

Infant Behavior Questionnaire-Revised: New evidence in support of
reliability and validity

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The Infant Behavior Questionnaire (IBQ) has been one of the most widely used temperament questionnaires since its publication 20 years ago (Rothbart, 1981). The IBQ has been utilized in investigations addressing a variety of psychological/developmental issues, such as infant reactivity, attachment, behavioral inhibition, and the impact of maternity leave on mother-child interactions (Calkins & Fox, 1992; Clark, Shibley Hyde, Essex, & Klein, 1997; Stifter & Fox, 1990). The Infant Behavior Questionnaire-Revised (IBQ-R) was recently developed (See Table 1 for scale definitions), and the initial evaluation of its psychometric properties produced satisfactory results (Gartstein & Rothbart, 2001; Jones-Becken, Gartstein, Rothbart, & Chasman, 1999). The development of the IBQ-R included modifications of the original seven scales (Activity Level, Distress to Limitations, Fear, Duration of Orienting, Smiling and Laughter, Soothability and Vocal Reactivity), and provided seven additional scales (High and Low Intensity Pleasure, Falling Reactivity/Rate of Recovery from Distress, Cuddliness, Perceptual Sensitivity, Sadness, Approach). A three factor structure of temperament, including Surgency/Extraversion, Negative Emotionality, and Orienting/Regulatory Capacity, has been described for the IBQ-R (Gartstein & Rothbart, 2001).

The present study represents a re-evaluation of the IBQ-R reliability, and discriminant validity, with a new sample of parents whose infants ranged in age from 3 to 12 months. In addition, convergent validity of this instrument was examined by computing correlations between the dimensions of the IBQ-R and the Baby and Toddler Behavior Questionnaires (BBQ/TBQ; Hagekull, 1985), an established measure of infant/toddler temperament. The relationships between the IBQ-R dimensions of temperament and areas of parental stress, assessed using the Parent Stress Inventory (PSI; Abidin, 1983), were examined in order to evaluate construct validity of the revised instrument. Finally, the predictive validity of the IBQ-R was also addressed. Parents who initially completed the IBQ-R when their infants were between 3 and 12 months of age, were asked to respond to the Early Childhood Behavior Questionnaire (ECBQ; Putnam, Ellis, & Rothbart, in press) when the children were between 18 and 30 months old. Subsequently, the predictive relationships between the IBQ-R and the ECBQ indicators were examined.

Method

Participants

Participants included parents of infants between 3 and 12 months of age, who were

residents of the Eugene-Springfield area in Oregon (N=360), and the San Francisco Bay area, California (N=140). The parents participating in this work have been recruited so that the samples consisted of approximately 50% male and 50% female infants, and were representative of the IBQ-R age range (i.e., infants' ages were evenly distributed across this age span). Majority of the Eugene-Springfield sample (N=249) also participated in a longitudinal follow-up.

Measures

The Infant Behavior Questionnaire-Revised (IBQ-R; Gartstein & Rothbart, 2001). The IBQ-R represents a rationally derived, fine-grained assessment tool, based on the definition of temperament proposed by Rothbart & Derryberry (1981), work with the Child Behavior Questionnaire (Rothbart, Ahadi, & Hershey, 1994), comparative studies, as well as other developmental research that had identified significant dimensions and associated behavioral tendencies. The development of this measure involved (1) formulating precise operational definitions of each dimension of temperament, and items assessing each of these dimensions; (2) performing item analysis items across the different age groups of infants (i.e., eliminating items with a large number of missing responses, and items that failed to contribute to the internal consistency of their respective scales). This multi-step process led to the development of 14 IBQ-R scales: Activity Level, Smiling and Laughter, Fear (social and non-social), Distress to Limitations, Duration of Orienting, Soothability, Vocal Reactivity, High and Low Intensity Pleasure, Falling Reactivity, Affiliation/ Cuddliness, Perceptual Sensitivity, Sadness, and Approach (See Table 1 for definitions). A three factor structure has been demonstrated for these IBQ-R scales, including Surgency, Negative Affectivity, and Orienting/Regulatory Capacity.

Baby/Toddler Behavior Questionnaire (BBQ/TBQ; Hagekull, 1985). The BBQ was designed for infants between 3 and 10 months of age, and the TBQ was developed for children between 11 and 15 months of age. These measures were evaluated with representative samples (N=791 and 357, respectively), and addressed 6 dimensions of temperament: Intensity/Activity, Regularity, Approach-Withdrawal, Sensory Sensitivity, Attentiveness, Manageability. Adequate internal consistency (Cronbach's alphas ranging from .51 to .77) and test-retest reliability (r's ranging from .63 to .93). Satisfactory convergent validity, based on correlations with observer ratings, and inter-rater reliability, were also reported for these instruments.

