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The Structure of Parent-Child Coping Interactions as a Predictor of Adjustment in Middle Childhood: A Dynamic Systems Perspective

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THE STRUCTURE OF PARENT-CHILD COPING INTERACTIONS AS A PREDICTOR OF ADJUSTMENT IN MIDDLE CHILDHOOD: A DYNAMIC SYSTEMS PERSPECTIVE

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Abstract

This study applied a contemporary dynamic systems methodology (state space grids) to examine how the structure of parent-child coping interactions, above and beyond the content of such interactions, influences adjustment (i.e., internalizing problems, externalizing problems, and coping efficacy) over time in middle childhood. A community sample of children (N = 65) completed a stressful laboratory task with a parent present, during which parent and child behavior were observed. Parent behavior during the task was coded using a socialization of coping framework. Parents' verbal suggestions to their child about how to cope with the stressful task were coded as primary control engagement suggestions (i.e., suggestions encouraging the child to directly address and attempt to change the stressor or the child's associated emotions), secondary control engagement suggestions (i.e., suggestions encouraging the child to change their own reaction to their stressor), or disengagement suggestions (i.e., suggestions encouraging the child to take their attention away from the stressor). Child coping verbalizations and behavior during the task was coded as either engaging with the stressor or disengaging from the stressor. The structure of the parent-child coping interaction was measured in two ways: (a) dyadic flexibility, defined as the dispersion of parent and child behavior across all possible behaviors and the number of transitions between different parent or child behaviors during the task, and (b) attractor (i.e., parent-focused, child-focused, or dyad-focused interaction pattern) strength, defined as the number of visits, duration per visit, and return time to that interaction pattern. Child adjustment outcomes were measured using parent-report (internalizing and externalizing problems) and child-report (coping efficacy) at baseline and a 6-month follow-up. Linear regression analyses were conducted examining dyadic flexibility and the proposed attractors as predictors of child adjustment, while accounting for demographic variables, attractor content, and adjustment at baseline. Findings suggested that dyadic flexibility in the parent-child coping interaction was largely adaptive for child adjustment, whereas attractor strength demonstrated a more complex relationship with child adjustment outcomes. This study demonstrates the utility of applying state-space grids to examine the structure of parent-child coping interactions, in addition to content, as predictors of child adjustment. Furthermore, this study offers novel, *detailed* information about coping interactions in families with children in middle childhood. Clinical implications, limitations, and future directions are discussed.

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The ability to effectively cope with stress and challenge is a key developmental task for children and adolescents. The development of coping involves many components, such as the child's internal resources and the context surrounding the child. Socialization of coping is a critical way in which parents can influence this developmental task in their children (Power, 2004; Skinner & Zimmer-Gembeck, 2007). Socialization of coping involves parents teaching their children to regulate their emotions and behaviors in the face of stress (Kliewer, Fearnow, & Miller, 1996; Abaied & Rudolph, 2010). Existing methodologies used to examine the development of coping and parent socialization of coping have primarily measured the mean-level content of parents' attempts to teach their children how to cope with stress (e.g., Abaied & Rudolph, 2010; Abaied, Wagner, & Sanders, 2014; Stanger, Abaied, Wagner, & Sanders, 2018) and children's global coping strategies (Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001; Watson et al., 2014). This thesis aimed to extend this research by shifting the focus of investigation from the content to the structure of socialization of coping and coping behavior. Structure refers to the flexibility vs. rigidity of the parent-child interaction, such as how parents adjust their parenting to meet the needs of their child as their child attempts to cope in real time. Until recently, analysis of the structure of parent-child interactions was scarce due to a lack of appropriate methodologies (e.g., Richters, 1997). The goal of this thesis was to apply a contemporary dynamic systems methodology, i.e., state space grids, to examine how the structure of parent-child coping interactions, above and beyond the content of such interactions, influences adjustment (i.e., internalizing problems, externalizing problems, and coping efficacy) over time in middle childhood.

Dynamic Systems Theory

The dynamic systems perspective is an overarching developmental theory in which to situate the study of coping. Dynamic systems theory emphasizes continuous interactions and nested processes. Specifically, dynamic systems theory argues that development must be conceptualized as continuous interactions between all levels of the developing system, spanning from the cellular and molecular level to the societal and cultural level (Thelen & Smith, 1998). Moreover, development must be conceptualized as nested processes and levels that are interacting and self-organizing over many different timescales, from milliseconds to years (Thelen & Smith, 1998). Dynamic systems theory emphasizes the *how* of developmental processes and proposes that developmental process refers to a change within a complex, dynamic system, in which development is the emergent product of many local interactions that occur in real time (Thelen & Smith, 1994).

When applied to the study of the development of coping, the family systems perspective, which is a subtype of the broader dynamic systems perspective, is most relevant. The family systems perspective suggests that each family member, and the characteristics of each family member, are embedded in a family system (Cox & Paley, 1997). Therefore, the coping process of the child cannot be separated or understood without accounting for that context. In this way, the family systems (and dynamic systems) perspectives are consistent with contemporary coping theories, suggesting that investigations of interactions between the child (e.g., behavior, physiology, temperament, and cognitive functioning) and the environmental context (e.g., parent behavior, peer support, family stressors, and socioeconomic status) are essential to understanding how coping develops (Skinner & Zimmer-Gembeck, 2009).

Development of Coping

Coping is broadly defined as the voluntary regulation of motivation, attention, behavior, emotions, and cognition in the face of stress (Skinner & Zimmer-Gembeck, 2009). Coping is a developmental process that can be conceptualized as a series of ongoing interactions that produce patterns over time (Skinner & Zimmer-Gembeck, 2009). Utilizing a dynamic systems framework, Skinner and Zimmer-Gembeck (2009) suggest that the development of coping consists of three related processes: adaptive, episodic, and interactional. The adaptive process relates to the long-term effects of coping on developmental outcomes. Most of the coping literature focuses on this process, examining how coping is involved in the relationships between stress, risk, and adversity and child outcomes. The episodic process examines episodes (i.e., specific instances) of coping that unfold over time. Research on this process tends to examine how present coping episodes influence future episodes, creating short-term trajectories in coping resources. The interactional process is the final process; it involves reciprocal coping interactions between person and context and the way in which many components of a coping response are evoked and coordinated in real-time. Research using the interactional level tends to examine single coping episodes in detail. These interactional coping processes are the focus of this dissertation.

Across all of Skinner and Zimmer-Gembeck's (2009) levels of coping process, I conceptualize the typology of coping based on Compas et al.'s (2001) coping framework, which posits that responses to stress can be either voluntary or involuntary. Involuntary responses are comprised of physiological, emotional, and cognitive responses that occur without conscious intention or effort (Connor-Smith & Compas, 2004), whereas coping is defined as a voluntary and effortful response to stress (Compas et al., 2001). Within this framework, coping is comprised of engagement and disengagement strategies to handle stressors. Engagement strategies involve orienting toward stress and related emotions. Engagement coping can be further divided into primary control engagement coping, defined as directly addressing the stressor or its resulting negative emotions (e.g., problem solving, expressing emotions) and secondary control engagement coping, defined as adapting oneself to the stressful condition (e.g., cognitive restructuring). Alternatively, disengagement coping involves orienting away from stress and related emotions (e.g., avoidance, denial).

As children develop cognitively, their coping strategies and coping supports change as well. Specifically, coping in early childhood tends to be dominated by overt, behavioral coping, such as physical distraction and crying. By middle childhood, children's cognitive (including attention and memory) abilities, as well as their emotional- and self-understanding, have developed to produce coping that tends to involve more cognitive strategies and a more coordinated regulatory system (Skinner & Zimmer-Gembeck, 2009). Caregiver roles in children's coping change across development as well. In early childhood, parents tend to be directly involved in facilitating their child's coping strategies; across childhood, parents shift towards providing direct instruction to their child and eventually to mainly providing reminders to their child (Skinner & Zimmer-Gembeck, 2009). This dissertation will examine the development of coping in middle childhood for two reasons. First, children's improving cognitive abilities allow them to produce a greater variety of coping strategies during this developmental period compared to infancy and early childhood (Sameroff & Haith, 1996; Band & Weisz, 1990). Second, this period marks an intermediary step in the caregiver's role in child coping, such that children are increasingly capable of implementing coping strategies on their own, but still rely on parents for guidance to some degree (Power, 2004). Thus, middle childhood represents an ideal developmental period to study the development of coping, and parents' role therein, due to the increased variability in children's coping strategies and parents' continuing role in the coping process.

In middle childhood, coping is most often measured through child self-report, parent-report of the child, and child interviews (Compas et al., 2001). These methods tend to capture the adaptive and episodic coping processes, as defined by Skinner and Zimmer-Gembeck (2009). Studies using these methodologies have found that engagement coping strategies tend to be associated with fewer internalizing problems (Compas et al., 2001; Bettis et al., 2015; Dunbar et al., 2013), and to a lesser extent, fewer externalizing problems in children (Compas et al., 2001; Compas et al., 2010). Disengagement coping, on the other hand, tends to be associated with more internalizing and externalizing problems (Compas et al., 2001; Downey, Johnston, Hansen, Birney, & Stough, 2010).

There is a much smaller literature assessing coping observationally. Studies using observational measures to examine coping in real time tend to focus on younger children, due to the overt, behavioral nature of their available coping strategies. For example, the Early Coping Inventory (ECI; Zeitlin, Williamson, & Szczepanski, 1988) is a global measure of adaptive behaviors seen as indicators of early coping abilities in 4- to 36-

month-olds. Vondra, Shaw, Swearingen, Cohen, and Owens (2001) found that at 24-months, two of the ECI global codes, the sociable (i.e., child gives and accepts affection, child maintains visual attention) and competent exploration (i.e., child initiates exploration, child demonstrates task persistence, child completes self-initiated activity) codes, predicted fewer externalizing problems over time. The competent exploration code also predicted fewer internalizing problems over time. Other methods include global codes of aggregated forms of emotion regulation in 3-year-olds, which predicted less anxiety over time (Bosquet & Egeland, 2006). Behavioral strategies, such as shifting attention and information seeking in 3-year-olds predicted fewer externalizing problems over time (Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002). Additionally, the Behavioral Approach-Avoidance and Distress Scale has been validated as a global measure of children's coping during a painful medical procedure in children ages 3 to 7 (Bachanas & Blount, 1996).

Another way that coping has been operationalized is task persistence in the context of dyadic problem solving. Chang and Olson (2016) examined child task persistence and maternal responsiveness in 3-year-olds. They found that observed child task persistence was related to higher maternal behavioral responsiveness during the same block design task and to fewer externalizing problems at ages 6 and 10 (Chang & Olson, 2016). Similarly, Eisenberg et al. (2003) found that child regulation (a latent variable that included observed task persistence during a puzzle task) mediated the relationship between parent positive and negative expressivity and externalizing problems, internalizing problems, and social competence among 6- to 10-year-olds. Suveg, Shaffer, and Davis (2016) have also developed a self-regulation coding scheme for preschoolers that assessed task engagement during a parent-child Etch-a-Sketch task. Their self-regulation scale ranged from “Very low engagement/persistence” to “Very high engagement/persistence” and included both verbal and behavioral indicators of task engagement (Suveg et al., 2016). They found that family risk moderated the relationship between parent-child physiological synchrony and child self-regulation, such that in low risk families, physiological synchrony was associated with better self-regulation, but the opposite was true in high risk families (Suveg et al., 2016).

The lack of research examining observations of coping in middle childhood is likely because observations are limited by the inability to assess covert cognitive coping strategies that are improving during this developmental period (Compas et al., 2001). For example, child self-report questionnaires include items such as, “I realize that I just have to live with things the way they are,” and “I think about happy things to take my mind off the problem or how I am feeling,” which are not directly observable coping strategies (examples taken from the Responses to Stress Questionnaire (RSQ), Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). However, many coping strategies are in fact observable. For example, other items from the RSQ include, “I do something to calm myself down,” “I get help from other people when I am trying to figure out how to deal with my feelings,” “I do something to try to fix the problem or take action to change things,” and “I just have to get away” (Connor-Smith et al., 2000). Some of these items would likely correspond to an observable behavior, such as taking a deep breath or taking an action that engages with the problem, and other items would likely correspond to verbalizations by the child, such as asking a parent or peer for help or discussing a problem-solving idea with someone. Thus, there are behaviors and verbalizations that could be coded to observationally measure coping in middle childhood. Observing child coping behavior allows for investigation of how the interactional, momentary processes underlying the development of coping unfold in real time, in line with the third level of the Skinner and Zimmer-Gembeck (2009) coping model.

Most of the previous studies that observe coping use global measures of coping, as opposed to micro-level codes, which reduces the variability of the child's coping behavior to a single score and does not allow for an examination of momentary interactions. For this dissertation, a novel coding scheme for child behavioral coping was developed to continuously assess child behavioral coping in real time during a stressful task. The child behavioral coping coding scheme was devised from the aforementioned review of previous observational studies of child coping and self-regulation (e.g., Suveg, Shaffer, & Davis, 2016) and from Compas et al.'s (2001) coping framework and Responses to Stress Questionnaire (Connor-Smith et al., 2000). The child behavioral coping coding scheme involves simultaneously coding child behavior and child verbalizations as either engaged with or disengaged from the stressful task. The child's behavioral coping was coded continuously as falling into one of six mutually exclusive and exhaustive categories: behavioral engagement/verbal engagement (BE/VE), behavioral engagement/silence (BE/VS), behavioral engagement/verbal disengagement (BE/VD), behavioral disengagement/verbal engagement (BD/VE), behavioral disengagement/silence (BD/VS), or behavioral disengagement/verbal disengagement (BD/VD). Coding both behavioral engagement and verbal engagement allowed me to account for multiple aspects of the coping process. For example, a child who is behaviorally engaged in the task (i.e., actively working on completing the task) but verbally disengaged (i.e., whining, complaining, asking to stop), may be using less adaptive coping strategies than a child who is behaviorally engaged in the task and verbally engaged as well (i.e., discussing the challenges of the task with their parent). This nuance would potentially be lost in a scheme that does not code behavior and verbalizations separately and may be more important when observing coping in middle childhood (as compared to early childhood) because of increases in cognitive and verbal abilities (Skinner & Zimmer-Gembeck, 2009).

Additionally, although previous coping studies have used observational data, most of them do not examine coping as an interactional process (Skinner & Zimmer-Gembeck, 2009). Most previous studies only examine the child's behavior without examining real-time interactions between the child and his/her context. To fill this gap in the literature, this dissertation investigated interactions between child behavioral coping and parent socialization of coping during the stress-inducing mirror tracing task.

Parental Socialization of Coping

To explore the role of parents in the interactional coping process, I examined parents' socialization of coping. Parent socialization of coping may occur passively through modeling of responses to stress or actively through direct coaching or instruction (Power, 2004). This investigation focuses on active, explicit socialization of coping in the form of coping suggestions that parents purposefully make to their children. I conceptualize parent socialization of coping based on Compas et al.'s (2001) coping framework as well. Socialization of coping, as assessed in this study, refers to parent encouragement to use specific voluntary responses to stress. These parent suggestions map onto Compas et al.'s (2001) categories for coping, and thus parents can encourage primary control engagement, secondary control engagement, and disengagement coping strategies.

Youth may or may not enact parents' specific coping suggestions; however, parent coping suggestions do appear to influence children's adjustment. Parent-reported engagement suggestions (collapsing across primary control and secondary control) are associated with children's adaptive responses to stress and fewer child externalizing symptoms (the latter among daughters) in the context of high peer stress for the child (Abaied & Rudolph, 2011; Abaied, Wagner, & Sanders, 2014; Kliewer et al.,1996; Miller, Kliewer, Hepworth, & Sandler, 1994). Parent-reported disengagement suggestions are associated with more maladaptive responses to stress in children and more child depressive symptoms (Abaied & Rudolph, 2010, 2011; Kliewer et al., 1996; Miller et al., 1994). Engagement coping suggestions also buffer children from the adverse effects of disengagement coping suggestions (Abaied & Rudolph, 2010, 2011). Consistent with coping theory, these findings suggest that engagement suggestions tend to predict adaptive outcomes whereas disengagement suggestions tend to predict maladaptive outcomes.

Methodological Limitations. Most research on parental socialization of coping has used questionnaire assessments, which would be categorized at the adaptive process level, according to Skinner and Zimmer-Gembeck's (2009) multilevel model of coping. However, there have been a few exceptions that have examined parental socialization of coping observationally. Kliewer et al. (2006) observed parent socialization of coping during a hypothetical discussion of videotaped vignettes of community violence. They found that, cross-sectionally, parent engagement suggestions were positively associated with children’s engagement coping and parent disengagement suggestions were positively associated with children’s disengagement coping.

In the related literature on social coaching, which differs from socialization of coping in that it is not based in coping theory, multiple studies have used observational methods to assess parents’ guidance about hypothetical social stressors. These studies found that observed parental encouragement of engagement-like strategies for managing social stress (e.g., positive thinking and prosocial behaviors) were related to adaptive outcomes in children, including less aggression, more prosocial behavior, and higher peer acceptance (Mize & Pettit, 1997; Werner, Eaton, Lyle, Tseng, & Holst, 2014). However, even though parents in these studies were instructed to talk to their children as they normally would at home, a limitation of this existing observational work is that parent suggestions and guidance were observed during parent–child discussions of hypothetical vignettes rather than a real-time stressor. Observations of parent-child discussions during a real-time stressor may elicit different, more ecologically valid responses from parents, as the task would more closely imitate daily parent-child interactions.

Limited research has directly observed parent suggestions in the context of a real-time stressor. Nolen-Hoeksema, Wolfson, Mumme, and Guskin (1995) observed mothers and their 5- to 7-year-old children engaging in a joint puzzle task. They found that mothers’ encouragement of mastery (similar to primary control engagement suggestions) was associated with less helpless behavior and more persistence by the child during the task and was related to more teacher-reported academic and social competence (Nolen-Hoeksema et al., 1995). Additionally, Cox, Mezulis, and Hyde (2010) examined gender differences in the types of suggestions parents make to their 11-year-old children during a difficult math task. They found that parents made similar levels of problem-focused coping suggestions (a combination of primary control and secondary control engagement strategies) to children of both genders (Cox et al., 2010).

