



Children's task-oriented patterns in early childhood: A latent transition analysis



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ABSTRACT

We examined individual differences and predictions of children's patterns in behavioral, emotional and attentional efforts toward challenging puzzle tasks at 24 and 35 months using data from a large longitudinal rural representative sample. Using latent transition analysis, we found four distinct task-oriented patterns in problem-solving tasks within parent-toddler/preschooler dyads representing different levels of regulatory strengths and weaknesses. We also found the relatively more positive and adaptive task-oriented patterns (i.e., the positive-motivated pattern and the content-compliant pattern) were more stable, but the relatively negative patterns (i.e., the negative-disengaged pattern and the emotional-mixed pattern) had much more variability and change from 24 to 35 months. Finally, infant attention, positive parenting, and family economic strains also significantly predicted children's task-oriented patterns at 24 months after controlling for child gender, race and maternal education. These findings contribute to prevention/intervention strategies for young children's optimal performance during challenging problem solving and their later school success.

1. Introduction

Children's task-oriented behavior in challenging problem-solving tasks has been of interest to researchers from different theoretical perspectives, including the organizational perspective on development. The organizational perspective on development emphasizes that different aspects of an individual's behavior, emotion, and cognition, including attention, are coordinated in functioning toward goal pursuit such that social-emotional and cognitive aspects of development are not separable (Sroufe & Waters, 1976). Research from this perspective has drawn on challenging problem-solving tasks such as shape sorting and cylinder and puzzle completion tasks (e.g., Egeland, Sroufe, & Erickson, 1983) to elicit children's behavior. The foci have been on the individual child's behavior or sometimes the behavior of parents who are able to support children as needed during the challenging tasks. Few studies have examined how different aspects of child problem-solving efforts might constitute distinct task-oriented patterns or how stable such patterns might be in early childhood. Identifying task-oriented patterns and the degree of stability in these patterns may provide a holistic

picture of the regulatory strengths and weaknesses in children's pursuit of problem solving and inform interventions that promote problem-solving efforts relevant for school readiness.

There has been little research on precursors of children's task-oriented patterns during challenging problem solving. Research does indicate that child, parent, and family factors might foster or compromise aspects of children's regulatory efforts in problem solving. For example, infant attention is related to child persistence on task and effortful control (e.g., Gaiter, Morgan, Jennings, Harman, & Yarrow, 1982; Kochanska, Murray, & Harlan, 2000). Positive parenting facilitates children's mood regulation, persistence and compliance (e.g., Young & Hauser-Cram, 2006), but family economic strains have been shown to constrain children's emotional and behavior control (e.g., Mistry, Vandewater, Huston, & McLoyd, 2002).

The present study examined children's patterns of task-oriented efforts (indicated by their behavioral, emotional, and attentional regulation) during challenging problem-solving tasks at 24 months (toddlerhood) and 35 months (preschool age) and pattern shifts over time as informed by the organizational perspective on development. We also

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examined select child, parent, and family correlates of children's task-oriented patterns at 24 and 35 months.

1.1. Patterns of task-oriented efforts from the organizational perspective

According to the organizational perspective of development (Sroufe & Waters, 1976), children's development of self-regulation starts in infancy with external regulation by caregivers, changes to the emergence of self-regulatory capacity in toddlerhood supported by the guidance of the caregiver, and then moves toward the establishment of independent self-regulation by the preschool period (Egeland, Bosquet, & Levy-Chung, 2002; Kochanska, 1993). In this theoretical tradition, problem-solving tasks (e.g., Egeland et al., 1983; Main, 1977; Matas, Arend, & Sroufe, 1978; Sroufe, 1979) are created to assess children's quality of adaptation or self-regulation at a given age. Specifically, they are created to tax children's regulatory capacities across domains as well as their capability to use environmental and personal resources toward the goal pursuit. Challenging puzzles are commonly used in such problem-solving tasks with puzzles presented in an order of increasing difficulty (Buckley & Woodruff-Borden, 2006; Davis, Burns, Snyder, Dossett, & Wilkerson, 2004; Harris, Robinson, Chang, & Burns, 2007). For example, in these problem-solving tasks, the tasks the child initially encounters are usually within the capacity of the child, and serve as a warm-up task. Tasks introduced later are difficult enough so that the child needs to exert some regulatory effort to complete the tasks while parents provide some help for the child as deemed necessary (Egeland et al., 1983; National Institute of Child Health and Development Early Child Care Research Network (NICHD SECCYD), 1999).

Child characteristics in challenging problem-solving tasks include those relevant to the behavioral, emotional, and attentional processes. The child characteristics that tap the behavioral process include child persistence, compliance to parent directives, reliance on help from the caregiver, and avoidance of the parent; whereas the child characteristics that tap the emotional process include task enthusiasm, anger/negativity/aggression, affection shown toward the parent, and negativity toward the caregiver (Egeland et al., 1983; Egeland et al., 2002; Matas et al., 1978). Child persistence also reflects the attentional process (Fredricks et al., 2004). All of these characteristics are interrelated constructs in suggesting children's coordination of self-regulation that is critical for children's learning and development. Nevertheless, researchers have focused mostly on understanding the individual child variables (e.g., Berhenke, Miller, Brown, Seifer & Dickstein, 2011) or the facilitative or disruptive aspects of parenting behavior during the challenging problem-solving tasks (e.g., Neitzel & Stright, 2003).

