



Structure and convergent validity of children's temperament traits as assessed by experimenter ratings of child behavior



Lisa N. Vroman*, Sharon L. Lo, C. Emily Durbin

Department of Psychology, Michigan State University, United States

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ABSTRACT

The structure of child temperament traits has been explored primarily using informant report. Less is known about temperament structure assessed by alternative methods, such as laboratory assessments. We report on the structure of child traits assessed by experimenter ratings of child behavior during laboratory tasks, and their convergent and discriminant validity with objectively coded and parent reported child traits. The results indicate a three-factor solution (Positive Emotionality, Negative Emotionality, and Effortful Control) fit the data best, with convergent and discriminant validity between experimenter ratings and objective coding of child behavior and parent report. The results suggest that experimenter ratings conducted after a laboratory visit provides an efficient and economical alternative or adjunct to conducting objective coding of the laboratory tasks.

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1. Introduction

Individual differences in emotional reactivity and self-regulation, or temperament, have long been identified as among the earliest emerging biobehavioral differences in children (Rothbart & Derryberry, 1981). Several theoretical traditions have emerged in developmental research to describe the main dimensions underlying these early differences in temperament (i.e., Buss & Plomin, 1984; Rothbart, 1981; Thomas & Chess, 1977). Most contemporary temperament models propose a multidimensional structure for temperament traits in early childhood through adolescence, with models converging to suggest that the primary dimensions concern individual differences in the experiential, expressive, and motivational components of positive and negative emotions, and in dimensions of behavioral or Effortful Control (e.g., De Pauw & Mervielde, 2010; Goldsmith et al., 1987; Halverson et al., 2003; Rothbart, Ahadi, Hershey, & Fisher, 2001).

Most of the empirical evidence regarding the structure of child temperament has relied on parent questionnaire methods, with a small number of studies using teacher reports (e.g., De Pauw, Mervielde, & Van Leeuwen, 2009; Digman & Shmelyov, 1996; Presley & Martin, 1994). These examinations of informant reports of child temperament have reliably uncovered at least three superfactors: Positive Emotionality/Surgency (PE), Negative

Emotionality (NE), and Effortful Control (EC) (Ahadi, Rothbart, & Ye, 1993; Casalin, Luyten, Vliegen, & Meurs, 2012; Rothbart, 2007; Rothbart et al., 2001). PE is generally described as reflecting positive mood, engagement with the environment, and sociability. NE generally refers to individual differences in the frequency and intensity of experiencing negative emotions, including anger/frustration, sadness, and fear. EC is generally described as reflecting aspects of behavioral control, including control of cognitive resources as well as of impulses or behavioral tendencies. For example, Rothbart et al. (2001) assessed the structure of temperament in children 3–7 years of age assessed via parent-report on the Children's Behavior Questionnaire (CBQ). Factor analyses revealed three temperament superfactors: PE, NE, and EC. These results are consistent with an earlier investigation completed by Ahadi et al. (1993) in which the structure of temperament was also investigated via parent-report on the Children's Behavior Questionnaire in both a U.S. and Chinese sample, and a similar three-factor solution was obtained.

An advantage of these three-factor models of temperament is that they are theoretically consistent with Tellegen's three-factor model of personality in adults, consisting of PE, NE, and Constraint (Tellegen, 1985), wherein Constraint is similar to EC. However, other studies using parent or teacher questionnaires have reported that anywhere from three to six factors fit the data best, with additional traits generally converging around the subdomains of sociability, activity/impulsivity, and the division of anger and fear into separate factors (rather than both collapsed into one broad NE factor) (e.g. De Pauw et al., 2009; Halverson et al., 2003; Presley &

* Corresponding author. Address: Department of Psychology, Michigan State University, East Lansing, MI 48824, United States.

E-mail address: vromanli@msu.edu (L.N. Vroman).

Martin, 1994). Thus, it is important to utilize multiple methods of assessing temperament to expand our understanding of how early-appearing dispositions cohere into higher-order structures. Comparing results across distinct methods will test the validity of structural results, and may also inform attempts to understand the development of individual differences and biological processes contributing to their development (Shiner et al., 2012). As each method of assessing child temperament has strengths and limitations, the use of multiple methods will help clarify the nature of child temperament. We propose that explorations of temperament structure using methods other than parent report may provide particularly useful incremental knowledge.

Parent-report measures provide ecologically valid information regarding parent perceptions of child behavior; however, parent-report is not without limitations. As noted by several researchers (e.g., Kagan, Snidman, McManis, Woodward, & Hardway, 2002), there are several factors that may weaken the validity of parent-report of child temperament. First, parents who have not had much experience with children are at a disadvantage when responding to questionnaire items that ask them to judge their child's behavior (and hence traits) relative to norms. Second, parent-report of child temperament is likely comprised of both objective and subjective influences (Stifter, Willoughby, & Towe-Goodman, 2008). For example, parents' perceptions of their child's temperament may be influenced by his/her own emotional state. Third, there is evidence that parent-reports of child behavior are biased by their own psychopathology and personality (Durbin & Wilson, 2012).

