completed the one-year follow-up assessment in CLK. Two families who did not complete the post-treatment assessment completed the one-year follow-up assessment in Turtle

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8
Turtle Program	**PG:** Anxiety Psychoeducation --- **CG:** How to introduce yourself How to ask someone to play	**PG:** Review identification of child anxiety CDI teach --- **CG:** Eye contact Identifying anxiety Balloon Breathing (relaxation)	**PG:** Review identification of child anxiety Troubleshoot CDI In-vivo CDI coaching --- **CG:** How to give compliments How to share about hobbies	**PG:** BDI teach Differential Attention for brave behaviors Principles of exposure + Fear hierarchies Monitoring parent anxiety in exposures --- **CG:** What it means to be brave Introduction to bravery ladders	**PG:** Troubleshoot CDI + exposures In-vivo BDI coaching (exposure practice) Monitoring and managing parent anxiety --- **CG:** Identifying and expressing emotions	**PG:** Troubleshoot CDI + exposures In-vivo BDI coaching (Show-and-Tell role play practice) --- **CG:** Dealing with disappointment Compromising with friends Show-and-Tell	**PG:** Troubleshoot CDI + exposures Differentiating anxiety and misbehaviors PDI teach --- **CG:** Assertiveness Working together to make decisions Listening to others' ideas Scavenger Hunt	**PG:** Troubleshoot CDI + PDI + exposures Planning for future transitions In-vivo coaching during graduation --- **CG:** Review skills Graduation ceremony and party

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6
Cool Little Kids	Anxiety psychoeducation	Review identification of child anxiety Role of anxiolytic parenting in increasing child anxiety Parent management skills for responding to child anxiety	Review examples of anxiolytic parenting Principles of exposure Fear hierarchies Monitoring parent anxiety in exposures	Troubleshoot exposures Additional fear hierarchies Cognitive restructuring for parent anxiety	Review parent encouragement of child independence Troubleshoot exposures Practice parent cognitive restructuring	Troubleshoot exposures Planning for future transitions

Figure 2.

The Turtle Program and Cool Little Kids session content. BDI, Bravery Directed Interaction; CDI, Child Directed Interaction; CG, Child Group; PDI, Parent Directed Interaction; PG, Parent Group. For more information, see Chronis-Tuscano et al. (2015), Danko et al. (2018) and Rapee et al. (2005)