More recently, Stanger, Abaied, Wagner, and Sanders (2018) developed a coding scheme that measures parent socialization of coping using Compas et al.'s (2001) framework. In the first study using this observational measure, 8- to 10-year-old children completed the mirror tracing task while parents were instructed to interact with the child as they normally would. Primary control engagement, secondary control engagement, and disengagement suggestions made by parents were coded to produce a measure of the frequency of each type of suggestion made per minute. Stanger et al. (2018) found that secondary control engagement suggestions predicted fewer child internalizing problems at the 6-month follow-up and that disengagement suggestions predicted fewer externalizing problems among children with higher skin conductance level reactivity. In another study using this same sample and observational measure, Abaied and Stanger (2017) found that primary control engagement suggestions predicted fewer social problems and disengagement suggestions predicted lower friendship quality. Finally, Stanger, Abaied, Wagner, and Sanders (2017) found that the combination of more secondary control suggestions and more disengagement suggestions predicted better child coping efficacy over time, and the combination of more primary control suggestions and more disengagement suggestions predicted worse coping efficacy. Together, these studies demonstrate the predictive validity of this observational method, suggesting that the Compas et al. (2001) framework can be used to observe parent socialization of coping in real time.

Importantly, like the observational studies of child coping described previously, these observational studies also fail to capture the interactional coping process (Skinner & Zimmer-Gembeck, 2009). This interactional process not only refers to the content of the interaction (e.g., how many times the parent provides a primary control coping suggestion), but also the structure of how the interaction unfolds over time. In the case of parent socialization, this could include the child's physiological, emotional, cognitive, and behavioral responses to the parent's attempts to provide explicit coping suggestions. Researchers of developmental psychopathology more broadly have repeatedly called for advances in methodology that would allow for a more accurate and effective study of the dynamic interpersonal systems at the foundation of child development (Cicchetti & Toth, 1997; Granic, 2000). Moreover, Eisenberg, Valiente, and Sulik (2009) called for the development of novel measurement and consideration of nonlinear relations with the field of socialization of coping specifically. Although the ability to accurately operationalize dyadic parent-child processes has been limited, there is a general understanding that adaptation between a child and his/her context is critical to adaptive development. This project began to address this critical gap in the coping literature by examining whether the structure of parent-child interactions during a stressful task may be as important to children's development of internalizing problems, externalizing problems, and coping efficacy as the content of the socialization (i.e., the mean-level types of coping suggestions parents make to their children) and mean-level child coping behaviors.

Measurement of Interaction Structure

From a dynamic systems framework, the structure of a dyadic interaction refers to the organization of that interaction. The emphasis on time in dynamic systems theory translates practically to the idea that a system can only occupy one state at a time. A state is defined as a specific, qualitatively unique condition of the system at a specific moment in time, and there are many possible states a system could potentially occupy (Hollenstein, 2007). The range of all possible states is referred to as the state space, and through time, the system's behavior can be traced as a pathway that wanders about the different possible states encompassed in the state space (Hollenstein, 2007).

There are two aspects of the organization of the dyadic interaction that are of interest when examining the development of coping: *attractors* and *flexibility*. Dynamic systems theory posits that organization of interactions involve attractors, which are recurring behavioral patterns, or stable states of the dyad. Attractors are said to "attract" the dyad away from other potential states in the state space under certain contexts (Thelen & Smith, 1998). When applied to parent-child interactions, attractors represent specific adaptive or maladaptive exchange patterns that a dyad tends to get stuck in (Lunkenheimer & Dishion, 2009).

Each dyad may have multiple attractors of varying strengths in any given situation, which means each dyad has multiple stable states (referred to as multistability in dynamic systems theory). Multistability means that focusing on a single attractor likely does not capture the range of dyadic behavior; instead, understanding the organization of the dyadic interaction must involve examining the transitions, or flexibility, between states. Thus, flexibility in the dyadic interaction is defined as (a) the number of transitions among behavioral states and (b) the dispersion of behavior across an entire behavioral repertoire (Hollenstein, 2007).

Methodologically, there are multiple ways to rigorously observe attractors and flexibility among dyads in real time. For example, Granic and Dishion (2003) observed adolescent peer dyads using a time series approach. For each dyad, Granic and Dishion (2003) created a time-series for the duration of each successive period of deviant talk between peers over the course of the interaction. The slope of the time-series for each dyad was used as an index of attractor strength. They found that the attractor strength predicted conduct problems (arrests, school expulsion) and drug abuse three years later, after controlling for prior problem behavior, family coercion, and deviant peer associations (Granic & Dishion, 2003). Additionally, Gottman and colleagues have used time-series analysis and coupled differential equations in their work on married couples and peer interactions (Bakeman & Gottman, 1997; Gottman, Guralnick, Wilson, Swanson, & Murray, 1997). In these examples, a unique equation is created for each member of the dyad, and the values at which each participant's trajectory intersect represent attractors. Although these methods provide valuable information about the organization of dyadic interactions, they are limited by the statistical constraint of only coding one continuous variable (Granic & Hollenstein, 2003).

Other dynamic systems methods involve plotting dyadic interactions on a grid. One example of this method is the Karnaugh map, which maps up to four dichotomous variables simultaneously in real time. Dumas, Lemay, and Dauwalder (2001) used this technique to map a 6-hr parent-child observation on control, compliance, aversive behavior, and positive behavior. They compared clinic-referred mother-child dyads to a community sample and found that a negative attractor characterized by maternal control, child noncompliance, and shared negative affect was present in both groups and was stronger in the clinic-referred dyads (Dumas et al., 2001). The limitation of this method is the constraint of only using dichotomous variables. State space grids are a newer, related graphical method that overcome this limitation.

State Space Grids. State space grid analysis (Lewis, Lamey, & Douglas, 1999) is a graphical method that maps observed, moment-by-moment behaviors onto a two-dimensional grid that defines a particular state space for a system (Hollenstein, 2007). Each cell in the grid represents the interaction of each dimension's state at a particular time. The two dimensions could represent any two categories, but the categories must be measured in real time, synchronized in time, and have some variability across the categories; in addition, the states must be mutually exclusive and exhaustive (Hollenstein, 2007). State space grids could include the same behavior of each member of a dyad (e.g., one dimension could be parent affect and the other child affect), two different behaviors of the same individual (e.g., one dimension could be child affect and the other child heart rate), or two different behaviors of two different members of a dyad (e.g., parent verbal commands and child affect). Any time a change occurs in either dimension, a new point is plotted in the cell that represents that joint behavior (Hollenstein, 2007). The resulting grid allows one to examine the organization of the dyadic events.

The two dimensions of the state space grid used for this dissertation were parent verbal socialization of coping and child coping behavior. The state space grids were used to examine the attractors and flexibility within parent-child coping interactions.

Although state space grids have yet to be used to study the development of coping, they have been used to identify attractors in other domains of parent-child interaction. For example, the coercive cycle of parent discipline is an example of a maladaptive attractor that is strongly related to problematic outcomes (e.g., Granic & Dishion, 2003). Smith et al. (2014) examined coercive parent-child interactions as an attractor during a series of parent-child tasks each year from ages 2 to 5; they found that the duration of time spent in coercive interactions predicted child noncompliance over time.

Less research has examined adaptive attractors, which could emerge as well (Lunkenheimer & Dishion, 2009). Lunkenheimer, Hollenstein, Wang, & Shields (2012) found that parent emotion elaboration during a difficult parent-child conversation was an attractor that predicted better emotion regulation in children. Additionally, Dishion, Forgatch, Van Ryzin, and Winter (2012) examined peaceful resolution as a positive attractor during a family problem solving task with a community sample of adolescents and a parent. Dishion et al. (2012) found that the combination of longer durations in a positive, peaceful state and fewer transitions away from this state was related to fewer future antisocial behavior problems. Most recently, Bardack, Herbers, and Obradović (2017) compared the association between school adjustment and a positive coregulation attractor using state space grid analyses vs. a global coding system in kindergarteners. Positive coregulation was defined as parent positive control behaviors when the child was showing positive or negative responses, and parents following the child's lead when the child showed on-task behavior (Bardack, Herbers, and Obradović, 2017). The positive coregulation attractor predicted fewer externalizing problems and fewer inattention/impulsive behaviors at school, whereas the global code of positive coregulation did not predict school outcomes (Bardack, Herbers, and Obradović, 2017).

When applied to parent-child coping interactions, attractors would be particular states (or clusters of states) that parent socialization and child coping behavior return to repeatedly or remain in for the longest durations. One example could be a state of *parent primary control engagement suggestion* and *child behavioral engagement/verbal engagement*. During the mirror tracing task, in which a child attempts to trace a star-shaped pattern while viewing the image through a mirror, this state could look like a parent and child in a cycle where the parent suggests a specific task-related strategy (e.g., try moving the mirror), the child attempts to implement the strategy, then the parent suggests another strategy (e.g., try moving the pencil in a straight line), etc. An example of a potentially less adaptive state could look like a parent and child repeatedly falling into a pattern in which the child is disengaged from the task (e.g., has put the pencil down, makes a negative statement about how hard the task is), the parent suggests that the child can stop the task, the child continues to disengage, and the parent suggests that the child should be done with the task. In this case, the attractor would be *parent disengagement suggestion* and *child behavioral disengagement/verbal disengagement*. Attractors in the context of parent-child coping interactions provide more information than the mean-level content of the interaction (i.e., mean duration of time the parent-child dyad spends in a specific state) by attempting to more accurately capture how the content of parent-child coping interaction patterns are organized over time. For example, ways to measure this organization include exploring how quickly dyads return to a state or how long dyads remain in a state on average before transitioning to a different state.

Developmental psychopathology researchers have also used state space grids to examine flexibility in parent-child interactions as a predictor of child psychopathology (Lunkenheimer et al., 2012; Hollenstein, Granic, Stoolmiller, & Snyder, 2004; Lunkenheimer, Olson, Hollenstein, Sameroff, & Winter, 2011). For example, Hollenstein et al. (2004) examined dyadic affect flexibility in kindergarteners. Child and parent affect were observed during a range of tasks, and state space grids were constructed for each parent-child dyad. The flexibility construct was created from a combination of the number of transitions between cells on the grid and the mean duration of time spent in each cell. This flexibility construct was then used as an independent variable to predict internalizing and externalizing problems over time. Hollenstein et al. (2004) found that less flexibility was associated with higher levels of concurrent and follow-up (6-months and one year) child externalizing problems, and there was more growth in child externalizing problems over time for dyads with lower levels of flexibility. Parent-child flexibility was also lower in children with chronically high levels of internalizing problems (Hollenstein et al., 2004). Importantly, the level of mutual negative (or positive) engagement within a dyad did not attenuate the associations between flexibility and either externalizing or internalizing measures, suggesting that the structure of the interaction (i.e., flexibility) was predictive of outcomes above and beyond the content of the interaction (Hollenstein et al., 2004).

Additionally, in a study of emotion socialization, Lunkenheimer et al. (2012) found that parents' flexibility in their use of discrete emotion words and socialization functions (i.e., emotion coaching, dismissing, or elaboration) during a parent-child interaction was associated concurrently with better child emotion regulation. Van der

Giessen et al. (2015) found that in mother-adolescent dyads, less dyadic emotional flexibility in early adolescence predicted increases in mothers' and adolescents' internalizing problems from early to late adolescence. These findings did not hold when the adolescents' or parents' emotional rigidity was examined in isolation, providing evidence for a systems perspective; specifically, the structure of the dyadic emotional experience may not be the same as the sum of the individuals' emotional experiences (Van der Giessen et al., 2015). Collectively, these studies suggest that dyadic flexibility is generally adaptive and can predict children's outcomes above and beyond the mean-level content (e.g., emotional valence or specific coaching behaviors) of a parent-child interaction.

Together, these findings suggest that more flexibility in the real-time interactions between parents' coping suggestions and children's coping behavior during a stressful task may be related to more adaptive child outcomes. The flexibility of parent-child coping interactions may offer unique prediction of child internalizing problems, externalizing problems, and coping efficacy beyond the content of the coping interaction because the opportunity for children to express a variety of emotions and behaviors provides the occasion for practicing regulating those behaviors (Gottman, Katz, & Hooven, 1996; Hollenstein et al., 2004). Moreover, parents who are less accepting of a range of emotional and behavioral states may not value or promote those learning opportunities, resulting in a limited repertoire of child coping behaviors (Eisenberg, Cumberland, & Spinrad, 1998; Ramsden & Hubbard, 2002; Hollenstein et al., 2004).

Aims and Hypotheses

Aim 1. *Investigate whether the flexibility of observed parent-child coping interactions during a challenge task predicted changes in three different child adjustment outcomes (internalizing problems, externalizing problems, and coping efficacy) over time during middle childhood.*

To examine Aim 1, I constructed state space grids of the parent-child coping interaction for all participants, with parent socialization of coping on one axis and child coping behavior on the other axis. I measured flexibility in two ways: (1) the range of dyadic states (dispersion), and (2) the frequency of changes among those states (transitions). Next, I conducted multiple regression analyses to investigate whether the flexibility construct was associated with child adjustment at a 6-month follow-up, controlling for adjustment at baseline. Additionally, I controlled for specific dyadic *content* by including the mean total durations the dyad spends in theoretically relevant cells. Separate analyses were conducted for each adjustment outcome (internalizing problems, externalizing problems, coping efficacy).

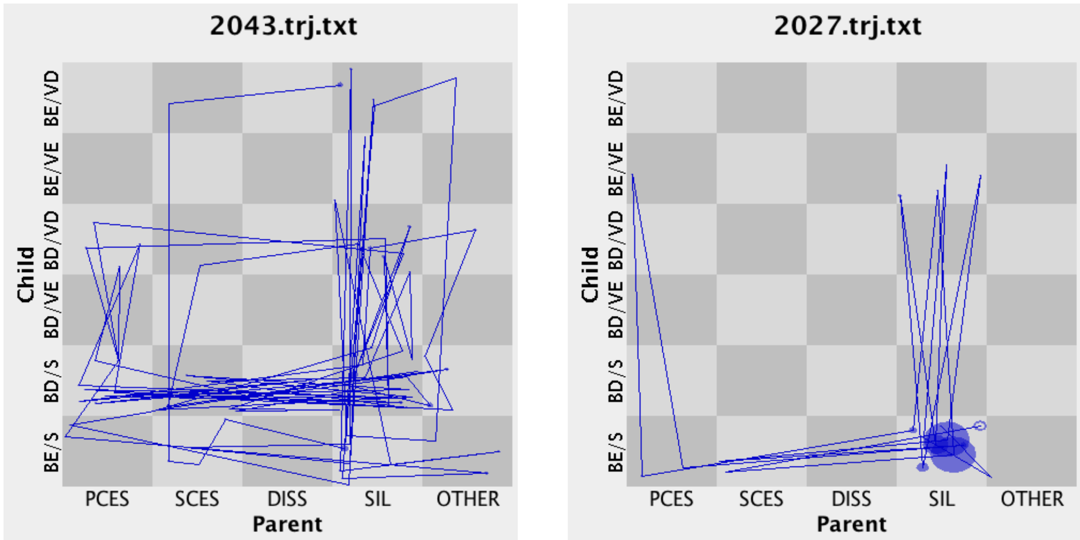

Figure 1. Examples of a highly flexible dyad (left) and a less flexible dyad (right).

Note. PCES = primary control engagement suggestion; SCES = secondary control engagement suggestion; DISS = disengagement suggestion; OTHER = other parent verbalization; SIL = parent silence; BE/VE = child behavioral engagement and verbal engagement; BE/VS = child behavioral engagement and silence; BE/VD = child behavioral engagement and verbal disengagement; BD/VE = child behavioral disengagement and verbal engagement; BD/VS = child behavioral disengagement and silence; BD/VD = child behavioral disengagement and verbal disengagement.

Aim 1 Hypotheses. I expected that higher levels of flexibility in parent-child interaction (i.e., a broader range of dyadic states and more transitions between states) would predict fewer child internalizing problems and externalizing problems and higher child coping efficacy over time, controlling for the content of the interaction (i.e., mean total duration in theoretically relevant cells). Flexibility in affect among parent-child dyads during interaction and discussion tasks predicted fewer internalizing and externalizing problems in early childhood and adolescence (Hollenstein et al., 2004; Van der Giessen et al., 2015), and flexibility in parent emotion socialization during a parent-child discussion task predicted better emotion regulation in children (Lunkenheimer et al., 2012). Additionally, research on parent socialization of coping found that disengagement suggestions can be adaptive, especially in combination with other forms of coping suggestions (Stanger et al., 2017). I expected that parent-child coping interactions would be consistent with this prior work because parents who are flexible in encouraging their children to display a range of coping behaviors provides the occasion for practicing and evaluating those behaviors (Gottman, Katz, & Hooven, 1996; Hollenstein et al., 2004). On the other hand, parents who present and encourage only a limited range of coping strategies may promote fewer learning opportunities for their children, which in turn may result in a limited repertoire of child coping behaviors and thus an increased risk for adjustment problems (Eisenberg, Cumberland, & Spinrad, 1998; Ramsden & Hubbard, 2002; Hollenstein et al., 2004).

Aim 2. *Conduct exploratory analyses investigating whether specific attractors within observed parent-child coping interactions during a challenge task predicted changes in the same three child adjustment outcomes over time in middle childhood.*

To examine Aim 2, I used the same state space grids constructed for Aim 1. I examined eleven potential attractors (see Figure 2): three parent socialization of coping attractors (primary control engagement suggestions, secondary control engagement suggestions, and disengagement suggestions), two child coping behavior attractors (engaged behavior (behavioral and verbal engagement or behavioral engagement and silence) and disengaged behavior (behavioral and verbal disengagement or behavioral disengagement and silence), and six dyad-focused attractors (parent engagement suggestions/child engagement behavior (PECE), parent disengagement/child disengagement (PDCD), parent engagement/child disengagement (PECD), parent disengagement, child engagement (PDCE), parent engagement, child mixed engagement/ disengagement (PECM), and parent disengagement, child mixed engagement/disengagement (PDCM)). I measured attractor strength in three ways: (1) the number of visits to the potential attractor cells (density), (2) the duration per visit to the potential attractor (perseverance), and (3) the latency to return to the potential attractor following an event in that cell (return time). Next, I conducted multiple regression analyses to investigate whether any of the attractor strength constructs for each potential attractor were associated with child adjustment at a 6-month follow-up, controlling for adjustment at baseline and controlling for the mean total duration of specific dyadic content in theoretically relevant cells. Separate analyses were conducted for each adjustment outcome (internalizing problems, externalizing problems, and coping efficacy).

