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Identifying child temperament types using cluster analysis in three samples

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ABSTRACT

Although previous research has explored the existence of temperament clusters in children, these studies have used single samples, reducing generalizability, and broad temperament constructs to identify clusters, obscuring fine-grained dimensional differences. To address these limitations, the current study identified a common cluster structure across two diverse samples of preschool children using the same fine-grained temperament measure (ns = 96, 187), then verified the cluster structure on a large, nationally-representative sample (n = 757). A consistent six-cluster solution was identified across the three samples: Unregulated, Regulated, High Reactive, Bold, Average, and Well-Adjusted. Demonstration of a replicable typology advances the understanding of temperament in childhood, and provides a parsimonious way to communicate complex information about a child's temperament to parents and caregivers.

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1. Introduction

Temperament is defined as individual differences in reactivity and regulation in the domains of affect, activity and attention (Rothbart & Bates, 2006). Temperament traits are those that are relatively stable and constitutionally based. These traits emerge early in life and are shaped by complex interactions between genetic, environmental, and maturational forces (Rothbart, 2012; Rothbart & Bates, 2006). Because children's temperament has been linked to important outcomes such as academic performance (Blair & Razza, 2007; Valiente, Lemery-Chalfant, Swanson, & Reiser, 2008), social development (Sanson, Hemphill, & Smart, 2004), and behavior adjustment (Gartstein, Putnam, & Rothbart, 2012), it is important to identify parsimonious ways to communicate information about an individual child's temperament to the people interacting with the child, especially parents, teachers and child-care providers.

Research on the basic dimensions of temperament and their relation to each other has traditionally employed a variable-centered approach, which typically involves the examination of broad factors, such as positive or negative emotionality, or single narrow traits, such as behavioral inhibition, to study the impacts of temperament on relevant outcomes. Although a variable-centered approach has been useful in identifying and understanding the relation between temperament dimensions and other phenomena, this approach typically does not consider individuals as characterized by multiple temperament dimensions simultaneously (Zentner & Shiner, 2012). A person-centered approach is a holistic interactionist perspective that considers the individual as the unit of analysis, comprised of multiple variables of interest, who can best be understood by considering all variables simultaneously (von Eye & Bergman, 2003). Applying a person-centered approach to child temperament means considering the combination and interactions of multiple temperament dimensions simultaneously as characterizing an individual child, and allows for the identification of typologies based on these combinations. Such typologies could be used to differentiate between individuals (Hart, Atkins, & Fegley, 2003; Zentner & Shiner, 2012), and may improve our understanding of children's behavior by considering the multifaceted nature of temperament. While person-centered approaches to understanding temperament are not new (e.g. Thomas & Chess, 1977), there is a renewed interest in using this approach to better understand the joint effects of multiple temperament dimensions within a given individual. Ultimately, such an understanding will improve the

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applicability of temperament knowledge to practical situations in parenting and in teaching.

An understanding of individual differences in children's temperament is particularly relevant in early childhood as children typically enter their first structured educational settings and face environmental demands that may be quite different from those of the home environment. Children who struggle to adjust to the structured school environment tend to have difficulty as they enter formal school; thus, establishing a positive trajectory in the early years is critical. Early intervention and prevention efforts that are targeted to children with certain temperament types that place them at risk for later adjustment, academic, or behavioral difficulties (McClowry & Collins, 2012; Sanson et al., 2009) could be effective for easing adjustment across the transition to formal school.

Seminal work by Thomas and Chess (1977) marks the beginning of applying person-centered approaches to understanding child temperament. Using a qualitative process, Thomas and Chess (1977) identified three temperament types: difficult, easy, and slow-to-warm up. Difficult children show irregular sleep and feeding practices; slow acceptance to new foods; prolonged adjustment to new situations, people and routines; intense reactions; and relatively frequent and loud periods of crying. Easy children are at the opposite end of the spectrum: they quickly develop regular sleep and feeding schedules; take to new foods easily; smile at strangers; and adapt to new situations with little fussing. Slow-to-warm-up children are marked by slow adaptability to new situations and people, even after repeated contact; show mildly intense negative responses; and are less likely to exhibit irregular biological functions. The difficult, easy and slow-to-warm up categories are still used today; however, many recognize that these categories are not exhaustive (i.e., many children do not clearly fall into any of these categories), and can be situation-dependent.