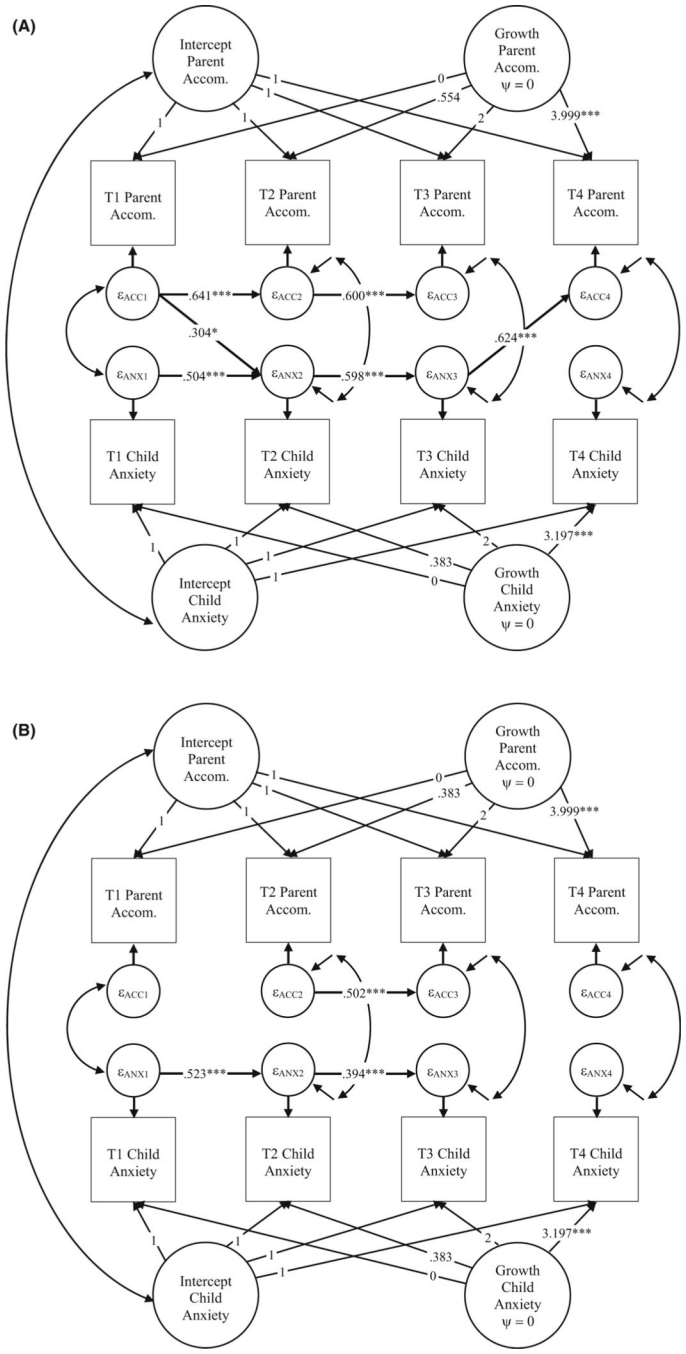

Figure 3.

(A) LCM-SR examining reciprocal relations between child anxiety and parent accommodation of child anxiety in Turtle. (B) LCM-SR examining reciprocal relations between child anxiety and parent accommodation of child anxiety in CLK. Accom./ACC, parent accommodation of child anxiety; ANX, child anxiety; CLK, Cool Little Kids; LCM-SR, Latent curve model with structured residuals; T1, pretreatment; T2, mid-treatment (4 weeks into treatment); T3, post-treatment (4 weeks after T2); T4, one-year follow-up; Turtle, The Turtle Program; ε, residual of observed measures; ψ, fixed factor variance; only

significant direct paths with standardized estimates are included for clarity. $^{\dagger}p$ = trend; *p < .05; **p < .01; ***$p \leq .001$

