Full length article

The Infant Behavior Questionnaire-Revised: Factor structure in a culturally and sociodemographically diverse sample in the United States

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ABSTRACT

The recommended factor structure for the Infant Behavior Questionnaire-Revised (IBQ-R), a widely used parent-report measure of infant temperament, has limited empirical support. Moreover, the recommended factors were developed using homogenous samples not representative of current United States (U.S.) sociodemographics. The objective of this study was to examine the factor structure of the IBQ-R in a culturally and sociodemographically diverse U.S. cohort (N = 380 mother-infant dyads). Mothers were assessed during pregnancy on a range of cultural and sociodemographic characteristics and completed the IBQ-R when their infants were 6 months of age. The sample was diverse on maternal marital status, educational attainment, household income, race/ethnicity, primary language spoken, and country of birth. Initial confirmatory factor analysis for the recommended three-factor model yielded a poor fit. Modifications employed in other studies failed to improve model fit. An exploratory factor analysis revealed an acceptable model fit for a three-factor solution that showed similarities to as well as differences from the originally proposed factor structure. Additional analyses suggested lack of invariance on several factor and scale scores by maternal country of birth, race/ethnicity, and household income. The findings suggest that the commonly used IBQ-R factor structure may need to be adjusted for diverse samples and deserves further study.

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1. Introduction

The Infant Behavior Questionnaire-Revised (IBQ-R) is a widely-used parent-report measure developed to assess dimensions of temperament along 14 scales (Table 1) in infants between 3 and 12 months of age (Gartstein & Rothbart, 2003).

Abbreviations: IBQ-R, Infant Behavior Questionnaire-Revised; EFA, exploratory factor analysis; CFA, confirmatory factor analysis; SES, socioeconomic status; GED, general equivalency diploma; App, Approach; VR, Vocal Reactivity; HP, High Intensity Pleasure; SL, Smiling and Laughter; Act, Activity Level; PS, Perceptual Sensitivity; Sad, Sadness; DL, Distress to Limitations; Fall, Falling Reactivity; Rate of Recovery from Distress; LP, Low Intensity Pleasure; Cud, Cuddliness; DO, Duration of Orienting; Soot, Soothability; SUR, Surgency; NEG, Negative Affectivity; REG, Orienting/Regulation.

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Table 1
IBQ-R scales.

<table>
<thead>
<tr>
<th>IBQ-R scale</th>
<th>Scale Description</th>
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<tbody>
<tr>
<td>Approach</td>
<td>Rapid approach, excitement, and positive anticipation of pleasurable activities</td>
</tr>
<tr>
<td>Vocal Reactivity</td>
<td>Amount of vocalization exhibited in daily activities</td>
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<tr>
<td>High Intensity Pleasure</td>
<td>Amount of pleasure or enjoyment related to high stimulus intensity, rate, complexity, novelty, and incongruity</td>
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<tr>
<td>Smiling and Laughter</td>
<td>Smiling or laughter in general caregiving and play situations</td>
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<tr>
<td>Activity Level</td>
<td>Movement of arms and legs, squirming, and locomotor activity</td>
</tr>
<tr>
<td>Perceptual Sensitivity</td>
<td>Amount of detection of slight, low intensity stimuli from external environment</td>
</tr>
<tr>
<td>Distress to Limitations</td>
<td>Fussing, crying, or showing distress when in a confining place or position, involved in caregiving activities, or unable to perform a desired action</td>
</tr>
<tr>
<td>Fear</td>
<td>Startle or distress to sudden changes in stimulation or novel physical objects or social stimuli; inhibited approach to novelty</td>
</tr>
<tr>
<td>Falling Reactivity/Rate of Recovery from Distress</td>
<td>Rate of recovery from peak distress, excitement, or general arousal; ease of falling asleep</td>
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<tr>
<td>Low Intensity Pleasure</td>
<td>Amount of pleasure or enjoyment related to low stimulus intensity, rate, complexity, novelty, and incongruity</td>
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<tr>
<td>Cuddliness</td>
<td>Expression of enjoyment and molding of body to being held by caregiver</td>
</tr>
<tr>
<td>Duration of Orienting</td>
<td>Attention to and/or interaction with a single object for extended periods of time</td>
</tr>
<tr>
<td>Soothability</td>
<td>Reduction of fussing, crying, or distress when caregiver uses soothing techniques</td>
</tr>
</tbody>
</table>