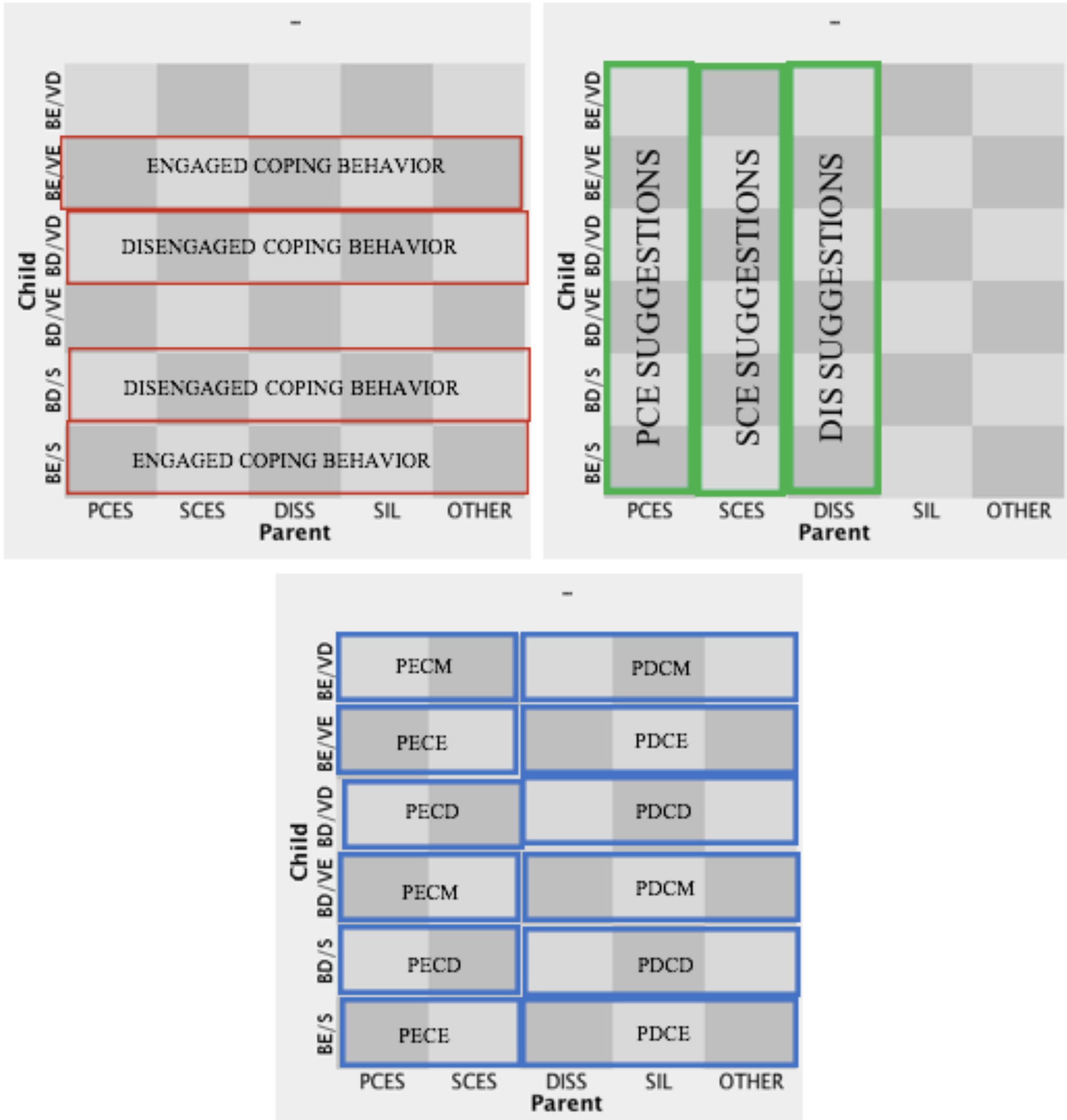

Figure 2. Constellations of states that represent the proposed child-focused attractors (red), proposed parent-focused attractors (green), proposed dyad-focused attractors (blue).

Note. PCES = primary control engagement suggestion; SCES = secondary control engagement suggestion; DISS = disengagement suggestion; OTHER = other parent verbalization; SIL = parent silence; BE/VE = child behavioral engagement and verbal engagement; BE/VS = child behavioral engagement and silence; BE/VD = child behavioral engagement and verbal disengagement; BD/VE = child behavioral disengagement and verbal engagement; BD/VS = child behavioral disengagement and silence; BD/VD = child behavioral disengagement and verbal disengagement. PECE = parent engagement suggestion/child engagement behavior. PECD = parent engagement suggestion/child disengagement behavior. PDCE = parent disengagement/child disengagement behavior. PDCD = parent disengagement/ child disengagement behavior. PECM = parent engagement suggestion/child mixed behavior. PDCM = parent disengagement/child mixed behavior.

Aim 2 Hypotheses. Because attractors have not been examined in this context or with these variables in previous research, the proposed attractors were exploratory. Regarding parent-focused attractor regions, I tentatively expected that the three types of coping suggestions would emerge as attractors predicting child adjustment. Specifically, I expected that primary and secondary control engagement suggestion attractors would predict fewer child internalizing and externalizing problems and better child coping efficacy over time. I also tentatively expected that the disengagement suggestion attractor would predict more child internalizing and externalizing problems and worse child coping efficacy over time. This pattern of results would be in line with the associations found in previous research on the socialization of coping (Abaied & Rudolph, 2010; 2011; Kliewer et al., 1996; Miller et al., 1994; Stanger et al., 2018), and would extend prior work by suggesting that these parenting behaviors are influencing child adjustment outcomes not only because of how often they are offered (i.e., mean total duration in these cells), but by how many unique times and how quickly parents return to that type of suggestion and how long they spend offering that type of suggestion each time it is offered. As observed primary control and secondary control engagement suggestions have been differentially associated with child adjustment outcomes (Stanger et al., 2017; Abaied & Stanger, 2017), I examined them as separate attractors.

Regarding the child-focused attractor regions, I tentatively expected that two potential attractors may predict child adjustment: an engagement attractor and a disengagement attractor. The child engagement behavior attractor was expected to predict fewer internalizing and externalizing problems and better coping efficacy over time. The child disengagement behavior attractor was expected to predict more internalizing and externalizing problems and worse coping efficacy over time. Prior research on observed child self-regulation suggests that task persistence, similar to behavioral engagement, is associated with fewer externalizing and internalizing problems in children (Chang and Olson, 2016; Eisenberg et al., 2003). Therefore, children who frequently enter and quickly return to the engagement cells and sparingly enter and slowly return to the disengagement cells would likely have fewer adjustment problems and better coping efficacy, above and beyond the effects of mean total duration in these attractor cells.

Regarding the dyad-focused attractor regions, my hypotheses were consistent with my predictions for the parent-focused and child-focused attractor regions. I tentatively expected that a parent engagement suggestion/child engagement behavior region (made up of parent engagement suggestion cells and the child engagement behavior cells) would be most associated with better adjustment, whereas the parent disengagement/child disengagement behavior region (made up of the parent disengagement suggestions, other parent verbalizations, and parent silence cells and the child disengagement behaviors cells) would be associated with worse adjustment. No specific hypotheses were made for the other four potential dyad-focused regions (parent engagement suggestion/child disengagement behavior, parent disengagement/child engagement behavior, parent engagement suggestion/child mixed behavior, and parent disengagement/child mixed behavior).

Methodology

Participants

Participants included a community sample of 65 youths (29 girls, 8–10 years old; mean age = 9.06, SD = 0.81; 93.8% White) and their parents. One parent accompanied the child to the laboratory assessment (referred to as primary parent) and when applicable, the second parent completed questionnaires at their home. Primary parent participants were predominantly Caucasian biological mothers (90.8% Caucasian; 93.8% female; 93.8% biological mother, 3.1% biological father, 3.1% adoptive mother). Second parent participants were primarily biological fathers (83.1% biological fathers, 3.1% biological mothers, 1.5% stepfathers, 3.1% adoptive mothers, 9.2% chose not to disclose). Relevant data were available for 65 families at Wave 1 (W1) and 51 families (78% retention) at Wave 2 (W2; 6-month follow-up). The average length of time between W1 and W2 was 5.75 months, with 95% of participants completing W2 within 4–8 months. At W2, two families declined to participate and all other missing data (12 participants) resulted from a lack of contact with participating families.

Procedure

All procedures were approved by the Human Subjects Review Board at the University of Vermont, and a parent provided written informed consent prior to child participation. At W1, participants completed a laboratory assessment administered by trained undergraduate and graduate research assistants. First, physiological sensors were attached to the child participant during a series of laboratory tasks and baseline assessments. Only the primary parent participant was present for this phase, which was videotaped. In the second phase, children and parents completed questionnaires in separate rooms. Second parents returned questionnaires by mail. At W2, child and parent participants completed the same battery of questionnaires. At each wave, youth received a small prize and parents received monetary compensation.

Measures

Mirror tracing task. The dyadic coping interactions were coded from video recordings of the mirror tracing task (Lafeyette Instrument Company, Lafayette, IN, USA), in which the child participant must trace a star-shaped pattern while viewing the image through a mirror. This task was designed to elicit frustration and distress somewhat akin to a challenging homework assignment. Parents were instructed to interact with their child as they normally would. Dyads were given 10 minutes to complete the task; however, they could request to end early if the child completed the task (or did not wish to continue), and the dyad could request extra time to finish the task after the first 10 minutes. Task lengths for each dyad ranged from 1.2 minutes to 16.22 minutes ($M = 7.35$, $SD = 3.23$).

Parental socialization of coping coding scheme. A coding manual was created based on Compas et al.'s (2001) coping framework and Abaied and Rudolph's (2010) Socialization of Coping Questionnaire to measure primary control engagement suggestions (PCES), secondary control engagement suggestions (SCES), and disengagement suggestions (DISS) verbalized by the parent toward their child during the mirror tracing task. PCES included suggestions about how the child could change the situation or his/her reaction to it, such as problem solving specific to the task, emotion expression, or persistence. Examples in this study include: "Let's think about it. Get your pencil up to that line," "Why don't you take a deep breath so you can calm down," and "Take your time, keep trying." SCES encouraged the child to adapt to the environment by accepting, thinking positively about, or restructuring thoughts about the stressor. Examples in this study include: "You didn't fail, it was supposed to be a challenge," “This is good practice for the next time you do a really hard task,” and “You are getting really close to finishing the task.” DISS included suggestions that encouraged the child to orient away from the stressor or stressor-related emotions and thoughts, which can involve both avoidance and denial. Examples in this study include: “Do you want to stop?” “Why don’t you skip that part,” and “You don’t have to finish if you don’t feel up to it.”

This coding manual was used in Stanger et al. (2018); however, in that study, only frequencies of parent coping suggestions were measured. The frequencies demonstrated high reliability (PCES ICC = .97; SCES ICC = .95; DISS ICC = .81). For this thesis, two more codes were added to this manual. All other parent verbalizations were coded (OTHER), and parent silence (SIL) was also coded. These additions allowed the entirety of the task to be coded. Coding was completed by myself and a trained undergraduate research assistant using James Long Company’s Video Coding System (Caroga Lake, NY). Twenty percent of the videos were initially double-coded to establish reliability, and every fifth video (i.e., twenty percent) was double-coded throughout the rest of coding to manage coder drift. Inter-rater reliability was high across all variables (average κ = .80 initially, and throughout).

Child behavioral coping coding scheme. A coding manual for child behavioral coping was developed for this dissertation and is based on Compas et al.’s (2001) coping framework, a review of many coding schemes capturing child behavioral self-regulation during a stressful task (e.g., Suveg, Shaffer, & Davis, 2016), and a thorough review of the participant videos. The child coping coding scheme involved simultaneously coding child behavior and child verbalizations as either engaged with or disengaged from the mirror tracing task. The child's behavioral coping was coded continuously as falling into one of six mutually exclusive and exhaustive categories: behavioral engagement and verbal engagement (BE/VE), behavioral engagement and silence (BE/VS), behavioral engagement and verbal disengagement (BE/VD), behavioral disengagement and verbal engagement (BD/VE), behavioral disengagement and silence (BD/VS), or behavioral disengagement and verbal disengagement (BD/VD). Examples of each of the categorizations are provided in Table 1 below. This coding was also completed by myself and a trained undergraduate research assistant using James Long Company's Video Coding System (Caroga Lake, NY). Twenty percent of the videos were double-coded to establish reliability, and every fifth video (i.e., twenty percent) was double-coded throughout the rest of coding to manage coder drift. Inter-rater reliability was high across all variables (average $\kappa = .81$ initially, average $\kappa = .83$ throughout).

Table 1.

Coding scheme for child coping behavior.

	Verbal Disengagement	No Verbal	Verbal Engagement
Behavioral Disengagement	Child stops doing the task; child pushes chair away from table; Child puts pencil down; Child says, "I hate this," "I quit," "This is too hard." (BD/VD)	Child stops doing task; Child pushes chair away from table; Child puts pencil down; Child is silent. (BD/S)	Child stops doing task; Child pushes chair away from table; Child puts pencil down; Child says, "I'm just taking a break", "I need to rest for a second," "I was trying my best." (BD/VE)
Behavioral Engagement	Child is on task; Child is drawing; Child moves the mirror; Child says, "I hate this," "I want to quit," "This is too hard," "Can I stop?". Any child complaining or whining. (BE/VD)	Child is on task; Child is drawing; Child moves the mirror; Child is silent. (BE/S)	Child is on task; Child is drawing; Child moves the mirror; If the child is not currently working, then they must be asking their parent for advice/help related directly to task; Child says, "This is weird!" "I did something like this at school," "Can you help me move the mirror?" (BE/VE)

Child psychopathology. The Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) is a 120-item parent-report measure of child problem behaviors. At W1 and W2, both parents were asked to rate the behavior of their child over the last 6 months on a 3-point scale (0 = Not True, 1 = Somewhat or Sometimes True, and 2 = Very True or Often True). The CBCL scales used in this study were the raw scores of the Internalizing Problems (composed of the Withdrawn/Depressed, Anxious/Depressed, and Somatic Symptoms syndrome scales) and Externalizing Problems (composed of the Rule-Breaking, Conduct Problems, and Aggression syndrome scales), which have a range of

0–64 and 0–70, respectively. Raw scores were used based on Achenbach and Rescorla's (2001, p. 89) recommendation to use raw scale scores rather than T-scores in statistical analyses when examining differences among children with mild symptoms (i.e., a community sample) because raw scores reflect the full range of variation among individuals' scores. For participants with two parent reports (W1 N = 36; W2 N = 37), CBCL raw scale scores for each parent were averaged. The t-tests comparing mean CBCL scores for children with one- versus two-parent reports were all nonsignificant, suggesting that mean ratings of both CBCL scales did not differ depending on whether one or two parents participated.

Child coping efficacy. The General Coping Efficacy questionnaire (GCE; Sandler, Tein, Mehta, Wolchik, & Ayers, 2000) is an 8-item measure assessing the degree to which a child believes that they can handle the demands of and emotions aroused by a stressful situation. Children completed this measure at W1 and W2 and rated each item on a 4-point scale (1 = Not at All, 2 = A Little Bit, 3 = Pretty Much, 4 = Very Much). A mean rating was calculated, with higher scores reflecting greater coping efficacy. Example items include: "Overall, how satisfied are you with the way you handled problems with other kids?" and "Overall, how good do you think you will be at handling your feelings when problems come up in the future?" Adequate reliability and validity of the GCE measure have been demonstrated previously (Sandler et al., 2000), and reliability was good in this sample, W1 $\alpha = .86$ and W2 $\alpha = .81$.

State Space Grid Construction

State space grids were constructed with GridWare 1.15 (Lamey, Hollenstein, Lewis, & Granic, 2004) from each observational data file. The two dimensions of the grid corresponded to the parent's verbalizations during the task (5 possible states: primary control engagement suggestions (PCES), secondary control engagement suggestions (SCES), disengagement suggestions (DISS), other verbalization (OTHER), and silence (SIL)) and child behavioral coping (6 possible states: behavioral engagement and verbal engagement (BE/VE), behavioral engagement and silence (BE/VS), behavioral engagement and verbal disengagement (BE/VD), behavioral disengagement and verbal engagement (BD/VE), disengagement and silence (BD/VS), behavioral disengagement and verbal disengagement (BD/VD)). Each cell on a grid represented a potential dyadic state, with all the cells representing the range of behavioral possibilities. A new point was plotted for each change in dyadic (either parent or child) behavior.

Flexibility was measured in two ways (Lamey et al., 2004; Lunkenheimer et al., 2012; Hollenstein et al., 2004): (1) the range of dyadic states (dispersion), and (2) the frequency of changes among those states (transitions). Dispersion, or spread of behavior across cells, was calculated as the sum of the squared proportional durations across all cells, adjusted for the total number of cells in the grid matrix, and inverted so that values range from 0 (no dispersion: all behavior in one cell) to 1 (maximum dispersion: behavior equally distributed across the grid). Transitions represents the total number of changes or movements between cells on the grid. Variations in the duration of each participant's task were controlled for by transforming transition counts to rates per minute. For both dispersion and transitions, higher values denote greater flexibility. The dispersion and transitions variables were then standardized using a z-score transformation.

Attractor strength was measured in three ways: (1) the number of visits to the potential attractor cells (density), (2) the duration per visit to the potential attractor (perseverance), and (3) the latency to return to the potential attractor following an event in that cell (return time). Density was calculated as the number of events within each attractor cell, divided by the total number of events in the entire state space to create a proportional density score. Perseverance was calculated as the average number of seconds per visit to each attractor cell, divided by the duration of the task. Return time was calculated as the average amount of time (in seconds) that it takes for the dyad to return to each attractor following an event in that cell, divided by the duration of the task. The density, perseverance, and return time variables were then standardized using a z-score transformation. Additionally, the transformed return time z-scores were subsequently reverse scored, so that all three variables had higher scores representing a stronger attraction to that region. Values that represented outliers on any of these three variables were then manually replaced to three standard deviations above or below the mean.

Data Analytic Plan

First, preliminary descriptive and correlational analyses were performed to examine the nature of dyadic flexibility and attractor strength within the sample. Additionally, correlational analyses were used to determine associations between the target variables and demographic characteristics of the participating families, including age, gender, and socioeconomic status (parent education and income). Demographic variables significantly associated with any of the independent or dependent variables were included in the regression analyses to control for potential confounds.

Additionally, to control for the possibility that specific dyadic *content* could account for a potential association between dyadic flexibility and/or attractor strength and adjustment outcomes, mean total durations in each hypothesized (theoretically relevant) attractor cell were calculated and transformed into proportion scores to account for variations in task length. For the dyadic flexibility regression analyses, mean total duration variables that were correlated with the outcome variables were included in the analyses (Hollenstein et al., 2004). For the attractor regression analyses, mean total duration variables that corresponded to the attractor regions examined in each set of analyses were included.

Second, a dyadic flexibility construct was created in Gridware 1.15 (Hollenstein et al., 2004; Granic, 2003; Lamey et al., 2004). A reliability analysis was conducted to ensure that the standardized dispersion and transition variables were adequately correlated (measured by Pearson correlation) and reliably hung together (measured by Cronbach's standardized alpha). Dispersion and transitions were highly correlated (r = .85) and reliable (α = .92), therefore, the mean of the standardized dispersion and transitions was used as the dyadic flexibility construct.