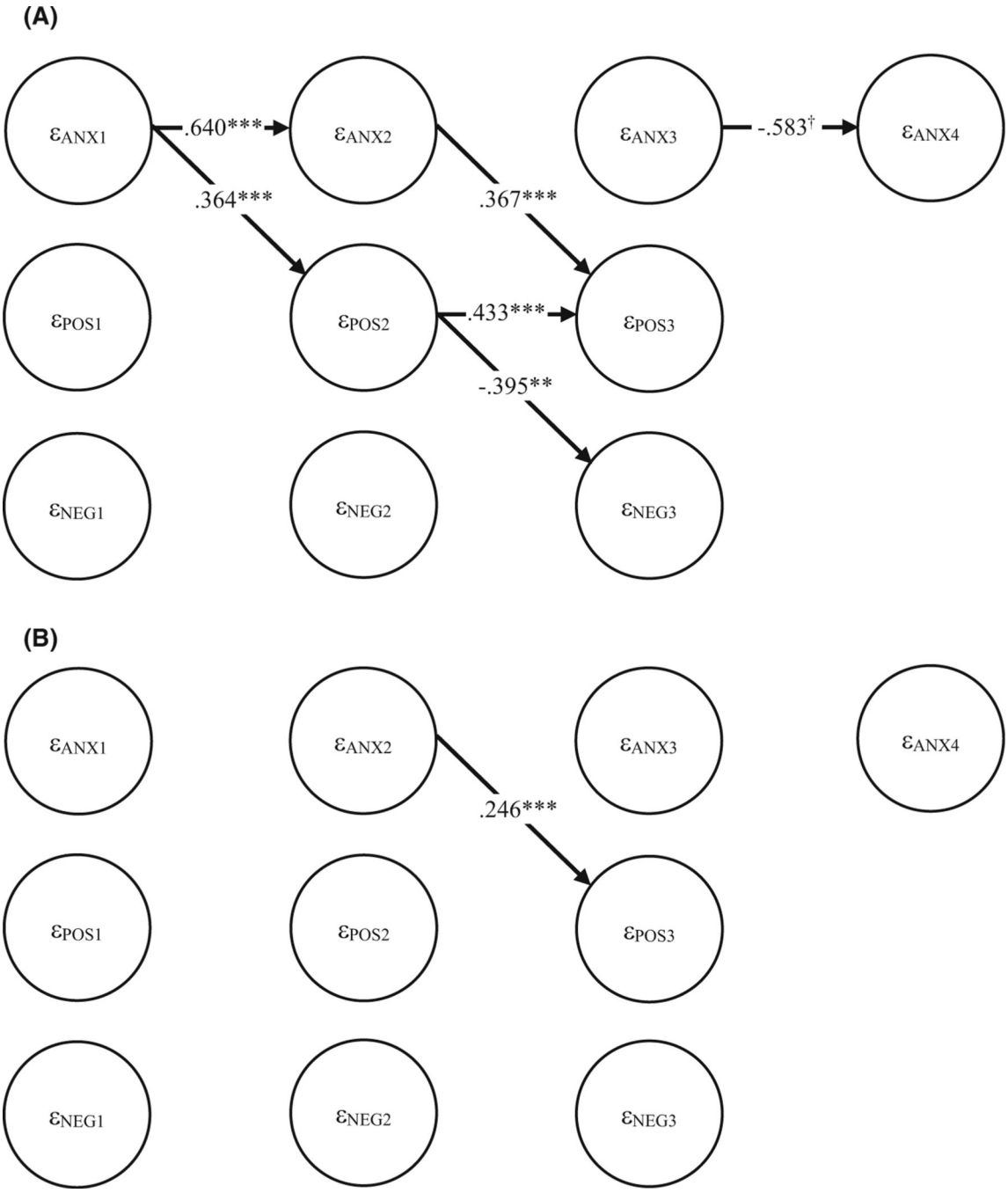

Figure 4.

(A) LCM-SR examining reciprocal relations between child anxiety and observed parenting in Turtle. (B) LCM-SR examining reciprocal relations between child anxiety and observed parenting in Turtle in CLK. ANX, child anxiety; CLK, Cool Little Kids; LCM-SR, Latent curve model with structured residuals; NEG, observed parent negative control; POS, observed parent positive affect; T1, pretreatment; T2, mid-treatment (4 weeks into treatment), T3, post-treatment (4 weeks after T2), T4, one-year follow-up; Turtle, The Turtle

Program; ε = residual of observed measures; only significant within-person direct paths with standardized estimates are included; $^{\dagger}p$ = trend, $^{*}p < .05$, $^{**}p < .01$, $^{***}p \leq .001$

Table 1

Sample characteristics at baseline assessment

	Turtle program	CLK
Primary parent (*N* = 151)		
Age in years, *M* (*SD*)	38 (4.4)	39.4 (5.7)
Sex (% female)	88%	83%
Parent race (%)		
White	69%	61%
Asian	21%	16%
Black	7%	20%
Other	3%	3%
Hispanic or Latinx (%)	7%	7%
Parent education (%)		
3 years of college or less	9%	12%
4 years of college (Bachelor's)	24%	24%
Master's Degree or equivalent	48%	36%
Doctoral Degree or equivalent	19%	28%
Median household income	$150,000+	
Child (*N* = 151)		
Age in months, *M* (SD)	53.2 (5.5)	52.7 (5.9)
Sex (% female)	56%	46%
Child Race (%)		
White	58%	43%
Asian	19%	9%
Black	7%	18%
Other	16%	30%
Hispanic or Latinx (%)	7%	11%

Outcome measures *M* (*SD*)	**Turtle program**	**CLK**	***t***
Family Accommodation Scale (FAS)	1.10 (0.73)	1.23 (0.82)	0.96
Preschool Anxiety Scale (PAS)	2.29 (0.62)	2.31 (0.52)	0.20
Observed Negative Control	2.42 (0.88)	2.69 (0.95)	1.78
Observed Positive Affect	2.50 (0.90)	2.23 (0.95)	−1.78

CLK, Cool Little Kids; PP, Primary Parent.

* $p < .05$.