Another well-known temperament typology is the overcontrolled, undercontrolled, and resilient types. Developed by Robins and colleagues (Robins, John, Caspi, Moffitt, & Stouthamer-Loeber, 1996) nearly 20 years ago on a sample of 300 American adolescent boys, this typology has been replicated with other populations, including German children ages four to six years, seven year old Icelandic children, and five and six year old American children in the National Longitudinal Survey of Youth, (see: Asendorpf & van Aken, 1999; Hart, Hofmann, Edelstein, & Keller, 1997; Hart et al., 2003). Overcontrolled individuals are shy, compliant, and dependent, while undercontrolled individuals are active, aggressive, resistant, and demonstrate difficulties regulating their emotions. Resilient individuals are compliant, cooperative, display positive emotions and well-developed cognitive and social skills, and are adaptive in stressful situations (Hart et al., 2003). Another typology comes from Aksan et al. (1999), who identified two groups: the controlled-nonexpressive type, characterized by high control and low approach and negative affectivity, and the noncontrolled-expressive type, characterized by low control and high approach and negative affectivity.

One research-based approach to exploring temperament from a person-centered perspective is cluster analysis. Cluster analysis is a method used to identify groups of individuals that are more similar to each other across a number of observed variables, but less similar to individuals in different groups (Mooi & Sarstedt, 2011). The resulting groupings, called clusters, have been derived for child temperament data with the goal of identifying typologies or profiles of child temperament (e.g. Caspi & Silva, 1995; Sanson et al., 2009). To our knowledge, only three studies have used cluster analysis with preschool children, who are the focus of the present study. Caspi and Silva (1995) used cluster analysis with data from a sample of 1037 three-year-old children in New Zealand and found five temperament clusters: undercontrolled, inhibited, confident, reserved, and well-adjusted. Sanson et al. (2009) identified four

temperament clusters for three- to four-year-old Australian children: nonreactive/outgoing, high attention regulation, poor attention regulation, and reactive/inhibited. Martin, Bridger, and Huttunen (2000) identified seven temperament clusters in a sample of 1000 5-year-olds in Finland: inhibited, impulsive, highly emotional, typical, reticent, uninhibited, and passive. There is some overlap in the clusters found across studies; for example, the reactive/inhibited cluster from Sanson et al. (2009) is similar to the inhibited cluster from Caspi and Silva (1995), and the poor attention regulation cluster (Sanson et al., 2009) is similar to the undercontrolled (Caspi & Silva, 1995) and impulsive (Martin et al., 2000) clusters. Whereas Sanson et al. (2009) does not appear to have a cluster similar to the reserved cluster found by Caspi and Silva (1995), the reticent cluster from Martin et al. (2000) appears to reflect the same characteristics as the reserved cluster found by Caspi and Silva (1995). See Table 1 for a comparison of temperament typologies found across studies.

Despite some overlap in temperament clusters, there are inconsistencies in the number of clusters found across studies that can be attributed to differences in the (a) source of temperament information (e.g. parent vs. observer rated), (b) temperament measurement used, (c) number of temperament dimensions used as the basis for groupings in cluster analysis, and (d) sample characteristics. Caspi and Silva (1995) used behavior ratings made by study investigators based on laboratory observations on a sample of 1037 three-year-old children in the Dunedin (New Zealand) Multidisciplinary Health and Development Study. Sanson et al. (2009) and Martin et al. (2000) both used parent report on the Child Temperament Questionnaire (CTQ; Thomas & Chess, 1977), however Sanson et al. (2009) obtained ratings on a sample of 1662 three to four-year-old children in Australia, while Martin et al. (2000) used a Finnish translation of the CTQ for a sample of 1000 five-year-olds. Arguably, there is overlap in the ways temperament was operationalized in these studies, yet differences in the measurement of temperament can be expected to produce considerable variability in the content of indicators, likely translating into differences in cluster analysis results.

There are also differences in the number of variables that were used to form clusters. Caspi and Silva (1995) used three broad temperament constructs (lack of control, approach, and sluggishness), while Sanson et al. (2009) used four broad constructs (approach, inflexibility, rhythmicity, and persistence) as their grouping variables; information is not available on what Martin et al., 2000 used as the grouping variables in the formation of their temperament clusters. These broad constructs typically represent higher order factors comprised of finer-grained, discrete temperament traits. For example, lack of control is a construct that includes emotional lability, restlessness, short attention span, and negativity; approach includes self-confidence, self-reliance, and ease in social interaction; sluggishness includes ratings of shyness, fearfulness, passivity, and flat affect (Caspi & Silva, 1995).

While using broad constructs of temperament (e.g. lack of control) as the grouping variables to create the temperament types can make data analysis more manageable, there are disadvantages. Broad temperament constructs are typically identified through factor analysis. For example, the Children's Behavior Questionnaire (CBQ; Rothbart, Ahadi, Hershey, & Fisher, 2001) is a widely used parent report of temperament for children ages three to seven years. The CBQ measures various fine-grained dimensions of temperament which load onto three higher order factors: surgency/extraversion, negative affectivity, and effortful control. It is the combination of multiple fine-grained temperament dimensions loading onto the temperament factors that are used to determine a child's "score" for that temperament factor. While parsimonious, this approach means that the focus is on coarser, aggregated values, and not the individual fine-grained dimension scores, and