Attractor strength constructs were also created in Gridware 1.15 for each of the hypothesized attractors. A reliability analysis was conducted to ensure that the standardized density, perseverance, and return time variables were adequately correlated (measured by Pearson correlation; see Table 6) and reliably hung together (measured by Cronbach's standardized alpha). Because the three variables making up the attractor strength construct were not highly correlated for any of the proposed attractors, the regression analyses included the construct variables as separate predictors.

Third, three sets of multiple regression analyses were performed. First, three multivariate regression analyses were performed examining the main effect of dyadic flexibility predicting each outcome (internalizing problems, externalizing problems, and coping efficacy) at W2. The outcome of interest at W1 and any demographic variables that were significantly correlated with the target variables were included in all models as covariates. The regression models were run using full information maximum likelihood estimation with robust standard errors (MLR) in Mplus Version 7 (Muthén & Muthén, 1998-2012). MLR procedures were used to estimate missing data at W2, which allowed me to retain a sample size of 65 for all models and allowed me to accommodate variables in the model with non-normal distributions. Second, additional multiple regression analyses were performed examining the main effects of each group of attractors (parent-focused, child-focused, and dyad-focused) predicting each outcome (internalizing problems, externalizing problems, and coping efficacy) at W2. The same covariates and missing data procedures were used for these analyses.

Of note, there were five proposed attractor regions in which fewer than 50 percent of dyads entered the region during the task. Two of these regions (parent engagement suggestion/child disengagement behavior and parent engagement suggestion/child mixed behavior) were dropped from all further analyses because they were dyad-focused regions without specific hypotheses *and* demonstrated very limited variation across dyads. For the other three regions with specific hypotheses (i.e., the parent disengagement suggestion region, the child disengagement behavior region, and the parent disengagement/child disengagement behavior region), density was the only attractor construct variable used in the regressions because the sample size of the perseverance and return time variables were too small (n = 14, 31, and 32 respectively). Lastly, a set of three regression models were analyzed that included the dyadic flexibility construct, all significant attractors from the previous set of models, and all covariates from the previous models predicting each outcome.

Results

Preliminary Analyses

Table 2 displays descriptive statistics for all study variables. At W1, nine youths (10.9%) had T-scores in the borderline or clinical range on the CBCL (defined as greater than the 84th percentile compared to same age peers) for externalizing problems, and 16 youths (21.9%) were in this range for internalizing problems.

State Space Grid Descriptives. Dyads visited a minimum of 4 grid cells and a maximum of 20 grid cells (*M* = 10.9, *SD* = 3.91) and made a minimum of 15 grid cell visits and a maximum of 435 visits (*M* = 156.68, *SD* = 86.50) during the course of the task. The grid cells with the highest mean dyad durations are displayed below in Figure 3, and the percentage of dyads entering each of the proposed attractor regions at least once are displayed in Figure 4. The mean dyad durations in each of the proposed attractor regions are presented in Figure 5.

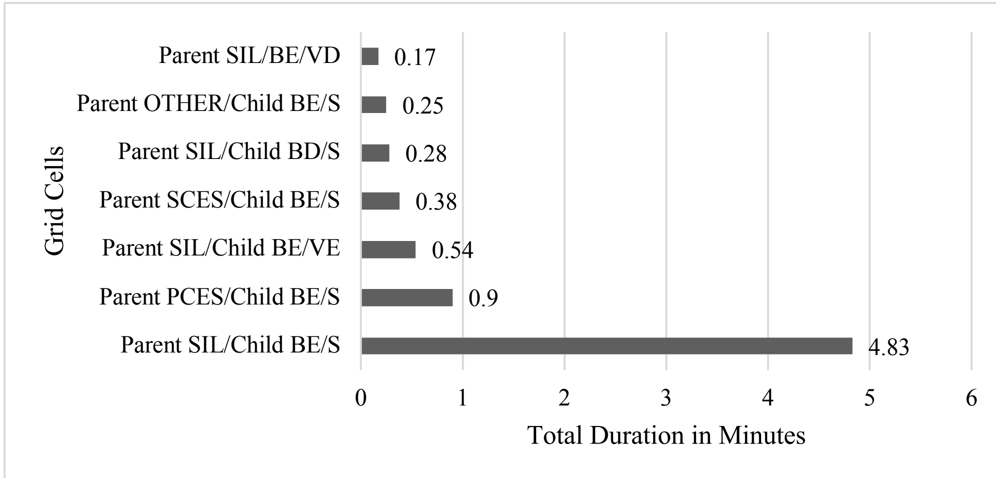

Figure 3. Grid cells with the highest mean dyads durations.

Note. PCES = primary control engagement suggestion; SCES = secondary control engagement suggestion; DISS = disengagement suggestion; OTHER = other parent verbalization; SIL = parent silence; BE/VE = child behavioral engagement and verbal engagement; BE/VS = child behavioral engagement and silence; BE/VD = child behavioral engagement and verbal disengagement; BD/VE = child behavioral disengagement and verbal engagement; BD/VS = child behavioral disengagement and silence; BD/VD = child behavioral disengagement and verbal disengagement.

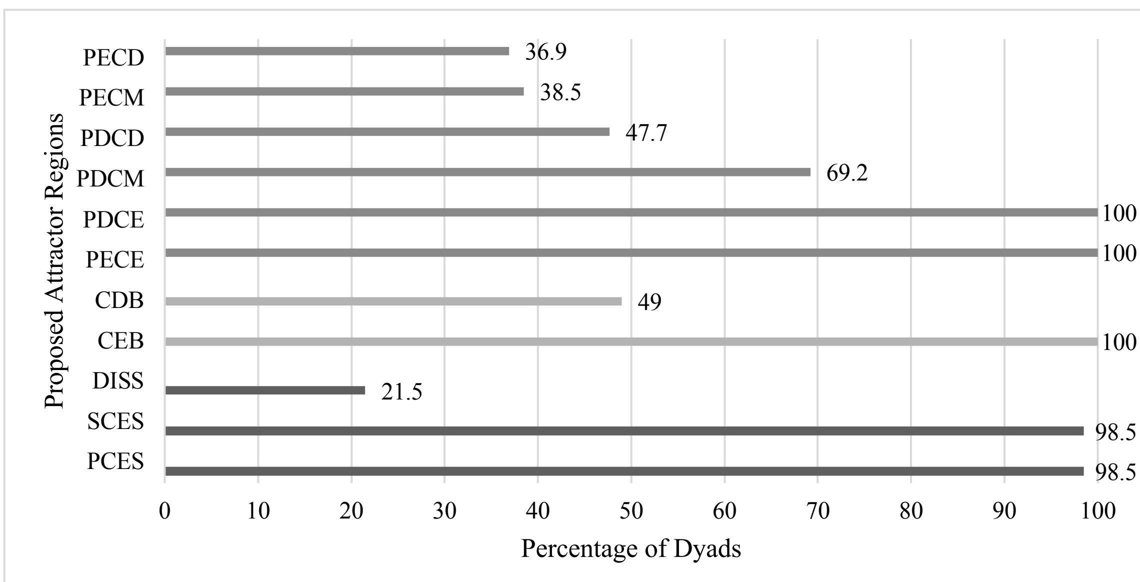

Figure 4. Percentages of dyads entering each of proposed attractor region at least once.

Note. PCES = primary control engagement suggestion; SCES = secondary control engagement suggestion; DISS = disengagement suggestion; CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior.

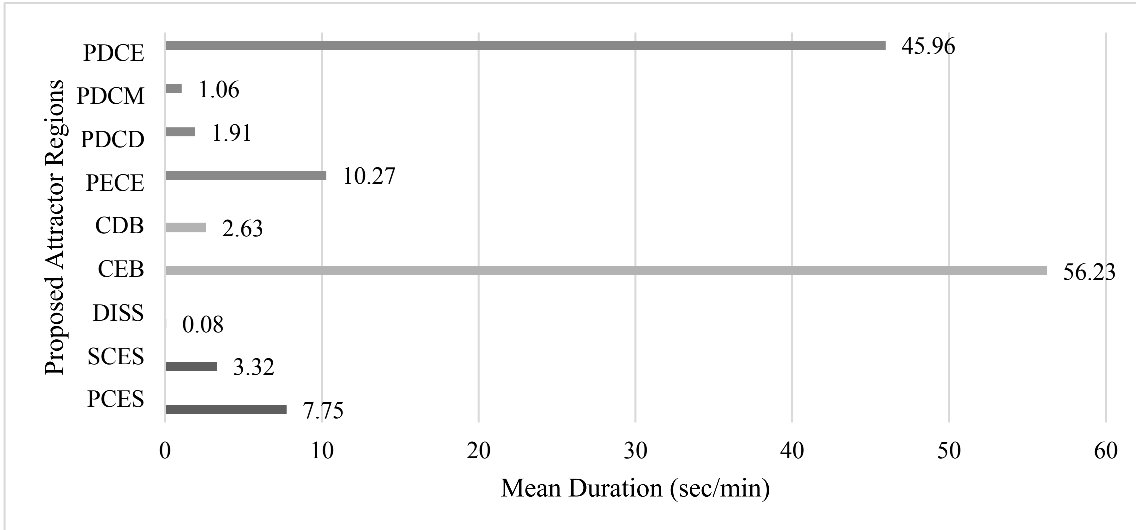

Figure 5. Dyad mean durations (seconds per minute) in each proposed attractor region.

Note. PCES = primary control engagement suggestion; SCES = secondary control engagement suggestion; DISS = disengagement suggestion; CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior.

Correlations. Table 3 displays correlations between the study covariates, outcome variables, and dyadic flexibility. Table 4 displays correlations between study covariates and proposed attractor regions. Child age was positively correlated with child internalizing and externalizing problems at both waves. Parent engagement suggestion/child engagement behavior and parent disengagement/child engagement behavior densities were negatively correlated with child age, meaning that dyads with younger children went to these regions more frequently. Child gender was correlated with parent primary control engagement suggestion duration (i.e., parents of females spent more time in this region), parent engagement suggestion/child engagement behavior duration and return time (i.e., dyads with female children spent more time in this region and returned more quickly to this region), and parent disengagement/child mixed behavior perseverance (i.e., dyads with male children spend longer per visit in this region). Parent disengagement suggestion return time was positively correlated with family income, meaning that parents who spent more time in this region reported higher incomes. Family income was negatively correlated with child internalizing and externalizing problems at W1. No other demographic variables were correlated with the content controls, independent variables, or outcome variables, and thus were dropped from the regression models. Child internalizing and externalizing problems were correlated with each other at both waves. Child internalizing problems was negatively correlated with child coping efficacy at W1. Child coping efficacy was positively correlated between waves.

Parent disengagement suggestion duration was negatively correlated with child engagement behavior duration, meaning that more time spent in the parent disengagement suggestion region was associated with less time spent in the child engagement behavior region. Parent disengagement suggestion duration was positively correlated with child disengagement behavior duration, meaning that more time spent in the parent disengagement suggestion region was associated with more time spent in the child disengagement behavior region.

Parent disengagement suggestion duration was positively correlated with W1 child internalizing problems, indicating that more time spent in the parent disengagement suggestion region was associated with more concurrent internalizing problems. Child engagement behavior duration was negatively correlated with child externalizing problems at W1 and W2, indicating that more time spent in the child engagement behavior region was associated fewer concurrent and follow-up externalizing problems. Child disengagement behavior duration was positively correlated with W2 child externalizing problems, meaning that more time spent in the child disengagement region was associated with more externalizing problems over time. Parent disengagement/child engagement behavior duration was negatively correlated with W2 child externalizing problems. Parent disengagement/child mixed behavior duration was positively correlated with W1 and W2 child internalizing and externalizing problems.

Dyadic flexibility was positively correlated with parent primary control engagement suggestion duration, secondary control engagement suggestion duration, child disengagement behavior duration, parent engagement suggestion/child engagement behavior duration, parent disengagement/child disengagement behavior duration, and parent disengagement/child mixed behavior duration, and was negatively correlated with child engagement behavior duration and parent disengagement/child engagement behavior duration. This means that more dyadic flexibility was associated with less time spent in the proposed attractors with the longest mean durations and was associated with more time spent in all other proposed attractors.

Table 5 displays correlations between the proposed attractor variables and the child adjustment outcome variables. For the parent-focused regions, parent primary control engagement suggestion density and return time were negatively correlated with W2 child coping efficacy, meaning that more frequent visits and faster return times to this region were associated with less child coping efficacy over time. Additionally, perseverance in this region was positively correlated with W1 coping efficacy, meaning that dyads who spent more time in the primary control engagement suggestion region per visit had children with better concurrent coping efficacy. Parent secondary control engagement suggestion density was negatively correlated with W1 and W2 externalizing problems, indicating that more frequent visits to this region were associated with fewer child externalizing problems concurrently and over time. Additionally, return time in this region was also negatively correlated with W2 child externalizing problems.

For the child-focused regions, child engagement behavior density was positively correlated with W2 internalizing problems and W1 and W2 externalizing problems, meaning that more frequent visits to this region were associated with more child adjustment problems. Perseverance in this region, however, was negatively correlated with W2 internalizing problems and W1 externalizing problems. This indicates that dyads who spent more time in the child engagement behavior region per visit had children with fewer adjustment problems.

For the dyad-focused regions, parent engagement suggestions/child engagement behavior density was negatively correlated with W1 externalizing problems, indicating that more frequent visits to this region were associated fewer child externalizing problems. Perseverance in this region was negatively correlated with W1 coping efficacy, meaning that dyads who spent more time in this region per visit had children with less concurrent coping efficacy. Parent disengagement/child engagement behavior return time was negatively correlated with W1 coping efficacy, indicating that faster return times in this region were associated less concurrent child coping efficacy. Parent disengagement/child mixed behavior density was positively correlated with W1 and W2 internalizing and externalizing problems, meaning that more frequent visits to this region were associated more child adjustment problems. Return time to this region was also positively correlated with W1 and W2 internalizing problems, meaning that faster returns to this region were also associated with more child internalizing problems. Finally, perseverance in this region was positively correlated with W1 coping efficacy, meaning that dyads who spend more time in this region per visit had children with better concurrent coping efficacy.

Correlations between the attractor strength variables are presented in Table 6. Only the correlations between attractor indices within each attractor region are presented in the text. Density and return time were moderately, positively correlated for the primary control engagement suggestion region, the secondary control engagement suggestion region, the parent engagement suggestion/child engagement behavior region, the parent disengagement/child disengagement behavior region, and the parent disengagement/child mixed behavior region. Density and perseverance were positively correlated for the parent disengagement/child disengagement behavior region and negatively correlated for the child engagement behavior region and the parent disengagement/child engagement behavior region. Perseverance and return time were positively correlated for the child engagement behavior region and negatively correlated for the primary control engagement suggestion region and the parent engagement suggestion/child engagement behavior region.

Correlations between the content controls and the attractor strength variables are presented in Table 7. Only the correlations between attractor indices and total duration within each proposed attractor region are presented in the text. In the primary control engagement suggestion region, density and return time were positively correlated with total duration. In the secondary control engagement suggestion region, all three attractor indicators were positively correlated with duration. In the disengagement suggestion region, only density was positively correlated with duration. In the child engagement behavior region, perseverance and return time were positively correlated with duration, and density was negatively correlated with duration. In the child disengagement behavior region, density and perseverance were positively correlated with duration. In the parent engagement suggestion/child engagement behavior region, density and return time were positively correlated with duration. In the parent disengagement/child disengagement behavior region, all three attractor indicators were positively correlated with duration. In the parent disengagement/child engagement behavior region, perseverance and return time were positively correlated with duration, and density was negatively correlated with duration. In the parent disengagement/child mixed behavior region, density and return time were positively correlated with duration.

Dyadic Flexibility Regression Analyses

Regression models were conducted for each of the three child adjustment outcomes with the dyadic flexibility construct as the primary independent variable. Covariates included child age, child gender, family income, W1 outcome, and the specific content controls that were correlated with each outcome. Standardized beta coefficients and 95% CIs for the three models are presented in Table 8.

Coping efficacy. The regression model predicting child coping efficacy revealed a significant, positive effect of W1 coping efficacy and nonsignificant effects of all other variables.

Internalizing problems. The regression model predicting child internalizing problems revealed a significant, positive effect of W1 internalizing problems and nonsignificant effects of child age, child gender, and family income. Regarding content controls, longer parent disengagement suggestion duration and shorter parent disengagement/child mixed behavior duration predicted fewer internalizing problems over time. Consistent with hypotheses, more dyadic flexibility was a marginally significant predictor of fewer internalizing problems over time, above and beyond the content controls.

Externalizing problems. The regression model predicting child externalizing problems revealed a significant, positive effect of W1 externalizing problems and a marginally significant effect of gender (i.e., parents of female children reported more child externalizing problems over time). All other effects were nonsignificant.

Path model. A path model that included all main effects and all three child adjustment outcome measures in the same model, accounting for correlations between the outcome variables at W1 and W2, was also analyzed. All main effects remained stable unless noted below. Dyadic flexibility reached marginal significance as a predictor of externalizing problems over time (β = -.18, 90% CI [-.34, -.02]). Consistent with hypotheses, more flexibility predicted fewer externalizing problems, above and beyond the content controls. Additionally, gender was no longer a significant predictor of externalizing problems and disengagement suggestion duration was reduced to a marginally significant predictor of internalizing problems (β = -.17, 90% CI [-.33, -.01]).

Exploratory Attractor Regression Analyses

Regression analyses were performed in Mplus for each set of attractor variables (i.e., parent-focused, child-focused, and dyad-focused) and each of the three child adjustment outcomes (i.e., externalizing problems, internalizing problems, and coping efficacy).

Parent-focused attractors. Regression coefficients and confidence intervals appear in Table 9. Covariates included child age, child gender, family income, W1 outcome, and the parent-focused content controls. Step 1 examined the covariates alone. Step 2 added the proposed attractor variables (i.e., density, perseverance, and return time for the primary control engagement suggestion region and the secondary control engagement suggestion region, and density for the disengagement suggestion region).

Coping efficacy. Step 1 predicting child coping efficacy revealed a significant, positive effect of W1 coping efficacy and nonsignificant effects of child age, child gender, family income, and all duration variables. Step 2 revealed that children in dyads with a faster return to the primary control engagement suggestion region demonstrated less coping efficacy over time (marginally significant). All other proposed attractor effects were nonsignificant.

