



Full length article

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



Michelle Bosquet Enlow^{a,*}, Matthew T. White^a, Katherine Hails^b,
Ivan Cabrera^b, Rosalind J. Wright^c

^a Boston Children's Hospital and Harvard Medical School, United States

^b Boston Children's Hospital, United States

^c Kravis Children's Hospital, Department of Pediatrics and Mindich Child Health & Development Institute, Icahn School of Medicine at Mount Sinai, 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; Sooth, Soothability; SUR, Surgency; NEG, Negative Affectivity; REG, Orienting/Regulation.

* Corresponding author.

E-mail address: michelle.bosquet@childrens.harvard.edu (M. Bosquet Enlow).

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Table 1
IBQ-R scales.

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

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, Peleg, 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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