ECBQ (Becken Jones, Gartstein, Rothbart, & Chasman, 1999; Putnam et al., in press) was designed for use with children between 18 and 30 months of age, and includes the following

13 scales: Attentional Focusing, Attentional Shifting, Discomfort, High Pleasure, Inhibitory Control, Low Pleasure, Perceptual Sensitivity, Positive Anticipation, Sadness, Soothability/Falling Reactivity, Activity Level, Anger Proneness, and Social Fearfulness. ECBQ scale definitions are generally similar to those of the IBQ-R (Table 2). Several scales are unique to the ECBQ, including Anger Proneness, Social Fearfulness, Discomfort, and Inhibitory Control. Satisfactory internal consistency has been demonstrated for this parent-report instrument, with Chronbach alphas ranging from .48 (Impulsivity) to .89 (Inhibitory Control). Analyses of ECBQ data revealed a three factor structure, similar to results obtained for the IBQ-R, including Surgency, Negative Affectivity, and Effortful Control.

Parent Stress Inventory (PSI; Abidin, 1983). The PSI is used to assess stressors in the parent-child system resulting from either child or parent characteristics, or situational variables. Several of the maternal domain subscales were used in this study as indices of maternal adjustment. The depression subscale provided the measure of maternal symptoms of depression. The sense of competence and attachment subscales were used to assess the mothers' perception of herself as a parent. The sense of competence subscale taps insecurity in the parenting role, whereas, the parental attachment subscale measures both the absence of emotional closeness to the child, and the parent's perceived inability to accurately assess the child's needs and emotions. The role restriction subscale reflects the experience of the parental role as restricting one's freedom and attempts to maintain own identity. Marital relationship quality was examined with the PSI, evaluating the emotional and active support of the other parent/partner in the area of child management. All PSI indicators were computed so that higher scores represented greater difficulties. Subscales of the maternal domain have been shown to have a moderate to high degree of internal consistency and test-retest reliability (Abidin, 1983).

Procedure

Birth announcements, published in the Eugene-Springfield, OR, and the San Francisco Bay Area, CA, were reviewed, and parents of infants who were between 3 and 12 months of age were contacted by telephone. The study was described to potential participants, who were told that the completion of the measures would take about an hour. Respondents were mailed consent forms and questionnaire materials, and asked to return completed forms. Participants in the longitudinal study, residing in the Eugene-Springfield area, were contacted when their children were at least 18 months of age, and asked to complete another temperament questionnaire.

Results

Evaluations of internal consistency and intercorrelations between the IBQ-R scales (Tables 3 & 4) for the San Francisco bay area sample provide additional support for reliability and mono-method discriminant validity for the IBQ-R. Correlations between the IBQ-R scales, and the conceptually/theoretically similar BBQ/TBQ indicators were generally significant, supporting convergent validity for the revised instrument (Table 5). Hierarchical regression analyses were performed to evaluate the relationships between domains of infant temperament and parental stress. These analyses were performed in order to statistically control for the contributions of parental demographic variables (e.g., education, income) and child background variables (e.g., age, gender) to these relationships. Lower levels of Parental Competence were associated with lower levels of infant Regulatory Capacity (Table 6). Difficulties in Attachment, from the parental perspective, were associated with lower levels of infant Surgency/Extraversion, and Restriction of Parental Role (due to the child's behavior) was related to higher levels of infant Negative Emotionality. Lower levels of child Surgency/Extraversion were also related to disruptions in the parental marital relationship. Correlations computed between the IBQ-R and the ECBQ factor scores provided support for predictive validity of the IBQ-R. Correlational analysis revealed considerable stability for Surgency/Extraversion, $r = .32$, $p < .001$, Negative Emotionality, $r = .42$, $p < .001$, and Regulatory Capacity, $r = .36$, $p < .001$. Regulatory capacity in toddlers was also predicted by infant Surgency/Extraversion, $r = .37$, $p < .001$.

Discussion

Thus, the results of the present study further support reliability (internal consistency) and validity (construct, predictive) of the IBQ-R. Further, the utility of this instrument has also been demonstrated, suggesting that parents are able to provide information regarding their children's behavioral/emotional tendencies. The IBQ-R represents a fine-grained, psychobiologically oriented, rationally derived, measurement tool that can be utilized in research and clinical interventions involving infants and their families.

References

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Table 1

Scale Definitions: Infant Behavior Questionnaire - Revised (IBQ-R)

Activity Level

Baby's gross motor activity, including movement of arms and legs, squirming and locomotor activity.