Internalizing problems. Step 1 predicting child internalizing problems revealed a significant, positive effect of W1 internalizing problems and nonsignificant effects of all other variables. Step 2 revealed that children in dyads with more frequent visits (i.e., higher density) to the primary control engagement suggestion region and the disengagement suggestion region demonstrated fewer internalizing problems over time. Additionally, longer durations per visit to the primary control engagement suggestion region predicted fewer internalizing problems over time. All other proposed attractor effects were nonsignificant.

Externalizing problems. Step 1 predicting child externalizing problems revealed a significant, positive effect of W1 externalizing problems and nonsignificant effects of all other variables. Step 2 revealed that longer durations per visit to the primary control engagement suggestion region and shorter durations per visit to the secondary control engagement suggestion region (marginally significant) predicted fewer externalizing problems over time. Additionally, faster return times to the primary control engagement suggestion region and secondary control engagement suggestion region predicted fewer externalizing problems over time (both marginally significant). The density effects were nonsignificant.

Child-focused attractors. Regression coefficients and confidence intervals appear in Table 10. Covariates included child age, child gender, family income, W1 outcome, and child-focused content controls. Step 1 examined the covariates alone. Step 2 added the proposed attractor variables (i.e., child engagement behavior density, perseverance, and return time, and child disengagement behavior density).

Coping efficacy. Step 1 predicting child coping efficacy revealed a significant, positive effect of W1 coping efficacy and nonsignificant effects of all other variables. All effects in Step 2 were nonsignificant.

Internalizing problems. Step 1 predicting child internalizing problems revealed a significant, positive effect of W1 internalizing problems and nonsignificant effects of all other covariates. Step 2 revealed that children in dyads with more frequent visits (i.e., higher density) to the child engagement behavior region demonstrated more internalizing problems over time. Additionally, children in dyads with more frequent visits (i.e., higher density) to the child disengagement behavior region demonstrated fewer internalizing problems over time. All other proposed attractor effects were nonsignificant.

Externalizing problems. Step 1 predicting child externalizing problems revealed a significant, positive effect of W1 externalizing problems and nonsignificant effects of all other variables. Step 2 revealed that children in dyads with more frequent visits (i.e., higher density) to the child engagement behavior region demonstrated more externalizing problems over time. All other proposed attractor effects were nonsignificant.

Dyad-focused attractors. Regression coefficients and confidence intervals appear in Table 11. Covariates included child age, child gender, family income, W1 outcome, and dyad-focused total duration variables. Step 1 examined the covariates alone. Step 2 added the proposed attractor variables (i.e., parent engagement suggestion/child engagement behavior density, perseverance, and return time, parent disengagement/child disengagement behavior density, parent disengagement/child engagement behavior density, perseverance, and return time, and parent disengagement/child mixed behavior density, perseverance, and return time).

Coping efficacy. Step 1 predicting child coping efficacy revealed a significant, positive effect of W1 coping efficacy and nonsignificant effects of all other variables. Step 2 revealed that children in dyads with a faster return time to the parent engagement suggestion/child engagement behavior region demonstrated less coping efficacy over time (marginally significant). All other proposed attractor effects were nonsignificant.

Internalizing problems. Step 1 predicting child internalizing problems revealed a significant, positive effect of W1 internalizing problems and nonsignificant effects of all other variables. Step 2 revealed that children in dyads with longer durations per visit (i.e., greater perseverance) to the parent engagement suggestion/child engagement behavior region demonstrated fewer internalizing problems over time. All other proposed attractor effects were nonsignificant.

Externalizing problems. Step 1 predicting child externalizing problems revealed a significant, positive effect of W1 externalizing problems and nonsignificant effects of all other variables. Step 2 revealed that children in dyads with more frequent visits (i.e., higher density) to the parent disengagement/child engagement behavior region demonstrated fewer externalizing problems over time. In addition, children in dyads with more frequent visits to the parent disengagement/child mixed behavior region and the parent engagement suggestion/child engagement behavior region (marginally significant) demonstrated more externalizing problems over time. Moreover, children in dyads with longer durations per visit to the parent engagement suggestion/child engagement behavior region and shorter durations per visit to the parent disengagement/child engagement behavior region demonstrated fewer externalizing problems over time. Children in dyads with a longer return time to the parent engagement suggestion/child engagement behavior region and a faster return time to the parent disengagement/child engagement behavior region demonstrated fewer externalizing problems over time.

Final Aggregate Regression Analyses

Regression coefficients and confidence intervals appear in Table 12. Covariates included child age, child gender, family income, W1 outcome, and any duration variables present in the dyadic flexibility analyses or corresponding to a significant attractor variable from the region-focused analyses above. Step 1 examined the covariates alone. Step 2 added dyadic flexibility and the proposed attractor variables that were significant predictors of the outcome of interest in the region-focused analyses above. For the externalizing problems regression analysis, only proposed analyses significant at the $p <$

.01 level were included in this aggregate model given the large number of variables reaching significance in the region-focused analyses.

Coping efficacy. Step 1 predicting child coping efficacy revealed a significant, positive effect of W1 coping efficacy and nonsignificant effects of all other variables. Step 2 revealed that children in dyads with a faster return time to the primary control engagement suggestion region demonstrated less coping efficacy over time (marginally significant). All other effects were nonsignificant.

Internalizing problems. Step 1 predicting child internalizing problems revealed a significant, positive effect of W1 externalizing problems. Additionally, dyads with longer total durations in the child engagement behavior region, child disengagement behavior region, and parent disengagement/child mixed behavior region predicted fewer internalizing problems over time. Step 2 revealed that greater dyadic flexibility predicted fewer internalizing problems over time. Additionally, children in dyads with more frequent visits (i.e., higher density) to the primary control engagement suggestion region demonstrated fewer internalizing problems over time. All other effects were nonsignificant.

Externalizing problems. Step 1 predicting child externalizing problems revealed and nonsignificant effects of all other variables. Step 2 revealed that children in dyads with longer durations per visit to the primary control engagement suggestion region demonstrated fewer externalizing problems over time. Additionally, children in dyads with a faster return time to the parent disengagement/child engagement behavior region demonstrated fewer externalizing problems over time. All other effects were nonsignificant.

Discussion

This project examined whether the organization of parent-child interactions during a stressful task (i.e., dyadic flexibility and exploratory attractor regions) predicted child internalizing problems, externalizing problems, and coping efficacy over time, above and beyond the effect of content (i.e., mean-level parent coping suggestions and child coping behavior). My hypotheses were partially supported. Dyadic flexibility in the parent-child coping interaction was largely adaptive for child adjustment, whereas attractor strength demonstrated a more complex relationship with child adjustment outcomes. This study demonstrates the utility of applying state space grids to examine the structure of parent-child coping interactions, in addition to content, as predictors of child adjustment. Furthermore, this study offers novel, *detailed* information about coping interactions in families with children in middle childhood.

In the following discussion, the findings related to the dyadic flexibility hypotheses are discussed first, followed by the findings related to the attractor hypotheses, separated into parent-focused, child-focused, and dyad-focused findings. Finally, limitations, future directions, and broader implications are discussed.

Dyadic Flexibility

Dyadic flexibility is one measure of the organization of an interaction. Greater flexibility indicates that the dyad demonstrated a wider range of behaviors during the interaction. Previous research on dyadic flexibility suggests that flexibility in parent-child interactions is positive; dyadic flexibility in affect and in emotion socialization, for example, tend to be associated with adaptive outcomes in children and adolescents (Hollenstein, 2004; Lunkenheimer et al., 2012; Van der Giessen et al., 2015).

In the present study, dyadic flexibility was calculated using (a) dispersion, a measure of the range of cells visited across the grid, and (b) transitions, a measure of the number of transitions between cells in the grid. There was substantial variability in both indicators of flexibility during the mirror tracing task. Dyads visited between 13 and 66 percent of grid cells during the task, and on average they visited about one third of all possible cells. This indicates that the mirror tracing task was successful at eliciting variation in dyadic flexibility in parent-child coping interactions.

The dyadic flexibility hypotheses were partially supported: as expected, greater dyadic flexibility was associated with fewer child internalizing and externalizing problems over time; however, contrary to predictions, it was not associated with child coping efficacy. When examined in separate regression analyses for each outcome, greater dyadic flexibility predicted fewer internalizing problems and did not predict externalizing problems or coping efficacy. When examined in a path model with all three outcomes, dyadic flexibility continued to predict fewer internalizing problems and also marginally predicted fewer externalizing problems. Finally, when examined in an aggregate model with significant proposed attractors (but each outcome examined separately), dyadic flexibility predicted fewer internalizing problems.

These results suggest a robust effect of dyadic flexibility predicting internalizing problems and, to a lesser extent, externalizing problems, above and beyond the content of the interactions as measured by both region durations and attractor indicators. This indicates that the structure of coping interactions, irrespective of the content of the interaction, is predictive of child adjustment outcomes. Specifically, greater dyadic flexibility in parent coping socialization and child coping behavior during a stressful task may be protective against adjustment problems in middle childhood. This finding adds to the growing body of research documenting the benefit of parent-child affective and emotional socialization flexibility in buffering against child psychopathology (Van der Giessen & Bögels, 2018; Hollenstein, 2004; Lunkenheimer et al., 2012; Van der Giessen et al., 2015) by expanding the concept of dyadic flexibility to parent socialization of coping and to child coping behavior using the Compas coping framework (Compas et al., 2001).

This study moves the socialization of coping literature forward by suggesting that understanding how the socialization process unfolds in families involves more than examining each type of coping suggestion as a predictor of child outcomes. The vast majority of studies examining parenting (including studies that use parent-report measures, global observational measures, and micro observational measures) identify a specific parenting practice and examine its relation to a child behavior. The dyadic flexibility finding from the current study illustrates that in addition to examining specific practices, there is also important information gathered from examining the diversity of parenting practices used in a certain context. Dyads can differ in the number and content of attractors (i.e., grid regions) they experience, yet have a comparable degree of rigidity that restricts their interaction. Specifically, this study supports the idea that children in a community sample benefit from having the opportunity to exhibit a range of emotions and coping behaviors and having parents who provide a range of coping suggestions and responses to their child throughout a stressful task. Parents who present only a limited range of coping strategies to their child during a stressful situation may foster fewer opportunities for children to practice a variety of coping responses (Eisenberg, Cumberland, & Spinrad, 1998; Ramsden & Hubbard, 2002; Hollenstein et al., 2004). Fewer opportunities to evaluate and choose coping responses that are effective in varying circumstances may put children at risk for adjustment problems (Gottman, Katz, & Hooven, 1996).

A next step in this line of research is to investigate dyadic flexibility across a series of diverse tasks. Examining the flexibility of dyads across multiple tasks would generate a measurement of the dyad's ability to adapt to changing environmental demands. The ability to transition between different contexts while maintaining flexibility is associated with improved child outcomes (Hollenstein et al., 2004; Granic & Hollenstein, 2006). This design would build on the present findings by demonstrating whether the dyads who are able to remain flexible in coping interactions across task contexts are the most well-adjusted over time, or whether flexibility in just one task context produces a buffering effect. Additionally, different contexts would pose different demands on children's coping behavior, and thus be a more stringent test of the role of dyadic flexibility in coping interactions. Another future direction is to examine dyadic flexibility in coping interactions in a clinical sample. Hollenstein (2004) found that affective rigidity was most common in children with the most severe internalizing problems, and father-child and mother-child dyads in which a child (age 8 to 18) was diagnosed with an anxiety disorder displayed more affective rigidity during a conflict interaction than healthy controls (Van der Giessen & Bögels, 2018). Based on these previous findings and the present findings, it appears likely that the present findings would replicate, or become more pronounced, in a clinical sample of children. The clinical utility of dyadic flexibility in the coping socialization process is yet to be understood. Clinical implications could be further elucidated by investigating (a) whether interventions that produce changes in child psychopathology produce related change in dyadic flexibility in coping interactions, and (b) whether intervention designed to increase dyadic flexibility produces related change in child psychopathology.

Exploratory Proposed Attractors

The second aspect of the organization of coping interactions examined in this study was attractors. Attractors represent specific adaptive or maladaptive recurring exchange patterns toward which a dyad tends to gravitate (Lunkenheimer & Dishion, 2009). The three indicators of attractor strength used in this study were (a) density, a measure of how many times the dyad visited the region, (b) return time, a measure of how long it took the dyad on average to return to the region, and (c) perseverance, a measure of how long the dyad remained in a region per visit. These indicators were not highly correlated for any of the proposed attractor regions. However, a trend emerged in which return time and density often produced effects in the same direction, whereas perseverance produced effects in the opposite direction. This trend can be understood in the following way: attractors are “stronger” if they have faster return times and higher densities (more frequent visits), and both of these measures indicate frequent moves into (and therefore out) of the region; however, attractors are also “stronger” if they have greater perseverance, which indicates longer durations per visit and therefore less movement in (and out) of the region. Thus, the three measures appear to sometimes be at odds; if return time is very fast for a particular region, that by definition suggests that the perseverance in that region will likely be low. Although higher levels of all three (i.e., greater density, greater perseverance, and faster return time) have been proposed to indicate a strong attractor region (Granic & Hollenstein, 2006), previous studies examining attractors in developmental psychopathology tend to focus on one indicator of attractor strength and have not examined differences among these three indicators. For this reason, there are few empirical studies to compare to the present results, unlike the dyadic flexibility findings, which can be readily compared across studies. The findings from the exploratory parent-focused, child-focused, and dyad-focused attractor regions are explored below.

Parent-focused attractors. The parent-focused attractor regions included primary control engagement suggestion, secondary control engagement suggestion, and disengagement suggestion. Almost all parents entered the primary control engagement suggestion region and the secondary control engagement suggestion region at least once. Only one-fifth of parents entered the disengagement suggestion region. This pattern is consistent with parent-report measures of socialization of coping, in which parents consistently reported using engagement suggestions more frequently than disengagement suggestions across three samples (two middle childhood samples and one college student sample; Abaied & Rudolph, 2010; Abaied, Wagner, Sanders, & Stanger, in preparation; Stanger et al., 2016). Additionally, this type of pattern is consistent with observational findings from the emotion coaching literature, in which almost all parents engaged in emotion coaching during an emotion discussion task, and only 35 percent of parents engaged in emotion dismissing (Lunkenheimer, Shields, & Cortina, 2007). On average, parents spent about twice as long providing primary control engagement suggestions compared to secondary control engagement suggestions. Kliewer et al. (2006) found that parents most frequently used active and proactive suggestions (similar to primary control) during a videotaped parent-child vignette discussion task and resignation/seeking understanding suggestions (similar to secondary control) was the third most frequently used strategy. Kliewer et al. (2006)'s coding scheme did not capture disengagement suggestions, however, and they only reported the percentage of parents who used at least one of each suggestion type. These descriptive findings from the present study illustrate that parents appear to favor primary control suggestions in the context of this challenge task and are using a combination of primary and secondary control suggestions most often. Future research will need to examine whether these comparative frequencies can be replicated or if they change depending on the context of the task.

Correlations. Correlations between parent-focused attractor regions and other attractor regions revealed that more time spent in the parent disengagement suggestion region was associated with less time spent in the child engagement behavior region and more time spent in the child disengagement behavior region. These observed correlations are consistent with prior observational (Kliewer et al., 2006) and parent-report research suggesting that parent disengagement suggestions tend to be associated with child disengagement coping (Abaied & Rudolph, 2011; Kliewer et al., 1996; Miller et al., 1994). More time spent in the parent disengagement suggestion region was also associated with greater concurrent internalizing problems, which is also consistent with prior parent-report research (Abaied & Rudolph, 2010).

Regressions. The exploratory hypotheses for parent-focused regions were partially supported. Consistent with the parent-focused hypotheses, primary control engagement suggestion density (i.e., more frequent visits) and perseverance (i.e., longer durations per visit) predicted fewer internalizing and externalizing problems over time.

Additionally, primary control engagement suggestion and secondary control engagement suggestion return time marginally predicted fewer externalizing problems over time. Contrary to the parent-focused hypotheses, primary control engagement suggestion return time marginally predicted worse coping efficacy over time. Additionally, disengagement suggestion density (i.e., more frequent visits) predicted fewer internalizing problems and secondary control engagement suggestion perseverance (i.e., shorter durations per visit) predicted fewer externalizing problems over time. In the aggregate models that included dyadic flexibility and the significant proposed attractors from previous models, half of the findings remained significant (delineated as robust in the text below).

Parent engagement suggestions. Consistent with the hypotheses, primary control engagement suggestion density predicted fewer internalizing problems (robust finding). Additionally, faster return times to the primary control engagement suggestion region and the secondary control engagement suggestion region predicted fewer externalizing problems. Together, these findings suggest that more frequent engagement coping suggestions, particularly primary control suggestions, are adaptive at buffering against adjustment problems, which is consistent with prior research using parents' report of their use of coping suggestions (Abaied & Rudolph, 2010; 2011) and is consistent with the coping literature on the effectiveness of primary control coping when dealing with a controllable stressor (Compas et al., 2001).

Consistent with the hypotheses, primary control engagement suggestion perseverance predicted fewer internalizing and externalizing problems (robust finding). However, contrary to hypotheses, secondary control engagement suggestion perseverance predicted greater externalizing problems. This finding suggests that longer primary control suggestions (or more suggestions in a row) are adaptive, whereas shorter secondary control suggestions were adaptive. Because faster return times to secondary control engagement suggestions were adaptive, it would be inaccurate to suggest that secondary control suggestions are simply maladaptive. Instead, this finding appears to be specific to the length of the suggestion.

When observing the parent-child interactions during this study, the shorter secondary control suggestions were often brief reframes of how to think about the situation differently (e.g., “You didn’t fail, this is supposed to be really hard.”), whereas longer secondary control suggestions tended to be descriptions of analogous situations or an account of a previous situation in which the child faced a similar stressor. It is possible that in the midst of this type of stressful task, the former, shorter type secondary control suggestion is more useful to the child in learning to effectively regulate their behavior and emotions across contexts. Observations of the primary control suggestions indicated that shorter suggestions tended to nonspecific (e.g., “Keep going!”), whereas longer primary control suggestions tended to involve greater problem-solving detail (e.g., “What if you take your pencil to the left point, look at the wall, and slowly move your hand in that direction.”). It is reasonable to surmise that in the context of this challenging but possible task, the latter strategy may be significantly more helpful, as it provided the child with more specific instructions for how to complete the task. There is also evidence from the emotion socialization literature that emotion elaboration perseverance (i.e., elaborative statements about emotion expression or questions about emotions) during a discussion of a difficult experience is associated with better emotion regulation in middle childhood (Lunkenheimer et al., 2012). This supports the primary control finding in that, although not a direct comparison, one type of primary control suggestion involves encouraging active engagement with the child's emotions. Overall, it appears that in the context of this task, more detailed parent suggestions that were task-specific, but not more general, were predictive of more adaptive child outcomes.