For the studies that have investigated the child variables, there is evidence of significant relationships between the individual child variables and children's academic and social outcomes. For example, in the behavioral domain, toddlers and preschoolers who are able to control themselves and comply with parents' rules are found to be adaptive and competent at the formal school ages (Kochanska, Koenig, Barry, Kim, & Yoon, 2010), but those who are defiant and aggressive in early childhood are more likely to experience school failure (Brennan, Shaw, Dishion, & Wilson, 2012) and future conduct problems (Shaw, Gilliom, Ingoldsby, & Nagin, 2003). In the emotional domain, observed negative affect and emotionality in preschoolers was found to be related to teacher-rated school adjustment difficulties and emotion dysregulation (Herndon, Bailey, Shewark, Denham, & Bassett, 2013), but positive affect in preschoolers was related to teacher rated classroom adjustment and peer acceptance (Shin et al., 2011). Child enthusiasm has also been treated as an aspect of children's self-regulation (Duncan et al., 2007) and is related to intrinsic motivation for competency (Morgan, Busch-Rossnagel, Maslin-Cole, & Harmon, 1992), an important factor in learning functioning (Gottfried, Fleming, & Gottfried, 2001). In the attentional domain, Head Start graduates with higher observed persistence had higher teacher ratings on reading and math skills, greater

interpersonal skills and work-related skills, self-regulation, and social competence in the kindergarten year (Berhenke et al., 2011). Children who demonstrated consistent attentional persistence through pre-K, K, and 1st grade demonstrated academic proficiency in math, vocabulary, reading, language and science tests by second grade (McDermott, Rikoon, & Fantuzzo, 2014).

It is still unclear how these individual aspects of child behavior, emotion, and attention in problem solving reflect overall patterns of adaptation in early childhood. While children make great strides in their behavior, emotion, and attention regulation through the early childhood years, the pace of development and the level of coordination and adaptation across behavior, emotion, and attention may vary, leading to diverse patterns of adaptation. A person-oriented approach has the capacity to depict the coordination and dis-coordination of behavior, emotion, and attention in children's task-oriented effort and help understand children's behavior as a "whole" rather than considering each behavior as a separate entity (Halle, Hair, Wandner, & Chien, 2012). This approach also helps identify regulatory patterns in children that may be amenable to targeted prevention or interventions (Chazan-Cohen, Halle, Barton, & Winsler, 2012).

Researchers have suggested both stability and change in children's regulatory processes during the second year of life as a result of both expected continuity in adaptation and developmental advances in children's regulatory repertoire during this period (Matas et al., 1978). Therefore, we were further interested in depicting the stability and change in children's regulatory and adaptation patterns from 24 to 35 months. Studies have demonstrated both stability and change in children's adaptation in different aspects. For example, positive emotionality was found to be relatively stable in early childhood between 3 months and 48 months of age (Lemery, Goldsmith, Klinnert, & Mrazek, 1999). However, other researchers report variability in the stability of children's behavioral and attentional persistence during challenging puzzle tasks. For example, Zhou, Hofer, and Eisenberg (2007) found that behavioral and attentional persistence was high and stable for some children, but moderate and slightly declining for other children, and low initially but rising later in yet another group of children from age 5–10. A holistic approach in examining how patterns of adaptation across the behavioral, emotional, and attentional domains at 24 months show transitions or stabilities by 35 months has yet to be explored. The present study fills this gap by examining the extent of stability and change in children's task oriented patterns across levels from 24 to 35 months.

1.2. Predictors of children's task-oriented patterns

Physiological studies suggest that children's learning depends on attention, and focused attention indicates a state that information is being processed, facilitated, or enhanced (Lawson & Ruff, 2004; Richards, 1997). Temperament literature has frequently suggested that individual differences in infant attention predict socioemotional development (Rothbart & Posner, 2006). For example, focused attention in infancy is related to higher effortful control and later attention during play in preschool (Kochanska et al., 2000; Lawson & Ruff, 2004; Ruff, Lawson, Parrinello, & Weissberg, 1990) as well as executive functions in toddlerhood (Johansson, Marciszko, Gredeback, Nystrom, & Bohlin, 2015). Therefore, the more infants focus attention on objects, the more capable they are of modulating arousal and inhibiting competing activities. Patterns of their task-oriented behavioral, emotional, and attentional efforts during toddlerhood and preschool may be distinct from others who were less attentive in infancy.

Further, both the sociocultural perspective of cognitive development (Rogoff, 1990; Vygotsky, 1978) and the organizational perspective of child development (Egeland et al., 2002; Kochanska, 1993) emphasize the crucial importance of early parenting as a primary source from which children's cognitive problem-solving skills and self-regulatory capacities evolve. Consequently, patterns of children's task-

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