Distress to Limitations

Baby's fussing, crying, or showing distress while (a) in a confining place or position; (b) involved in caretaking activities; (c) unable to perform a desired action.

Fear

The baby's startle or distress to sudden changes in stimulation, novel physical objects or social stimuli; inhibited approach to novelty.

Duration or Orienting

The baby's attention to and/or interaction with a single object for extended periods of time.

Smiling and Laughter

Smiling or laughter from the child in general caretaking and play situations.

High Pleasure

Amount of pleasure or enjoyment related to high stimulus intensity, rate, complexity, novelty, and incongruity.

Low Pleasure

Amount of pleasure or enjoyment related to low stimulus intensity, rate, complexity, novelty, and incongruity.

Soothability

Baby's reduction of fussing, crying, or distress when soothing techniques are used by the caretaker.

Falling Reactivity/Rate of Recovery from Distress

Rate of recovery from peak distress, excitement, or general arousal; ease of falling asleep.

Cuddliness

The baby's expression of enjoyment and molding of the body to being held by a caregiver.

Perceptual Sensitivity

Amount of detection of slight, low intensity stimuli from the external environment.

Sadness

General low mood; lowered mood and activity specifically related to personal suffering, physical state, object loss, or inability to perform a desired action.

Approach

Rapid approach, excitement, and positive anticipation of pleasurable activities.

Vocal Reactivity

Amount of vocalization exhibited by the baby in daily activities.

Table 2

Scale Definitions: Early Childhood Behavior Questionnaire (ECBQ)

Attentional Focusing

Concentration, and/or extended duration of orienting, on an object of attention; resisting distraction.

Attentional Shifting

The ability to transfer attentional focus from one activity/task to another.

Discomfort

Negative affect related to sensory qualities of stimulation, including intensity, rate or complexity of light, movement, sound, textures.

High Pleasure

Pleasure or enjoyment related to situations involving high stimulus intensity, rate, complexity, novelty, and incongruity.

Inhibitory Control

The capacity to stop, moderate, or refrain from a behavior under instruction.

Low Pleasure

Pleasure or enjoyment related to situations involving low stimulus intensity, rate, complexity, novelty, and incongruity.

Perceptual Sensitivity

Detection of slight, low intensity stimuli from the external environment.

Positive Anticipation

Excitement about and positive anticipation of expected pleasurable activities.

Sadness

Tearfulness or lowered mood related to exposure to suffering, disappointment, object loss, loss of approval.

Soothability/Falling Reactivity

Rate of recovery from peak distress, excitement, or general arousal; ease of falling asleep.

Activity Level

Limb, trunk, or locomotor movement during a variety of daily situations, including free play, confinement, or quiet activities.

Anger Proneness

Crying, protesting, hitting, and putting or other signs of anger in situations involving conflict with another child or the caregiver.

Social Fearfulness

Inhibition, distress, withdrawal (vs. approach), or signs of shyness in novel or uncertainty-provoking situations of a social nature.

Table 3			
IBQ-R: Descriptive Statistics			
Infants 3 to 12 months of age (N=140)			
Scale	M	SD	Alpha
Activity	4.19	.83	.72
Approach	4.60	1.06	.82
Cuddliness	4.70	1.31	.87
Distress to Limitations	3.72	.77	.71
Duration of Orienting	3.98	.96	.79
Fear	2.92	1.01	.68
Falling Reactivity	4.37	1.10	.72
High Pleasure	5.72	.72	.70
Low Pleasure	5.03	.88	.74
Perceptual Sensitivity	4.12	1.03	.77
Sadness	3.56	.77	.69
Smile and Laughter	4.78	.84	.60
Soothability	3.66	.67	.63
Vocal Reactivity	4.78	.91	.78

Table 4
CORRELATIONS AMONG THE 14 IBQ-R SCALES (N=73)