This proposed explanation indicates that not all coping suggestions within the generally adaptive engagement categories are useful in every situation. Therefore, parents who are able to match the needs of the situation to the needs of their child may be providing the most effective coping socialization. This interpretation is consistent with a goodness of fit framework, which suggests that an optimal match between the environment and person will yield the healthiest adjustment and that the source of pathology can often be found in the interaction between a person and their environment (Chess & Thomas, 1999). A goodness of fit model has previously been applied to cognitive appraisals of the controllability of stressors and coping behaviors, where a poor appraisal-coping fit (e.g., attempting to problem-solve a stressor that was appraised as uncontrollable) was associated with worse adjustment in college students (Forsythe & Compas, 1987). In this case, the goodness of fit may be between the parents' appraisal of the stressor and their ability to tailor generally helpful coping suggestions to meet the needs of that appraisal. Tu, Gregson, Erath, and Pettit (2017) found support for the goodness of fit framework in the context of parenting focused on peer stress. They found that parent facilitation of peer interactions predicted better friendship quality and less loneliness among youth with high peer acceptance, but not among youth with low peer acceptance (Tu et al., 2017). In contrast, they found that parental social coaching predicted better friendship quality among youth with low peer acceptance and predicted lower friendship quality among youth with high peer acceptance. These findings support the idea that the effectiveness of parents' use of generally adaptive socialization practices can depend on their child's current context.

Inconsistent with the hypotheses, faster primary control engagement suggestion return time predicted worse coping efficacy over time (robust finding). One potential explanation for this finding is that a high frequency of direct, problem-solving suggestions may lead children to feel as though they are not able to handle a stressor on their own, which could lead to poorer coping *efficacy.* As coping efficacy is posited to capture not what children do in response to stress but how effectively they feel they have done it (Skinner & Zimmer-Gembeck, 2009), children may feel less confident in their ability to handle stressors when their parent is highly involved in the process. This view of coping efficacy is supported by the present sample, in which coping efficacy was uncorrelated with parent report of child externalizing problems and was only correlated with internalizing problems at W1. Additionally, observed child coping behavior during the task was unrelated to children's report of their coping efficacy.

Parent disengagement suggestions. Inconsistent with the hypotheses, disengagement suggestion density (i.e., more frequent visits) predicted fewer internalizing problems (robust finding). This finding diverges somewhat from previous research in which disengagement suggestions have been associated with heightened adjustment problems (Abaied & Rudolph, 2010, 2011; Kliewer et al., 1996; Miller et al., 1994). However, some research has shown that in the context of specific physiological profiles, disengagement suggestions can buffer against substance use and externalizing outcomes (Stanger et al., 2016; Stanger et al., 2018). Disengagement suggestions in the context of this laboratory task tended to involve suggesting that the child take a break from the task. Observations of the participants demonstrated that many children did not follow their parent's suggestion to disengage from the task, indicating that in this context, presenting a variety of options may have been helpful in allowing the child to choose the most effective one. It is also important to consider the comparative time parents spend offering engagement vs. disengagement suggestions. Parents spent approximately half of one second total offering disengagement suggestions throughout the task (compared to approximately one minute for primary control and 30 seconds for secondary control suggestions), and the maximum total time spent by any parent offering disengagement suggestions was 7 seconds (compared to 267 seconds for primary control and 139 seconds for secondary control suggestions). These durations suggest that even the parents who were offering the most frequent disengagement suggestions were still likely offering substantially more engagement suggestions. This finding is consistent with parent-report research (Abaied & Rudolph, 2010; Stanger et al., 2016) documenting a positive correlation between the use of engagement and disengagement suggestions. Additionally, this interpretation is supported by previous parent-report research documenting that the adaptiveness of disengagement and engagement suggestions depend on the amount of stress in the child's environment. Specifically, in the context of high interpersonal stress, disengagement suggestions were associated with increased child depression only in the context of few engagement suggestions and in the context of mild noninterpersonal stress, disengagement suggestions were associated with fewer externalizing problems (Abaied & Rudolph, 2010). Therefore, disengagement suggestions may be adaptive when made in moderation, when made in addition to engagement suggestions, and may be more beneficial under certain child circumstances.

Summary. In general, the findings from the parent-focused attractor regions lend support for the idea that stronger parent coping suggestion attractors were generally adaptive for child adjustment outcomes over time. These findings contribute novel information about what specifically is adaptive about *how* these suggestions are conveyed to a child throughout a stressful task (i.e., is the frequency of suggestions, the length of each suggestion, or simply the total duration of suggestions most important). The findings from this study suggest that both frequency of coping suggestions and the length of each suggestion have implications for child adjustment, whereas overall durations (i.e., the content controls) were comparatively less predictive of adjustment outcomes. This level of detail becomes increasingly important when considering clinical implications; these details make it possible to give parents more precise advice about how to most effectively provide a child with coping suggestions.

Child-focused attractor regions. The child-focused attractor regions included child engagement behavior and child disengagement behavior, based on the Compas coping framework (Compas et al., 2001). All children exhibited engagement behavior and approximately half of the children exhibited disengagement behavior during the task. It was also common for children to engage both verbally and nonverbally in the task. As the coding scheme for child behavioral coping was created for this study, it is important to note that the coding scheme was reliable and that children did exhibit behavior in every category (with behavioral disengagement/verbal engagement and behavioral disengagement/verbal disengagement being the least frequently visited). These results lend preliminary support for this coding scheme as a useful tool in the observation of child coping.

Correlations. More time spent in the child engagement behavior region was associated with fewer concurrent and follow-up externalizing problems. Additionally, more time spent in the child disengagement region was associated with more externalizing problems over time. These findings are in line with previous research on the association between child self-report and parent report of engagement and disengagement coping and externalizing problems (Compas et al., 2001; Compas et al., 2010; Downey et al., 2010).

Regressions. The exploratory hypotheses for the child-focused regions were not supported. Contrary to the child-focused hypotheses, the child-focused regions did not predict coping efficacy over time, and child engagement behavior density (i.e., more frequent visits) predicted greater internalizing and externalizing problems. Additionally, child disengagement behavior density predicted fewer internalizing problems. In the aggregate models that included dyadic flexibility and the significant proposed attractors from previous models, none of the findings remained significant. As such, the findings should be interpreted cautiously.

Child engagement behavior. Contrary to the hypotheses, child engagement behavior density predicted greater internalizing and externalizing problems over time. Because this finding was so unexpected, and because the total duration in this region was correlated with externalizing problems in the expected direction (i.e., longer duration was correlated with fewer externalizing problems), partial correlations were run between this region and each outcome variable, controlling for W1 of the outcome. The partial correlation with internalizing problems was in the same direction as the regression finding (partial $r = .27$, $p =. 05$) and the partial correlation with externalizing problems was nonsignificant (partial $r = .05$, $p = .73$). By considering the definition of the density variable, a likely explanation became clear: fewer visits to the child engagement behavior region can also be interpreted as fewer *exits* from this region. This is likely a more accurate interpretation for this particular region because children spent the majority of their task here (on average, 56 seconds out of every minute were spent in this region). Therefore, child engagement behavior appears to be a very strong and possibly adaptive attractor during this task, likely in line with previous research on the benefits of engagement coping for child adjustment (Compas et al., 2001). This finding also identifies a general weakness of density (and return time) as indicators of attractor strength in contexts in which there is little movement away from the attractor region.

Child disengagement behavior. Contrary to the hypotheses, child disengagement behavior density predicted fewer internalizing problems over time. The partial correlation between this variable and internalizing problems, controlling for W1 internalizing problems, was nonsignificant (partial $r = -.08$, $p = .57$). Therefore, this finding should be interpreted cautiously. This finding may be capturing children who know when they need a break because this region includes children who are consistent in their disengagement behavior (i.e., either silent or verbally disengagement while they are behaviorally disengaged) and does *not* include children in the "mixed" behavior category (i.e., children displaying a combination of engagement and disengagement verbalizations/behavior at the same time). It is possible that one consequence of using a behavioral coding scheme to measure disengagement coping is that many of the behaviors attributed to disengagement coping, such as avoidance and denial, may be difficult to parse from behaviors that serve regulatory functions, such as taking a break, pausing, or temporarily distancing oneself from the stressor, especially when the child is silent. This potential explanation is supported by the fact that only density was predictive of internalizing problems, indicating that this finding may be more related to frequency of visits and not about how long the child spends disengaging. Children who effectively utilize short breaks from a stressor in addition to other coping strategies may be more equipped to handle stressors in general, resulting in fewer anxiety and depressive symptoms.

In future research, it will be important to complete a more in-depth examination of the coping coding scheme created for this study by examining the association between the mixed behavior/verbalization categories and child psychopathology as well as investigating differences between whether the child was engaging or disengaging silently or with corresponding engagement or disengage verbalizations (which were examined together in the present study). In particular, within the disengagement behavior region it is possible that the cells in which the child verbalizes disengagement from the task (i.e., the disengagement behavior/disengagement verbalization cell and the engagement behavior/disengagement verbalization cell) are more predictive of poor outcomes than the cells in which the child is either silent or verbalizing engagement (i.e., the disengagement behavior/silent cell and the disengagement behavior/engagement verbalization).

Summary. Although there is a growing consensus in the literature that parent-child interactions need to be observed in real-time, the coping literature has lagged behind due to the internal nature of some aspects of the coping process. However, capturing child coping behavior is instrumental to fully understanding how parents can most effectively respond to their child under stressful contexts. This was the first study to attempt to measure observations of child behavioral coping in middle childhood using a coping framework. A novel coding scheme was developed and was found to be reliable and predictive of child adjustment over time. This approach generates opportunity for future research examining the development of coping in childhood and provides a starting place for using observational measures to replicate findings from the well-documented self-report and parent-report child coping literature.

Given that the vast majority of child behavior was in the child engagement region, creativity in creating a more stressful task (or a variety of stress-inducing tasks) in future research may result in greater variation in child coping behavior. The use of a highly stressful task to examine coping interactions is important because one of the principles of dynamic systems theory is that transitions (i.e., moving away from and back to equilibrium) are critical to demonstrating the characteristics of that system (Granic & Lamey, 2002; Thelen & Ulrich, 1991). Methodological manipulation (i.e., the task chosen) can put a system in a temporary "transition state" so that the ability of the system to respond flexibly and to cope is challenged (Hollenstein, 2004). Lunkenheimer, Kemp, Lucas-Thompson, Cole, and Albrecht (2017) recently delineated potential criteria for parent-child interaction task design to ensure that tasks meet this dynamic systems principle: (a) the task is above the natural ability level of the child's developmental status, (b) a sudden time limit is added partway through the task, (c) the dyad is told they must work together but the parent can only participate verbally, and (d) the child is told they will only get a prize if they finish the task (Lunkenheimer et al., 2017). Criterion (a) was present in the current study, however the rest of the criteria would likely be applicable to older children as well and may assist in challenging the dyad more effectively.

Dyad-focused attractor regions. The dyad-focused attractor regions included parent engagement suggestion/child engagement behavior, parent engagement suggestion/child disengagement behavior, parent engagement suggestion/child mixed behavior, parent disengagement/child engagement behavior, parent disengagement /child disengagement behavior, and parent disengagement/child mixed behavior. Two regions (parent engagement suggestion/child disengagement behavior and parent engagement suggestion/child mixed behavior) were not included in further analyses because less than 50 percent of dyads entered these regions *and* there were no specific hypotheses for these regions.

All dyads entered the parent engagement suggestion/child engagement behavior region and the parent disengagement/child engagement behavior region at least once. Dyads spent by far the longest time (approximately 5 minutes, on average), in the parent silence – child engagement behavior/silence cell (part of the parent disengagement/child engagement behavior region), indicating that the most common dyad behavior involved the child silently working on the task while their parent watched in silence. This cell could be viewed as a baseline for a child-centered challenge task, as it is the expectation of the task and what one might anticipate is occurring if the task is going well. Parents spent almost a minute on average offering primary control suggestions and about 25 seconds offering secondary control suggestions while their child actively engaged in the task (parent engagement suggestion/child engagement behavior region). In comparison, parents spent only 6 seconds offering primary control suggestions and 2.5 seconds offering secondary control suggestions while their child was in any of the other child categories. These results indicate that parents are offering substantially more coping suggestions while their child is engaged in the task than while their child is disengaged from the task. On average, children disengaged from the task for 10 seconds total while their parent was silent (parent disengagement/child disengagement behavior region), and 5 seconds total while their parent was in any other parent category. These findings indicate that, on average, parents are responding in the moment to about one-third of their child's disengagement behaviors.

Correlations. More time spent in the parent disengagement/child engagement behavior region was associated with fewer externalizing problems at W2. Additionally, more time spent in the parent disengagement/child mixed behavior region was associated with greater internalizing and externalizing problems at both waves. These correlations are consistent with the findings from the regression analyses reviewed below, and thus are discussed in the context of the regression findings.

Regressions. The exploratory hypotheses for dyad-focused regions were partially supported. Consistent with the dyad-focused hypotheses, parent engagement suggestion/child engagement behavior perseverance (i.e., longer durations per visit) predicted fewer internalizing and externalizing problems over time. Contrary to the dyad-focused hypotheses, parent disengagement/child disengagement behavior did not predict any of the child adjustment outcomes. Faster parent engagement suggestion/child engagement behavior return time marginally predicted worse coping efficacy and more externalizing problems over time. Additionally, parent engagement suggestion/child engagement behavior density (i.e., more frequent visits) also predicted more externalizing problems over time. In the regions without specific hypotheses, parent disengagement/child mixed behavior density (i.e., more frequent visits) predicted more externalizing problems over time. Parent disengagement/child engagement behavior perseverance (i.e., longer durations per visit) predicted greater externalizing problems over time and density (i.e., more frequent visits) and faster return time predicted fewer externalizing problems over time. In the aggregate models that included dyadic flexibility and the significant proposed attractors from previous models, only one of the dyad-focused findings remained significant: faster parent disengagement/child engagement behavior return time predicted fewer externalizing problems over time.

Parent engagement suggestion/child engagement behavior. Contrary to hypotheses, faster parent engagement suggestion/child engagement behavior return time and greater density (i.e., more frequent visits) predicted greater externalizing problems. These findings are in the opposite direction as the parent-focused primary and secondary control engagement suggestion regions return time findings. The difference between the parent-focused regions and the dyad-focused region is that the dyad-focused region includes the child engagement behavior region. There are two possible explanations for these unexpected findings. First, it is possible that engagement suggestions are more effective when the child is not currently fully engaged in the task (as they are when in the child engagement behavior region). For example, more frequent returns to this region suggest that perhaps the parent is less in tune with the moments when their child is in need of assistance (such as when the child is disengaging completely or when the child is in a mixed behavior region). This explanation is supported by the fact that faster parent engagement suggestion/child engagement behavior return time also predicted worse coping efficacy over time (which was also contrary to hypotheses). Perhaps if the parent provides frequent suggestions at a time that the child is not in need of those suggestions, the suggestions may be ineffective at increasing the child's confidence that they understand when to use which coping strategies, producing less coping efficacy. Prior research on parent report of socialization of coping and interpersonal stress lends support for this idea; the effectiveness of engagement suggestions at buffering against externalizing problems differed for males vs. females only in youth who experienced high levels of interpersonal stress (Abaied & Rudolph, 2010). For females, engagement suggestions were most effective at buffering against externalizing problems when youth reported high levels of interpersonal stress. For males, engagement suggestions predicted worse externalizing problems when youth reported high levels of interpersonal stress. This is applicable to the current study in that these findings suggest that the adaptiveness of engagement suggestions depend on context, particularly whether the child is experiencing significant stress. In addition, these findings suggest that it may be important to examine gender as a moderator of the present findings.

An alternative possible explanation is that this region is experiencing the same issue that arose in the child engagement behavior region; faster return times and greater density indicates that the dyad is entering *and* leaving the child engagement behavior region more often. Under this interpretation, the findings are an artifact of the measures (which no longer suggest "strength" if the dyad almost never leaves a particular region), and not an indication that this region is truly maladaptive. The additional finding that parent engagement suggestion/child engagement behavior perseverance (longer durations per visit to this region) predicted fewer internalizing and externalizing problems over time (which is consistent with hypotheses) provide support for this alternative explanation.

Parent disengagement/child engagement behavior. The parent disengagement/child engagement behavior region showed the opposite constellation of findings from the parent engagement suggestion/child engagement behavior region; density and return time (robust finding) predicted fewer externalizing problems whereas perseverance predicted greater externalizing problems over time. It is important to consider that the parent disengagement part of this region was constructed from disengagement suggestions (which constituted a very small amount of time in this region) *and* parent silence and parent verbalizations that were not coping suggestions. Therefore, this region is likely comprised primarily of moments when the child is fully engaged in the task and the parent is leaving the child alone (on average, dyads spent five times as long in the parent silence/child engagement behavior grid cell as any other cell in the grid). When viewed in this way, it is plausible that frequent visits to this region (higher density and faster return time), would be adaptive because it may indicate a match between the parent's behavior and their child's current context (i.e., the child is actively working on the task and parent intervention may not be warranted). This dyadic interaction may suggest to the child that their parent has confidence in their ability to handle the stressor on their own. Additionally, it is plausible that perseverance would be more problematic in this region: if the parent remains disengaged for long amounts of continuous time without re-engaging with their child and the task, that would be maladaptive. This dyadic region may be analogous to a 'let sleeping dogs lie' parenting strategy, where parents choose to ignore their child when their child is acting appropriately, out of fear that they will create negative behavior by disrupting the child's positive behavior. In reality, research suggests that the opposite is true; if children do not get attention for their positive behaviors, they will ultimately seek out negative attention instead (McMahon & Forehand, 2005). In the context of the present task, this behavior by parents may indicate this 'let sleeping dogs lie' attitude, which is ultimately predictive of more behavior problems in children over time.

Parent disengagement/child mixed behavior. Parent disengagement/child mixed behavior density predicted greater externalizing problems over time. More frequent visits to this region suggest that the parent is often disengaging while their child is either verbally or behaviorally disengaged from the task. In comparison to the previous region, this combination of parent and child behavior suggests a mismatch between the in-the-moment coping needs of the child (the child was either verbally or behaviorally disengaging from the task) and the parent's lack of support and engagement suggestions in those moments. If a child expresses or demonstrates disengagement coping and their parent either encourages this behavior or is nonresponsive (i.e., the silent grid cell), the disengagement coping strategy is reinforced. Frequent use of disengagement coping, in turn, is associated with behavior problems (Compas et al., 2001). An alternative potential mechanism for this association is that when the child is in the mixed behavior region in the context of this task, it is an indication that they are searching for parent attention and support (e.g., they are experiencing significant stress related to the task but are attempting to remain partially engaged). If parents frequently miss these cues and do not provide such attention, the child's behavior escalates negatively, leading to increased externalizing problems. Both of these possibilities again align with a goodness of fit framework (Chess & Thomas, 1999), where there is not an optimal match between the child's characteristics (current coping behavior) and their environment (parent's behavior).