Laboratory measures of child temperament represent an important complement to informant-report measures for assessing individual differences in child traits. First, they are less influenced by subjective biases evident in parent-report measures, wherein parent characteristics are difficult to disentangle from their perceptions of child traits. Second, they provide access to a fine-grained sample of behaviors that can be mined for evidence of multiple traits, as coding from videotaped tasks can be designed to measure a multitude of traits without the need for recall of specific child behaviors. Third, because they use standardized probes, differences across children in their responses are more easily observed and responses to important, but infrequently encountered stimuli, such as those that may elicit fear, can be more readily assessed.

There is a growing literature employing laboratory tasks to assess individual differences in child traits (e.g., Carlson & Wang, 2007; Dennis, Brotman Miller, Huang, & Kiely Gouley, 2007; Durbin, 2010; Kochanska, Murray, Jacques, Koenig, & Vandegest, 1996; Willoughby, Wirth, & Blair, 2012). Evidence regarding the structure of traits assessed in this manner is slim, but suggests that coding of child behaviors produces evidence for three broad temperament dimensions (PE, NE, and EC) that are similar to those described in the literature on parent-report. In a recent investigation, Dyson, Olino, Durbin, Hill Goldsmith, and Klein (2011) reported on the factor structure of temperament in preschoolers, whose traits were assessed by a battery of lab tasks, including several drawn from the Laboratory Temperament Battery (Lab-TAB; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1995). The authors uncovered a five-factor model: Sociability, Positive Affect/Interest, Dysphoria, Fear/Inhibition, and Constraint. This five-factor solution is similar, but distinct from, other models that have examined the structure of child temperament via parent-report. For example, the results overlap with Rothbart et al.'s (2001) three-factor model of temperament (i.e., PE, NE, and EC) derived from parent-report on the CBQ, but with a few subtle distinctions. Data from laboratory tasks split the broad PE factor into sociability and positive affect, and the NE factor into fear and sadness/anger. In a similar investigation, Kotelnikova, Olino, Mackrell, Jordan, and Hayden (2013) assessed the structure of temperament in middle childhood by administering a battery of seven laboratory tasks to a community

sample of 205 seven-year-old children. The data supported a four-factor model comprised of Positive Emotionality/sociability, disinhibition/anger, fear/behavioral inhibition, and sadness. Here, the authors identified a factor akin to PE as defined in 3-factor models. However, NE was split into fear/behavioral inhibition, and sadness. An EC factor was not extracted in this sample, which may be attributable to the fact that lab tasks designed to elicit this trait were not included in the battery.

Given that most evidence suggests the level of convergence between different methods of assessing child temperament is low (e.g., Durbin, Hayden, Klein, & Olino, 2007; Majdandzic & van den Boom, 2007), it is important to evaluate not only the similarity of trait structure across methods, but also their areas of convergence and divergence. The low-to-moderate convergence across these multiple methods of assessment suggests that the use of different measurement approaches may contribute to the discrepancies among recovered trait structures. In an examination of infant temperament structure assessed via both parent-report on the Infant Behavior Questionnaire (IBQ; Rothbart, 1981) and laboratory measures, modest-to-moderate convergence between the two methods was observed across the PE, NE, and EC temperament superfactors (Rothbart, Derryberry, & Hershey, 2000). In toddlerhood and preschool-aged children, the convergence between behavioral and caregiver measures of temperament (on the CBQ) is also moderate (Kochanska et al., 1996). Several potential sources of difference between laboratory methods employing objective coding of child behavior and parent-report questionnaires likely contribute to lower convergence. First, coders typically see only a small sample of child behavior in a single (or a few) contexts, whereas parents see behaviors across a variety of contexts, particularly recurring contexts, allowing for inferences about their child's behavioral style across different situations and in response to similar and dissimilar stimuli. Second, coders have the advantage of videotaped samples that reduce their memory burden and allow for minute examination of behaviors that are not possible during live interaction. Third, coders do not have any relationship with the children they code, such that their stance towards a child's behavior is more neutral than for someone who engages in ongoing interactions with that child (i.e., their parent), and whose relationship to the child has both a history and a deep personal meaning.

In the current project, we examined the factor structure and convergent validity of ratings of child traits made by experimenters who conducted laboratory assessments with children. This approach offers an interesting comparison to both coding and parent-report methods. These ratings are similar to traditional coding of laboratory tasks in that they are made based on the behaviors exhibited by a child during structured lab tasks and are completed by people with no prior experience or long-standing relationship with the child. However, they are similar to parent-report measures in that they require an aggregation of perceptions recalled across a longer sample of behavior (a 2-hour visit), and the reporter (the experimenter) has an interactive role with the child as they engage him or her in the laboratory tasks. Finally, if their structural and convergent validity were supported, they also could potentially serve an economical, substitute for or supplement to data from objective coding measures, as experimenter ratings can be collected immediately after a laboratory assessment and are readily scored.

We examined the factor structure, convergent, and discriminant validity of experimenter ratings of child temperament traits collected following a battery of emotion-eliciting laboratory tasks in a sample of 168 young children. Experimenter ratings were compared to parent-reports of child traits and scores derived from objective coding of child behavior. Based on previous research using parent-report and laboratory methods, it was predicted that

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