Table 2

Direct effects of the LCM-SR examining reciprocal relations between child anxiety and parent accommodation of child anxiety

	Turtle		CLK	
Path	***B* (*SE*)**	***β* (*SE*)**	***B* (*SE*)**	***β* (*SE*)**
Autoregressions				
T1 ANX → T2 ANX	0.48 (0.14)***	0.50 (0.14)***	0.48 (0.14)***	0.52 (0.09)***
T2 ANX → T3 ANX	0.48 (0.14)***	0.60 (0.20)***	0.48 (0.14)***	0.39 (0.16)***
T3 ANX → T4 ANX	0.21 (0.23)	0.24 (0.26)	0.21 (0.23)	0.22 (0.23)
T1 ACC → T2 ACC	0.57 (0.11)***	0.64 (0.09)***	0.09 (0.13)	0.13 (0.18)
T2 ACC → T3 ACC	0.57 (0.11)***	0.60 (0.11)***	0.57 (0.11)***	0.50 (0.08)***
T3 ACC → T4 ACC	0.15 (0.12)	0.16 (0.13)	0.15 (0.12)	0.20 (0.16)
Cross-Lags				
T1 ACC → T2 ANX	0.22 (0.09)*	0.30 (0.11)*	−0.08 (0.05)	−0.19 (0.12)
T2 ACC → T3 ANX	−0.08 (0.05)	−0.13 (0.08)	−0.08 (0.05)	−0.11 (0.07)
T3 ACC → T4 ANX	−0.10 (0.13)	−0.16 (0.20)	−0.10 (0.13)	−0.15 (0.19)
T1 ANX → T2 ACC	−0.00 (0.13)	−0.00 (0.11)	−0.00 (0.13)	−0.00 (0.09)
T2 ANX → T3 ACC	−0.00 (0.13)	−0.00 (0.11)	−0.00 (0.13)	−0.00 (0.08)
T3 ANX → T4 ACC	0.82 (0.25)**	0.62 (0.13)**	−0.06 (0.20)	−0.06 (0.19)

ACC, parent accommodation of child anxiety; ANX, child anxiety; CLK, Cool Little Kids; LCM-SR, Latent curve model with structured residuals; T1, pretreatment; T2, mid-treatment (4 weeks into treatment); T3, post-treatment (4 weeks after T2); T4, one-year follow-up; Turtle, The Turtle Program.

† *p* = trend

* $p < .05$

** $p < .01$

*** $p \leq .001$.

Table 3

Indirect effects of the CLPM and LCM-SR examining reciprocal relations between child anxiety and parent accommodation of child anxiety

	CLK			Turtle		
Path	***B* (*SE*)**	**β (*SE*)**	**95% CI**	***B* (*SE*)**	**β (*SE*)**	**95% CI**
T1 ACC → T2 ANX → T3 ANX				.11 (.05) *	.17 (.08) *	.04, .34
T1 ACC → T2 ANX → T3 ANX → T4 ACC				.09 (.06) *	.11 (.06) *	.02, .25
T1 ANX → T2 ANX → T3 ANX → T4 ACC				.21 (14) ***	.21 (.01) ***	.03, .56
T2 ANX → T3 ANX → T4 ACC				.40 (.18) **	.38 (.18) **	.10, .77

ACC, parent accommodation of child anxiety; ANX, child anxiety; CLK, Cool Little Kids; CLPM, Cross-lagged panel model; LCM-SR, latent curve model with structured residuals; T1, pretreatment; T2, mid-treatment (4 weeks into treatment); T3, post-treatment (4 weeks after T2); T4, one-year follow-up; Turtle, The Turtle Program.

† *p*= trend

* $p < .05$

** $p < .01$

*** $p \leq .001$.

Table 4

Direct effects of the LCM-SR examining reciprocal relations between child anxiety and observed positive affect and negative control