The IBQ-R was rationally derived, based on a definition of temperament as constitutionally based individual differences in reactivity (e.g., arousability of emotional, motor, and attentional responses) and self-regulation (processes that modulate reactivity, such as attention; Gartstein & Rothbart, 2003). Parent-report questionnaires of infant temperament have proven to be valuable research tools given a number of benefits they provide over laboratory observations. Such benefits include a low cost method for obtaining information on multiple temperament dimensions, the opportunity to gather data on behavior across various contexts that are not affected by the artificiality of structured observations, and simpler logistics of administration and scoring (Bornstein et al., 2015; Dragan, Kmita, & Fronczyk, 2011; Montirosso, Cozzi, Putnam, Gartstein, & Borgatti, 2011). Moreover, the IBQ-R has demonstrated good internal consistency, reliability, and validity, including correlations with laboratory observations (Gartstein & Marmion, 2008; Goldsmith & Campos, 1990; Parade & Leerkes, 2008).

1.1. IBQ-R and the structure of infant temperament

In addition to being used to measure individual differences in infant temperament characteristics, the IBQ-R has been utilized to identify the structure of infant temperament via factor analysis (Clifford et al., 2013; Derauf et al., 2011; Gartstein & Rothbart, 2003; Gartstein, Bridgett et al., 2010; Putnam, Rothbart, & Gartstein, 2008). When the IBQ-R was first introduced (Gartstein & Rothbart, 2003), the developers presented the results of an exploratory factor analysis (EFA), which revealed three factors, labeled by the developers as (1) Surgency/Extraversion, consisting of the scales Approach, Vocal Reactivity, High Intensity Pleasure, Smiling and Laughter, Activity Level, and Perceptual Sensitivity; (2) Negative Affectivity, consisting of the scales Sadness, Distress to Limitations, Fear, and Falling Reactivity/Rate of Recovery from Distress; and (3) Orienting/Regulation, consisting of the scales Low Intensity Pleasure, Cuddliness, Duration of Orienting, and Soothability (Gartstein & Rothbart, 2003). Internal consistency ratings of the factors were high, with Cronbach’s alpha values ranging from 0.91 to 0.92 (Gartstein & Rothbart, 2003).

The authors noted that this factor structure is generally consistent with broad dimensions of temperament documented for older children and adults and with theories of personality (Gartstein & Rothbart, 2003; Rothbart, Ahadi, Hershey, & Fisher, 2001). In subsequent years, investigators have utilized these factors in analyses relating infant temperament to a variety of child outcomes (e.g., Brunst et al., 2014; Rothbart, Sheese, Rueder, & Posner, 2011; Tester-Jones, O’Mahen, Watkins, & Karl, 2015; Tikotzky, Chambers, Gaylor, & Manber, 2010; van den Heuvel, Johannes, Henrichs, & Van den Bergh, 2015). Moreover, much of the recent literature regarding infant temperament has been based on IBQ measures (original Infant Behavior Questionnaire [IBQ], IBQ-R) of the structure of infant temperament (Bornstein et al., 2015).

1.2. Cultural and sociodemographic influences on infant temperament

Although temperament characteristics are hypothesized to be biologically based, they are also hypothesized to be impacted by experience (Gartstein et al., 2006), including cultural and sociodemographic influences (Gartstein, Knyazev, & Slobodskaya, 2005). Children’s social settings, familial customs, and caregivers’ psychosocial characteristics and beliefs may influence the meaning of children’s temperament (Cozzi et al., 2013; Gartstein, Poley, Young, & Slobodskaya, 2009; Super & Harkness, 1986). Consequently, parents may engage in caregiving practices that reinforce the characteristics consistent with their values and those of their cultural group (Dragan et al., 2011; Gartstein et al., 2006, 2009), leading to cross-cultural differences in the development of temperament (Gartstein et al., 2006). Support for this hypothesis comes from a number of studies among infants from different cultural groups that show differences on mean ratings across temperament scales (e.g., Cozzi et al., 2013; Dragan et al., 2011; Gartstein et al., 2006, 2009; Montirosso et al., 2011). Importantly, limited longitudinal...
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