Summary. The dyad-focused attractor regions are arguably the most novel of the attractor analyses because they examine the combined behavior of the parent and child in any given moment of the task. There is no prior research on socialization of coping that examines simultaneous parent and child behavior during a stressful interaction. Whereas the dyadic flexibility findings suggested that the behavior of both parent and child together were important in predicting child adjustment outcomes irrespective of the content, the dyad-focused attractor regions suggest that the specific content of combined parent and child behavior is also predictive of child outcomes. Although replication is certainly warranted, these findings suggest that in the context of a stressful task, parents' behavior is less effective when their suggestions match the current coping behavior of the child. For example, parent engagement suggestions when the child was currently engaged in the task were shown to be maladaptive over time, whereas parent disengagement during this time was shown to be adaptive over time. Similarly, parent disengagement when the child was disengaged from the task was maladaptive over time. This makes sense in the context of socialization because this is capturing a learning process where children are likely more or less receptive to learning depending on their own context and needs in the moment.

Attractor Summary. The exploratory attractor analyses contributed substantially to our understanding of how parent-child coping interactions unfold over time. The attractor indicators demonstrated predictive power across all three regions; however, these associations were not always in the anticipated direction. The measures of attractor strength move the literature on parent-child coping interactions forward by building a specific, detailed conceptualization of how parents and children behave during stressful interactions and how these particular patterns contribute to children's adaptive development. From the attractor regions examined in this study, this increased intensity in detail was examined regarding parent and child behaviors independently of one another and, perhaps most novel, together as an interactional process. This level of detail not only allows for a more complete understanding of the socialization of coping process in youth, it is also critical when considering how to most effectively advise parents on how to positively change their coping interactions with their children.

A direction for future research on attractors involves examining the interplay between dyadic flexibility and attractor strength. Lunkenheimer (2012) examined interactions between dyadic emotion socialization flexibility and specific dyadic emotion socialization attractors in 8- to 12-year-olds and their parent(s) during a discussion of a positive experience. She found that greater emotion socialization flexibility buffered children's emotion regulation from the effect of (a) weak emotion coaching attractors and (b) strong emotion dismissing attractors. This suggests that greater flexibility in emotion socialization may buffer children's emotion regulation skills even when a negative attractor, such as emotion dismissing, was strong in the dyad. Investigating whether similar processes play out in coping interactions would move the research towards a more integrated understanding of the organization of parent-child coping interactions.

Limitations and Future Directions

These findings must be considered in the context of some limitations. First, there were multiple limitations regarding the sample. The sample was community-based, which resulted in modest levels of child adjustment problems, and was fairly homogenous socioeconomically and racially. Additionally, the sample size was small, which limited the magnitude of effect sizes that were detectable. However, even with rigorous statistical controls for content of the interaction and for baseline levels of adjustment outcomes, main effects of flexibility and attractor strength were still observed. Finally, the sample consisted of primarily biological mothers. Previous research has demonstrated differences in the adaptiveness of dyadic flexibility between father-child dyads and mother-child dyads (Lunkenheimer, 2011). Given the shortcomings of this sample, the findings should be replicated in a larger, more diverse sample that includes a larger sample of father-child dyads.

Second, the individual variables that were planned to be combined to form the proposed attractor strength constructs were not strongly associated with each other. Moreover, issues arose when using the density variable for a region where children rarely left. The use of these variables as indicators of attractor strength in parent-child interactions is still new and this was the first attempt to apply these indicators to parent-child coping interactions. Therefore, further refinement of these attractor strength measures is needed.

Third, there were multiple grid regions with low base rate occurrences during the task. In particular, only 21% of dyads entered the disengagement suggestion region. Therefore, a few individuals likely drove the effects found for disengagement suggestions. However, the use of MLR in the analysis was best practice with regard to accounting for this significant skew in the data. Additionally, if a dyad did not enter a region at all, this resulted in missing data for the return time and perseverance variables for that region, which limited the sample size for these variables and led to them being dropped from a number of analyses. In order to fully examine all of the regions of interest in this study, it is important for future research to consider a different task that may lend itself to more disengagement suggestions from parents and greater variability of child behavior during the task (perhaps an even more difficult task, or a series of shorter, difficult tasks).

Fourth, the dyad-focused regions that involved parent disengagement were highly predictive of outcomes; however, this region encompassed many different parenting behaviors, making it difficult to know which were truly predictive of outcomes. In particular, parents spent a large amount of time providing verbalizations that did not meet the definition for the coping suggestion categories (categorized as "Other"). This Other category was included in the parent disengagement piece of the dyad-focused attractor regions even though the Other category consisted of both task-related and non-task-related verbalizations. In the future, it may be beneficial to split the Other category into task-related and non-task-related verbalizations in order to parse out whether there is potentially another aspect of the socialization process that is not being captured through parent suggestions. For example, perhaps parents are using a less-directive strategy, such as narration or guiding questions, that is important to the socialization process. Bardack, Herbers, and Obradović (2017) operationally defined positive co-regulation during a free play task with kindergarteners as *either* parenting control behaviors (similar to primary and secondary control suggestions) *or* following the child's lead when the child shows active engagement with the task. This construct may contribute to the explanation for why the parent disengagement/child engagement behavior region was fairly adaptive in the present study. However, it is also important to consider that the Bardack, Herbers, and Obradović (2017) study was examining younger children, and it may be more developmentally appropriate for a parent to use a narration socialization strategy for younger children compared to older children.

Fifth, although this study adds considerable detail to elucidating the process of parent-child coping interactions, a sequential analysis of parent and behaviors during the stressful task was beyond the scope of the present study. A recent study examining mother and adolescent emotional states during a conflict interaction used lag-sequential analyses to calculate first-order transition probabilities from mother's emotional state to adolescent's emotional state (Branje et al., 2018). Branje et al. (2018) found that mothers were more likely than adolescents to initiate positivity after negativity and to reciprocate positivity, whereas adolescents were more likely than mothers to reciprocate negativity. This pattern suggests that mothers play an active role in changing the emotional content of conflict interactions in adolescence. In addition, Morelen and Suveg (2012) also used transitional probabilities to examine supportive vs. unsupportive parenting and adaptive vs. maladaptive child emotion regulation during a parent-child emotion discussion task. Morelen and Suveg (2012) found that parents were more likely to follow children's adaptive emotion regulation with supportive emotional responses (compared to unsupportive) and children were more likely to show adaptive emotion regulation (compared to maladaptive) in response to supportive emotion parenting. These findings suggest that parents and children reciprocally contribute to the emotion socialization process during an emotion-focused discussion task in middle childhood. Transitional probabilities may represent a fruitful direction for future research on parent-child coping interactions using process-oriented dynamic methodologies.

Conclusions

This project advances our understanding of the development of coping in multiple ways. First, a novel coding scheme was developed to capture momentary child behavioral coping during a stressful task. This was the first examination of observed child coping using the Compas coping framework (Compas et al., 2001) and results provide initial predictive validity of this coding scheme. Second, this was the first examination of the socialization of coping that observed both parent and child responses during a stressful task, filling a critical gap in our understanding of the socialization of coping process. Third, this study provided additional evidence for the utility of a contemporary dynamic systems methodology to developmental psychopathology research broadly, by using it to capture parent-child coping interactions with a focus on the organization and process of the interaction. In addition, the state space grid approach creates a statistical method to clearly define the constructs of dyadic flexibility and attractor strength across research studies, allowing for a consistent and complex study of the process of parent-child interactions. Fourth, this methodology was effectively used to demonstrate that non-content specific (dyadic flexibility) and content-specific (attractor strength) aspects of the structure of parent-child coping interactions are critical to our understanding of the development of psychopathology in youth.

Table 2.

Descriptive statistics for all study variables.

	M (SD)	Minimum	Maximum
Covariates			
Chile Age	9.06 (.81)	8	10
Child Gender	45% female		
Parent 1 Gender	93.8% female		
Parent 1 Education	2.92 (Some grad school)	1 (Prof. degree)	6 (Some college)
Family Income	5.21 ($60,000 - $74,999)	1 ($0 - $14,999)	7 ($90,000+)
Flexibility			
Dispersion	.52 (.20)	.04	.90
Transitions/min	22.44 (10.29)	2.15	45.48
Attractor Strength			
PCES			
Density	.13 (.07)	.00	.33
Perseverance (n = 64)	2.50 (1.11)	1.04	6.59
Return time (n = 64)	33.22 (45.40)	4.44	295.59
SCES			
Density	.09 (.05)	.00	.22
Perseverance (n = 64)	1.59 (.91)	.54	5.24
Return time (n = 64)	48.67 (55.80)	6.75	359.60
DISS			
Density	.003 (.007)	.000	.03
Perseverance (n = 14)	1.29 (.72)	.46	2.97
Return time (n = 14)	110.94 (111.76)	1.94	345.99
CEB			
Density	.05 (.04)	.00	.19
Perseverance	159.78 (161.10)	6.33	641.13
Return time	3.36 (5.11)	.00	28.41
CDB			
Density	.01 (.02)	.00	.13
Perseverance (n = 32)	9.86 (8.93)	.60	39.06
Return time (n = 32)	109.98 (104.52)	2.98	406.13
PECE			
Density	.20 (.07)	.05	.34
Perseverance	2.22 (.87)	1.08	4.69
Return time	21.55 (30.13)	2.86	170.86
PDCD			
Density	.02 (.04)	.00	.20
Perseverance (n = 31)	3.84 (2.43)	.71	11.94
Return time (n = 31)	87.69 (94.27)	1.95	374.89
PECD			
Density	.07 (.02)	.00	.13
Perseverance (n = 24)	2.21 (2.20)	.29	10.96
Return time (n = 24)	85.67 (96.16)	4.33	320.93
PECM			
Density	.002 (.004)	.00	.02
Perseverance (n = 25)	.56 (.40)	.04	1.71
Return time (n = 25)	143.54 (123.32)	36.80	566.94

PDCE			
Density	.09 (.05)	.01	.23
Perseverance	16.66 (22.78)	2.58	131.44
Return time	2.77 (2.13)	1.12	17.19
PDCM			
Density	.01 (.02)	.00	.09
Perseverance (n = 45)	1.47 (1.21)	.20	8.21
Return time (n = 45)	108.31 (124.09)	9.49	683.92
Content Controls (sec)			
PCES Duration	59.91 (60.07)	.00	266.76
SCES Duration	24.99 (27.02)	.00	138.93
DISS Duration	.58 (1.37)	.00	7.19
CEB Duration	417.84 (190.40)	25.32	972.80
CDB Duration	15.18 (29.60)	.00	146.45
PECE Duration	79.94 (74.64)	3.00	299.38
PDCD Duration	10.78 (22.06)	.00	118.33
PECD Duration	4.40 (9.18)	.00	35.89
PECM Duration	.57 (1.16)	.00	5.24
PDCE Duration	337.90 (157.55)	18.23	733.88
PDCM Duration	7.44 (13.15)	.00	68.12
Outcomes			
W1 INT Problems	6.03 (5.51)	.00	28.00
W2 INT Problems	4.60 (4.26)	.00	20.00
W1 EXT Problems	5.83 (5.97)	.00	26.00
W2 EXT Problems	4.63 (4.73)	.00	18.50
W1 Coping Efficacy	2.97 (.40)	2.00	4.00
W2 Coping Efficacy	3.00 (.44)	2.00	3.75

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. INT = internalizing. EXT = externalizing.

Table 3.

Correlations between content controls, outcome variables, and dyadic flexibility.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. PCES Duration	$.33^{**}$	.13	-.14	.11	$.91^{**}$	.08	$-.77^{**}$	.11	.00	.11	.06	.23	.19	-.07	$.65^{**}$
2. SCES Duration	-	.16	-.18	.19	$.61^{**}$	.19	$-.57^{**}$	.00	.05	.07	-.10	-.08	.02	.02	$.60^{**}$
3. DISS Duration		-	$-.44^{**}$	$.45^{**}$	.04	$.39^{**}$	$-.35^{**}$	.17	$.27^{*}$	.10	.18	.19	.02	-.21	.14
4. CEB Duration			-	$-.97^{**}$	.06	$-.95^{**}$	$.68^{**}$	$-.51^{**}$	-.23	-.21	$-.35^{**}$	$-.34^{**}$	-.09	.06	$-.44^{**}$
5. CDB Duration				-	-.07	$.99^{**}$	$-.65^{**}$	$.29^{*}$	.15	.14	.23	$.29^{*}$	.06	-.06	$.38^{**}$
6. PECE Duration					-	-.08	$-.69^{**}$	-.01	-.04	.06	-.06	.06	.14	-.03	$.67^{**}$
7. PDCD Duration						-	$-.63^{**}$	$.25^{*}$	.12	.11	.20	.26	.05	-.06	$.37^{**}$
8. PDCE Duration							-	$-.36^{**}$	-.13	-.19	-.21	$-.30^{*}$	-.17	.07	$-.81^{**}$
9. PDCM Duration								-	$.36^{**}$	$.36^{**}$	$.60^{**}$	$.35^{*}$	.11	-.03	$.37^{**}$
10. W1 INT Problems									-	$.83^{**}$	$.66^{*}$	$.56^{**}$	$-.27^{*}$	-.18	.12
11. W2 INT Problems										-	$.59^{**}$	$.67^{**}$	-.03	-.01	.10
12. W1 EXT Problems											-	$.83^{**}$	-.04	-.01	.15
13. W2 EXT Problems												-	-.01	.07	.08
14. W1 CE													-	$.38^{**}$	.18
15. W2 CE														-	.05
16. Dyadic Flexibility															-

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. CE = coping efficacy. INT = internalizing. EXT = externalizing. **p*<.05, ***p*<.01

Table 4.

Correlations between covariates and all study variables.

	Child Age	Child Gender	P1 Gender	P1 Education	Family Income
PCES Duration	-.12	.41**	-.17	-.03	.14
SCES Duration	-.12	.10	-.15	-.16	.23
DISS Duration	-.05	.02	.12	-.14	.05
CEB Duration	-.03	.13	-.09	.08	-.03
CDB Duration	.01	-.12	.09	-.15	.10
PECE Duration	-.16	.39**	-.22	-.05	.19
PDCD Duration	.01	-.15	.08	-.15	.10
PDCE Duration	.10	-.18	.10	.10	-.16
PDCM Duration	.06	-.12	.04	.21	-.22
W1 INT Problems	.32**	-.16	.16	.11	.28*
W2 INT Problems	.36**	-.01	.09	.10	-.22
W1 EXT Problems	.29*	-.22	.20	.10	.31*
W2 EXT Problems	.31*	-.07	.18	-.04	-.13
W1 Coping Efficacy	.12	.11	-.17	.19	-.08
W2 Coping Efficacy	-.03	.06	-.12	-.08	-.01
Dyadic Flexibility	-.16	.17	-.10	-.06	.18
PCES Density	-.24	.20	-.09	.00	.13
PCES Perseverance	-.10	.14	-.02	-.09	.04
PCES Return Time	-.15	.12	-.14	.07	.18
SCES Density	-.13	-.06	-.11	-.14	.22
SCES Perseverance	.04	-.04	.04	-.12	.09
SCES Return Time	-.16	.12	-.04	-.13	.19
DISS Density	.02	-.06	.12	.02	-.03
DISS Perseverance	-.05	.10	-.04	-.11	.11
DISS Return Time	-.12	.28	.00	-.21	.57*
CEB Density	.09	-.19	.05	.21	-.13
CEB Perseverance	-.51	-.05	.00	-.54	.27
CEB Return Time	.03	.16	-.08	.12	-.11
CDB Density	.04	-.14	.10	.13	-.03
CDB Perseverance	.02	-.01	.03	-.18	-.04
CDB Return Time	-.02	-.05	.15	-.11	.14
PECE Density	-.27*	.15	-.18	-.02	.18
PECE Perseverance	-.10	-.25	.08	-.29	.23
PECE Return Time	-.19	.25*	-.14	.05	.04
PDCD Density	-.04	-.17	.13	-.03	.08
PDCD Perseverance	-.10	-.24	-.06	-.20	.14
PDCD Return Time	-.15	-.01	-.02	-.08	.12
PDCE Density	-.27*	.06	-.17	.02	.20
PDCE Perseverance	.20	-.21	.13	-.05	-.06
PDCE Return Time	.04	.05	-.05	.18	-.11
PDCM Density	.04	-.10	.03	.15	-.09
PDCM Perseverance	-.09	-.32*	.04	-.13	.06

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. INT = internalizing. EXT = externalizing. *p<.05, **p<.01

Table 5.

Correlations between outcome variables and proposed attractor variables.

	W1 CE	W2 CE	W1 INT	W2 INT	W1 EXT	W2 EXT
PCES Density	.01	-.32*	-.09	-.10	-.04	.06
PCES Perseverance	.36**	.19	-.08	-.09	-.04	.03
PCES Return Time	-.08	-.27*	.02	.00	.08	-.01
SCES Density	-.07	.10	-.18	-.15	-.33*	-.29*
SCES Perseverance	.18	.03	.03	.01	-.03	.04
SCES Return Time	-.19	-.16	-.05	-.13	-.13	-.29*
DISS Density	.02	-.20	.23	.01	.21	.19
DISS Perseverance	-.03	.02	-.37	-.29	.10	-.01
DISS Return Time	.19	-.46	.24	.17	.08	-.07
CEB Density	.05	-.03	.17	.31*	.34**	.30*
CEB Perseverance	.00	.13	-.23	-.28*	-.25*	-.24
CEB Return Time	-.11	.02	-.06	-.06	-.12	-.18
CDB Density	-.01	-.01	-.05	.02	.03	.22
CDB Perseverance	.14	.06	.04	-.04	.13	.17
CDB Return Time	.19	-.11	-.14	-.09	.13	.30
PECE Density	-.06	-.20	-.23	-.21	-.32*	-.24
PECE Perseverance	.35**	.16	-.06	-.06	-.02	.06
PECE Return Time	-.10	-.24	-.04	-.13	-.05	-.25
PDCD Density	.01	.02	-.01	.06	.09	.27
PDCD Perseverance	.15	.06	-.14	-.21	-.10	-.16
PDCD Return Time	.29	-.14	-.27	-.18	.01	.22
PDCE Density	.11	.05	-.03	-.05	-.02	-.12
PDCE Perseverance	.08	.20	-.02	.05	-.07	.10
PDCE Return Time	-.26*	-.15	-.07	-.01	-.14	-.20
PDCM Density	.04	-.05	.28*	.33*	.45**	.30*
PDCM Perseverance	.30*	.10	-.03	-.10	.17	.11
PDCM Return Time	-.04	.08	.31*	.47**	.27	.33

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. CE = coping efficacy. INT = internalizing problems. EXT = externalizing problems. *p<.05, **p<.01

Table 6.