Scale	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 (S) Activity	<i>.24</i>													
2 (S) Smile/Laughter	<i>.23</i>	<i>.53</i>												
3 (S) High Pleasure	<i>.32</i>	<i>.21</i>	<i>.31</i>											
4 (S) Perceptual Sensitivity	<i>.29</i>	<i>.37</i>	<i>.37</i>	<i>.31</i>										
5 (S) Approach	<i>.39</i>	<i>.58</i>	<i>.54</i>	<i>.46</i>	<i>.44</i>									
6 (S) Vocal Reactivity	<i>.33</i>	<i>.02</i>	<i>-.01</i>	<i>.18</i>	<i>-.01</i>	<i>.10</i>								
7 (NA) Distress to Limitations	<i>.26</i>	<i>.03</i>	<i>.06</i>	<i>.34</i>	<i>.01</i>	<i>.27</i>	<i>.24</i>							
8 (NA) Fear	<i>.22</i>	<i>.02</i>	<i>-.03</i>	<i>.13</i>	<i>.05</i>	<i>.03</i>	<i>.50</i>	<i>.32</i>	<i>.9</i>					
9 (NA) Sadness	<i>-.21</i>	<i>.19</i>	<i>.20</i>	<i>-.09</i>	<i>.36</i>	<i>.01</i>	<i>-.44</i>	<i>-.28</i>	<i>-.28</i>	<i>10</i>				
10 (NA) Falling Reactivity	<i>-.04</i>	<i>.16</i>	<i>.26</i>	<i>.11</i>	<i>.09</i>	<i>.09</i>	<i>.01</i>	<i>.15</i>	<i>-.01</i>	<i>-.01</i>	<i>11</i>			
11 (RC) Duration of Orienting	<i>.01</i>	<i>.29</i>	<i>.40</i>	<i>.17</i>	<i>.14</i>	<i>.19</i>	<i>-.14</i>	<i>-.15</i>	<i>-.28</i>	<i>.17</i>	<i>.35</i>	<i>12</i>		
12 (RC) Low Pleasure	<i>-.01</i>	<i>.03</i>	<i>.17</i>	<i>.08</i>	<i>.06</i>	<i>.06</i>	<i>-.11</i>	<i>.18</i>	<i>-.02</i>	<i>.02</i>	<i>.15</i>	<i>.21</i>	<i>13</i>	
13 (RC) Soothability	<i>-.25</i>	<i>.23</i>	<i>.17</i>	<i>-.28</i>	<i>.32</i>	<i>-.09</i>	<i>-.19</i>	<i>-.39</i>	<i>-.07</i>	<i>.50</i>	<i>.11</i>	<i>.25</i>	<i>.09</i>	<i>14</i>
14 (RC) Cuddliness														

Factors:

S = Surgency

NA = Negative Affect

RC = Regulatory Capacity

Bold: $p < .05$; Bold/Italic: $p > .01$.

Table 5. Correlations between the IBQ-R and the BBQ/TBQ

Scales	Intensity/ Activity	Regularity	Approach/ Withdrawal	Sensory Sensitivity	Attentiveness	Manageability
Activity	.50**	.09	.01	.01	.31**	-.22**
Smile/Laughter	.42**	.21*	.10	.04	.24**	.12
High Pleasure	.35**	.34**	-.02	-.08	.35**	.07
Perceptual Sensitivity	.27**	.32**	-.05	.11	.37**	-.08
Approach	.32**	.22**	-.04	.07	.39**	.01
Vocal Reactivity	.57**	.27**	.07	-.07	.37	-.03
Distress to Limitations	.13	-.08	-.17*	.06	.05	-.19*
Fear	.18*	.12	-.41**	-.02	.21*	-.09
Sadness	.09	-.02	-.23**	.01	.08	-.27**
Falling Reactivity	-.02	.04	-.05	.12	.08	.14
Duration of Orienting	.03	.10	-.05	.02	.15	.22**
Low Pleasure	.02	.28**	.26**	.10	.08	.44**
Soothability	.03	.22**	.04	-.10	-.06	.14
Cuddliness	-.14	.06	.04	.21**	-.04	.21*

*p<.05; **p<.01, all two-tailed test.

Table 6

Hierarchical Regression Analyses: Infant temperament and parental stress.

Regression 1: Parental Competence - Dependent Variable

Variable	R ¹	R ²	R ² Change	F Change	Beta
Regulatory Capacity	.32	.10	.08	3.54*	-0.23*

Regression 2: Attachment - Dependent Variable

Variable	R	R ²	R ² Change	F Change	Beta
Surgency/Extraversion	0.42	0.18	0.13	6.63**	-0.33**

Regression 3: Restricted Parental Activities - Dependent Variable

Variable	R	R ²	R ² Change	F Change	Beta
Negative Emotionality	0.34	0.11	0.09	4.08**	0.26**

Regression 4: Marital Relationship - Dependent Variable

Variable	R ¹	R ²	R ² Change	F Change	Beta
Surgency/Extraversion	.32	.10	.08	3.67*	-0.25*

*p<.05; **p<.01, all two-tailed test.

¹All R, R², and F statistics are presented for the entire step, that included all three IBQ-R factors (Surgency/Extraversion, Negative Emotionality, and Regulatory Capacity).