	Turtle		CLK	
Path	***B* (*SE*)**	**β (*SE*)**	***B* (*SE*)**	**β (*SE*)**
Autoregressions				
T1 ANX → T2 ANX	0.62 (0.15)***	0.64 (0.13)***	0.17 (0.11)	0.28 (0.16)
T2 ANX → T3 ANX	0.17 (0.11)	0.30 (0.19)	0.17 (0.11)	0.09 (0.08)
T3 ANX → T4 ANX	−0.90 (0.51)†	−0.58 (0.24)†	0.21 (0.21)	0.23 (0.22)
T1 PA → T2 PA	0.15 (0.23)	0.12 (0.18)	0.23 (0.20)	0.19 (0.17)
T2 PA → T3 PA	0.41 (0.12)***	0.43 (0.13)***	0.23 (0.20)	0.27 (0.23)
T1 NC → T2 NC	−0.18 (0.15)	−0.28 (0.27)	−0.18 (0.15)	−0.16 (0.13)
T2 NC → T3 NC	−0.18 (0.15)	−0.11 (0.07)	−0.18 (0.15)	−0.18 (0.15)
Cross-Lags				
T1 PA → T2 ANX	0.02 (0.03)	0.03 (0.06)	0.02 (0.03)	0.05 (0.11)
T1 NC → T2 ANX	−0.01 (0.04)	−0.01 (0.07)	−0.01 (0.04)	−0.03 (0.15)
T2 PA → T3 ANX	0.02 (0.03)	0.07 (0.14)	0.02 (0.03)	0.04 (0.07)
T2 NC → T3 ANX	−0.01 (0.04)	−0.01 (0.08)	−0.01 (0.04)	−0.02 (0.10)
T3 PA → T4 ANX	0.08 (0.12)	0.22 (0.33)	0.02 (0.10)	0.04 (0.22)
T3 NC → T4 ANX	−0.10 (0.14)	−0.21 (0.28)	0.05 (0.06)	0.12 (0.16)
T1 ANX → T2 PA	0.87 (0.27)**	0.36 (0.12)**	−0.65 (0.40)	−0.27 (0.14)
T1 NC → T2 PA	0.05 (0.12)	0.03 (0.08)	0.05 (0.12)	0.04 (0.10)
T2 ANX → T3 PA	0.87 (0.27)**	0.37 (0.12)**	0.87 (0.27)**	0.25 (0.11)**
T2 NC → T3 PA	0.05 (0.12)	0.02 (0.05)	0.05 (0.12)	0.05 (0.13)
T1 ANX → T2 NC	−0.03 (0.21)	−0.03 (0.21)	−0.03 (0.21)	−0.01 (0.09)
T1 PA → T2 NC	−0.04 (0.13)	−0.08 (0.25)	−0.04 (0.13)	−0.04 (0.11)
T2 ANX → T3 NC	−0.03 (0.21)	−0.02 (0.12)	−0.03 (0.21)	−0.01 (0.05)
T2 PA → T3 NC	−0.28 (0.10)**	−0.39 (0.14)**	−0.03 (0.23)	−0.03 (0.24)

ANX, child anxiety; CLK, Cool Little Kids; LCM-SR, Latent curve model with structured residuals; NC, observed parent negative control; PA, observed parent positive affect; T1, pretreatment; T2, mid-treatment (4 weeks into treatment); T3, post-treatment (4 weeks after T2); T4, one-year follow-up; Turtle, The Turtle Program.

†p = trend

*$p < .05$

**$p < .01$

***$p \leq .001$.

Table 5

Indirect effects of the CLPM examining reciprocal relations between child anxiety, and observed positive affect and negative control

	CLK			Turtle		
Path	***B* (*SE*)**	**β (*SE*)**	**95% CI**	***B* (*SE*)**	**β (*SE*)**	**95% CI**
T1 ANX → T2 PA → T3 NC				− .23(.10) **	−.14(.06) **	−.26, −.04
T1 ANX → T2 PA → T3 PA				.34(.13) **	.15(.05) **	.06, .24
T1 ANX → T2 ANX → T3 PA				.53(.21) ***	.24(.10) ***	.07, .47

ACC, parent accommodation of child anxiety; ANX, child anxiety; CLK, Cool Little Kids; CLPM, Cross-lagged panel model; LCM-SR, latent curve model with structured residuals; Turtle, The Turtle Program; T1, pretreatment; T2, mid-treatment (4 weeks into treatment), T3, post-treatment (4 weeks after T2), T4, one-year follow-up.

† *p*= trend

* *p*< .05

** *p* < .01

*** *p* ≤ .001.