Correlations between the proposed attractor variables.

	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. PCES Dens.	-.17	.65**	-.06	-.16	.35**	.07	.10	.30	-.21	-.22	-.02	-.10	.01	.20	.73**
2. PCES Pers.	-	-.35**	-.05	.56**	-.35**	-.07	.01	.22	-.02	.23	-.24	.01	.69**	.18	-.22
3. PCES RT		-	.06	-.13	.55**	.10	-.24	.71**	.07	-.48**	.00	.06	-.05	.25	.48**
4. SCES Dens.			-	.19	.36**	-.06	.12	.10	-.10	-.05	-.11	.13	.13	.15	.52**
5. SCES Pers.				-	-.05	.16	-.31	.09	.02	.02	-.61**	.31*	.67**	.12	-.20
6. SCES RT					-	.11	.01	.19	-.20	-.38**	-.02	-.13	-.03	.16	.49**
7. DISS Dens.						-	-.19	.07	.14	-.33**	-.28*	.36**	.26	.16	-.12
8. DISS Pers.							-	-.42	-.09	.34	-.08	-.41	.49	-.05	.24
9. DISS RT								-	-.21	.02	-.15	-.25	.27	.22	.08
10. CEB Dens.									-	-.52**	-.12	.47**	.01	.31	-.31*
11. CEB Pers.										-	.27*	-.37**	-.13	-.33	-.07
12. CEB RT											-	-.44**	-.94**	-.20	.21
13. CDB Dens.												-	.12	.34	-.19
14. CDB Pers.													-	.23	-.26
15. CDB RT														-	.13
16. PECE Dens.															-
17. PECE Pers.															
18. PECE RT															
19. PDCD Dens.															
20. PDCD Pers.															
21. PDCD RT															
22. PDCE Dens.															
23. PDCE Pers.															
24. PDCE RT															
25. PDCM Dens.															
26. PDCM Pers.															
27. PDCM RT															

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. Dens. = density. Pers = perseverance. RT = return time. **p*<.05, ***p*<.01

Table 6, continued.

Correlations between the proposed attractor variables.

	17	18	19	20	21	22	23	24	25	26	27
1. PCES Dens.	-.08	.52**	-.06	-.20	.37*	.52**	-.49**	.09	.00	.02	-.11
2. PCES Pers.	.93**	-.35**	.12	.71**	.28	.03	.28*	-.73**	-.03	.62**	.04
3. PCES RT	-.21	.77**	.10	-.49**	.34	.54**	-.79**	.17	.28*	-.17	.05
4. SCES Dens.	-.03	-.02	.12	.31	.21	.31*	-.09	-.02	-.14	.10	-.14
5. SCES Pers.	.76**	-.27*	.46**	.66**	.11	.03	.12	-.74**	-.04	.60**	-.02
6. SCES RT	-.28*	.77**	-.13	.03	.15	.48**	-.83**	.21	.07	-.21	.04
7. DISS Dens.	.00	-.03	.39**	-.03	.07	-.12	-.15	-.24	.12	.23	.09
8. DISS Pers.	-.12	.02	-.36	.29	.01	-.23	.05	.24	-.03	.46	-.10
9. DISS RT	.22	.10	.06	.13	.25	.42	-.42	-.16	.08	.02	-.18
10. CEB Dens.	.01	-.19	.43**	-.09	.27	.09	.05	-.07	.83**	.04	.61**
11. CEB Pers.	.15	-.36**	-.35**	.22	-.32	-.40**	.56**	.02	-.61**	.07	-.76**
12. CEB RT	-.43**	.26*	-.73**	-.85**	-.29	-.01	.04	.77**	-.12	-.81**	.16
13. CDB Dens.	.13	-.31*	.86**	.11	.31	-.09	.10	-.27*	.14	.24	.23
14. CDB Pers.	.71**	-.36*	.63**	.77**	.32	.00	.01	-.95**	.16	.88**	-.31
15. CDB RT	.11	-.07	.40*	.09	.92**	.17	-.07	-.20	.24	.10	.45*
16. PECE Dens.	-.21	.52**	-.29*	-.18	.27	.57**	-.42**	.32**	-.18	-.12	-.17
17. PECE Pers.	-	-.30*	.28*	.66**	.21	.07	.20	-.83**	-.02	.66**	-.03
18. PECE RT		-	-.39**	-.34	-.03	.55**	-.90**	.39**	.17	-.61**	.11
19. PDCD Dens.			-	.42*	.45*	-.05	.08	-.57**	.24	.51**	.09
20. PDCD Pers.				-	.19	-.02	.19	-.71**	-.08	.88**	-.34
21. PDCD RT					-	.29	-.13	-.26	.22	.17	.39*
22. PDCE Dens.						-	-.59**	.02	.38**	.04	.16
23. PDCE Pers.							-	-.14	-.33**	.28	-.28
24. PDCE RT								-	-.10	-.76**	.09
25. PDCM Dens.									-	.08	.59**
26. PDCM Pers.										-	-.27
27. PDCM RT											-

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. Dens. = density. Pers = perseverance. RT = return time. *p<.05, **p<.01

Table 7.

Correlations between content control variables and proposed attractor variables.

	PCES Dur	SCES Dur	DISS Dur	CEB Dur	CDB Dur	PECE Dur	PDCD Dur	PDCE Dur	PDCM Dur
PCES Density	.75**	.21	.15	-.06	.07	.69**	.06	-.55**	-.02
PCES Perseverance	.18	-.02	-.04	-.17	.19	.10	.20	-.20	.00
PCES Return Time	.55**	.36**	.13	-.17	.11	.55**	.09	-.53**	.24
SCES Density	-.05	.65**	-.05	.05	.01	.22	.04	-.13	-.21
SCES Perseverance	-.02	.35**	.17	-.45**	.51**	.02	.53**	-.34**	-.03
SCES Return Time	.28*	.57**	.14	-.03	.03	.45**	.04	-.35**	.00
DISS Density	.03	.11	.92**	-.41**	.42**	-.06	.38**	-.25*	.15
DISS Perseverance	-.05	-.29	.20	.24	-.24	-.14	-.34	.22	.05
DISS Return Time	.33	.22	.19	-.20	.21	.28	.21	-.35	.03
CEB Density	-.08	-.11	.10	-.41**	.23	-.19	.20	-.15	.78**
CEB Perseverance	-.32**	-.31*	-.33*	.43**	-.33**	-.29*	-.31*	.53**	-.52
CEB Return Time	-.02	-.15	-.31*	.81**	-.86**	.09	-.90**	.52**	-.17
CDB Density	-.05	-.01	.20	-.42**	.44**	-.13	.46**	-.20	.11
CDB Perseverance	-.02	.23	.34	-.89**	.92**	-.17	.93**	-.62**	.19
CDB Return Time	.25	.18	.18	-.36*	.33	.17	.29	-.42*	.22
PECE Density	.49**	.46**	-.08	.31*	-.28*	.66**	-.27*	-.26*	-.22
PECE Perseverance	.23	.08	.03	-.32**	.35**	.15	.36**	-.34**	.03
PECE Return Time	.46**	.33**	-.01	.15	-.20	.55**	-.21	-.30*	.11
PDCD Density	-.02	.07	.31*	-.76**	.79**	-.16	.80**	-.43**	.20
PDCD Perseverance	-.22	.16	.02	-.54**	.59**	-.25	.65**	-.28	-.01
PDCD Return Time	.43*	.20	.10	-.41*	.39*	.31	.37*	-.56**	.16
PDCE Density	.61**	.59**	-.09	-.09	.02	.73**	.02	-.60**	.28
PDCE Perseverance	-.51**	-.43**	-.17	.18	-.12	-.55**	-.10	.53**	-.28*
PDCE Return Time	-.09	-.11	-.27*	.70**	-.75**	.04	-.76**	.48**	-.14
PDCM Density	.14	.08	.14	-.53**	.32*	.03	.27*	-.40**	.92**
PDCM Perseverance	-.10	-.02	.21	-.58**	.59**	-.21	.63**	-.33*	.21
PDCM Return Time	.15	-.01	.13	-.16	.04	.06	-.01	-.18	.47**

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. Dur = duration. *p<.05, **p<.01

Table 8.

Dyadic flexibility regression analyses (N=65).

	W2 Coping Efficacy		W2 INT Problems		W2 EXT Problems	
	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2
Step 1						
Child Age	-.11 [-.42, .21]	.18	.06 [-.07, .20]	.77	.03 [-.08, .14]	.78
Child Gender	.03 [-.24, .30]		.10 [-.04, .24]		.12^ [-.001, .24]	
Family Income	.08 [-.19, .34]		.01 [-.13, .14]		.01 [-.12, .13]	
W1 Outcome	.40** [.11, .70]		.82** [.69, .95]		.88* [.77, .99]	
DISS Duration	--		-.23** [-.39, -.07]		--	
CEB Duration	--		--		-.07 [-.27, .14]	
PDCE Duration	--		--		.01 [-.16, .18]	
PDCM Duration	--		.17* [.01, .33]		-.16 [-.41, .09]	
Step 2						
Dyadic Flexibility	-.04 [-.30, .23]	.00	-.13^ [-.26, .01]	.01	-.21 [-.46, .05]	.00

Note. DISS = disengagement suggestion. CEB = child engagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. INT = internalizing. EXT = externalizing. ** $p < .01$, * $p < .05$, ^ $p < .10$

Table 9.

Parent-focused attractor regression analyses.

	W2 CE (N=61)		W2 INT (N=63)		W2 EXT (N=63)	
	β [95% CI]	ΔR²	β [95% CI]	ΔR²	β [95% CI]	ΔR²
Step 1						
Child Age	-.09 [-.41, .22]	.20	.07 [-.06, .21]	.75	.01 [-.10, .12]	.76
Child Gender	.08 [-.17, .32]		.09 [-.08, .25]		.10 [-.02, .22]	
Family Income	.06 [-.21, .34]		-.01 [-.16, .14]		.05 [-.10, .20]	
W1 Outcome	.43 [.13, .73]		.86** [.76, .97]		.91** [.80, 1.03]	
PCES Duration	-.14 [-.46, .18]		.03 [-.11, .18]		.02 [-.14, .17]	
SCES Duration	.13 [-.11, .37]		-.04 [-.20, .13]		-.07 [-.19, .05]	
DISS Duration	-.11 [-.32, .11]		-.20* [-.37, -.03]		-.10 [-.27, .07]	
Step 2						
PCES Density	-.39 [-.88, .10]	.18	-.33^ [-.67, .007]	.03	.00 [-.29, .29]	.06
SCES Density	-.02 [-.42, .38]		.04 [-.18, .26]		.09 [-.11, .29]	
DISS Density	-.06 [-.50, .39]		-.29* [-.57, -.02]		.11 [-.41, .63]	
PCES Perseverance	-.17 [-.54, .21]		-.34* [-.59, -.08]		-.28* [-.52, -.04]	
SCES Perseverance	-.16 [-.54, .22]		.14 [-.06, .35]		.16^ [-.03, .35]	
PCES Return Time	-.40^ [-.84, .04]		-.03 [-.23, .16]		-.21^ [-.44, .02]	
SCES Return Time	.02 [-.30,.34]		-.16 [-.35, .04]		-.22^ [-.43, .002]	

Note. PCES = primary control engagement suggestion. SCES = secondary control engagement suggestion. DISS = disengagement suggestion. CE = coping efficacy. INT = internalizing problems. EXT = externalizing problems. ** $p < .01$, * $p < .05$, ^ $p < .10$

Table 10.

Child-focused attractor regression analyses.

	W2 CE (N=61)		W2 INT (N=63)		W2 EXT (N=63)	
	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2
Step 1						
Child Age	-.09 [-.42, .24]	.19	.10 [-.04, .25]	.70	.03 [-.08, .14]	.77
Child Gender	.03 [-.25, .30]		.12 [-.03, .26]		.12^ [-.01, .24]	
Family Income	.06 [-.23, .36]		.01 [-.16, .17]		.01 [-.13, .14]	
W1 Outcome	.42** [.12, .71]		.80** [.67, .94]		.88** [.76, .99]	
CEB Duration	.36 [-.48, 1.21]		-.64 [-1.45, .17]		.46 [-.37, 1.28]	
CDB Duration	.30 [-.58, 1.19]		-.64 [-1.48, .20]		.45 [-.34, 1.24]	
Step 2						
CEB Density	-.03 [-.49, .43]	.01	.47** [.15, .79]	.07	.41** [.12, .70]	.06
CDB Density	.09 [-.21, .40]		-.27* [-.50, -.05]		-.07 [-.32, .18]	
CEB Perseverance	.08 [-.23, .40]		.00 [-.17, .18]		.04 [-.09, .16]	
CEB Return Time	.12 [-.51, .74]		-.23 [-.52, .07]		-.13 [-.59, .33]	

Note. CEB = child engagement behavior. CDB = child disengagement behavior. CE = coping efficacy. INT = internalizing problems. EXT = externalizing problems. ** p < .01, * p < .05, ^ p < .10

Table 11.

Dyad-focused attractor regression analyses

	W2 Coping Efficacy		W2 INT Problems		W2 EXT Problems	
	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2
Step 1	(N=61)	.20	(N=63)		(N=63)	
Child Age	-.08 [-.44, .27]		.10 [-.05, .24]	.72	.02 [-.09, .13]	.76
Child Gender	.02 [-.24, .28]		.12 [-.04, .28]		.14* [.02, .25]	
Family Income	.07 [-.25, .38]		.01 [-.16, .18]		.01 [-.13, .14]	
W1 Outcome	.41** [.10, .72]		.78** [.57, .98]		.93** [.56, 1.28]	
PECE Duration	-.22 [-1.98, 1.53]		-.11 [-1.77, 1.54]		.22 [-1.71, 2.15]	
PDCD Duration	-.22 [-1.88, 1.44]		-.14 [-1.61, 1.33]		.26 [-1.40, 1.92]	
PDCE Duration	-.28 [-2.68, 2.11]		-.10 [-2.40, 2.19]		.31 [-2.32, 2.95]	
PDCM Duration	-.16 [-.80, .47]		.13 [-.42, .68]		-.07 [-.79, .65]	
Step 2	(N=41)		(N=43)		(N=43)	
PECE Density	-.22 [-.71, .27]	.54	.06 [-.18, .30]	.22	.05^ [-.01, .11]	.23
PDCD Density	.06 [-.46, .59]		-.29 [-.77, .20]		.09 [-.04, .22]	
PDCE Density	.42 [-.33, 1.18]		-.42 [-1.09, .26]		-.15* [-.26, -.03]	
PDCM Density	-.40 [-1.25, .45]		.48 [-.14, 1.10]		.34** [.04, .64]	
PECE Pers.	.01 [-1.00, 1.03]		-.68** [-1.19, -.17]		-.36* [-.56, -.17]	
PDCE Pers.	-.52 [-1.25, .21]		1.26 [-.31, 2.83]		.36** [.07, .65]	
PDCM Pers.	-.05 [-.38, .28]		-.03 [-.18, .12]		-.03 [-.07, .02]	
PECE RT	-1.15^ [-2.51, .20]		1.19 [-.27, 2.65]		.28* [.04, .52]	
PDCE RT	.22 [-2.19, 2.64]		-.55 [-1.21, .11]		-.69** [-.98, -.40]	
PDCM RT	.44 [-.17, 1.04]		.14 [-.08, .35]		.03 [-.02, .07]	

Note. PECE = parent engagement suggestion and child engagement behavior. PDCD = parent disengagement and child disengagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. Pers. = perseverance. RT = return time. INT = internalizing. EXT = externalizing. ** $p < .01$, * $p < .05$, ^ $p < .10$

Table 12.

Aggregated regression analyses.

	W2 Coping Efficacy		W2 INT Problems		W2 EXT Problems	
	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2	β [95% CI]	ΔR^2
Step 1						
Child Age	-.08 [-.40, .24]	.23	.05 [-.08, .18]	.77	.03 [-.09, .14]	.75
Child Gender	.08 [-.17, .32]		.11 [-.05, .27]		.10 [-.02, .21]	
Family Income	.07 [-.19, .33]		.02 [-.12, .16]		.00 [-.13, .13]	
W1 Outcome	.43** [.14, .71]		.83** [.71, .96]		.93 [.74, 1.12]	
PCES Duration	-.37 [-.87, .13]		.09 [-.26, .45]		.23 [-.10, .55]	
DISS Duration	--		-.26* [-.45, -.06]		--	
CEB Duration	--		-.59^ [-1.26, .07]		-.24 [-.56, .08]	
CDB Duration	--		-.50 [-1.14, .14]		--	
PECE Duration	.29 [-.20, .77]		.15 [-.50, .21]		--	
PDCE Duration	--		--		.27 [-.12, .66]	
PDCM Duration	--		--		-.20 [-.43, .04]	
Step 2						
Dyadic Flexibility	.16 [-.16, .48]	.08	-.38** [-.60, -.16]	.10	-.08 [-.37, .21]	.13
PCES Density	--		-.30** [-.51, -.08]		--	
DISS Density	--		-.42* [-.76, -.08]		--	
CEB Density	--		.13 [-.15, .40]		.21 [-.17, .59]	
CDB Density	--		.08 [-.08, .24]		--	
PDCE Density	--		--		.03 [-.30, .35]	
PDCM Density	--		--		.25 [-.21, .70]	
PCES Pers.	--		-.23 [-.57, .11]		-.25^ [-.53, .02]	
PECE Pers.	--		.13 [-.21, .48]		--	
PDCE Pers.	--		--		.12 [-.06, .30]	
PCES RT	-.35^ [-.77, .07]		--		--	
PECE RT	-.04 [-.42, .34]		--		--	
PDCE RT	--		--		-.37^ [-.81, .07]	

Note. PCES = primary control engagement suggestion. DISS = disengagement suggestion. CEB = child engagement behavior. CDB = child disengagement behavior. PECE = parent engagement suggestion and child engagement behavior. PDCE = parent disengagement and child engagement behavior. PDCM = parent disengagement and child mixed behavior. Pers. = perseverance. RT = return time. INT = internalizing. EXT = externalizing. ** $p < .01$, * $p < .05$, ^ $p < .10$

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