

The Body Signal Beliefs Questionnaire (BSBQ)

Background

Beliefs about internal bodily signals or *interoceptive beliefs* cover a broad class of beliefs, including individuals' beliefs or self-characterizations about their tendencies to attend to and notice interoceptive signals (*interoceptive sensibility*, Garfinkel et al., 2014) or individuals' beliefs about how fast their heartbeat is going during heartbeat perception tasks (e.g., Legrand et al., 2022). Here, we have developed a questionnaire aimed at tapping individuals' value-based beliefs about their degree of intensity, distress/comfort, and efficacy in managing internal bodily sensations (i.e., interoceptive sensations). Current work has validated the predictive validity of value-based interoceptive beliefs for emotional experiences during an acute stressor in 250 healthy young adults (MacCormack et al., under review), with additional validation ongoing in a sample of 120 healthy adults ranging in age from 18-80. Development of the full 22-item scale, as presented herein in its current form, was completed in a separate online sample of 634 adults (Bonar et al., in prep).

Development and Validation

Study 1 (MacCormack et al., under review): 250 healthy young adults from the University of North Carolina at Chapel Hill's Department of Psychology and Neuroscience introductory psychology course participant pool participated in the first session of a two session study (57.6% female; 57.6% European American, 13.6% African American, 13.6% Asian American, 6.4% Latinx, 6.0% biracial, and 2.8% that were other ethnic identities; $M_{age} = 19.20$ years, $SD_{age} = 1.29$ years ranging from 17 to 29 years old). During this first session, participants completed a 12-item version of the BSBQ ($\alpha = .69$) that we created to capture beliefs about the intensity, danger, and difficulties posed by interoceptive sensations. Factor analyses suggested a single factor structure of 7 items ($\alpha = .77$) which represent negative beliefs. These final 7 items were: "My body is unpredictable," "I have a hard time handling my bodily sensations," "I believe that my body's feelings can be misleading," "Listening to my body's sensations can be problematic," "My bodily urges are difficult to control," "Sometimes I'm afraid of my bodily feelings," and "My body is an intense place." All items were rated on a 7-point Likert scale ranging from 1 (not at all true of me) to 7 (extremely true of me). We reverse coded items so that higher endorsements suggest more positive beliefs about the body. We found that greater positive body beliefs interacted with sympathetic nervous system reactivity to predict the intensity of self-reported high arousal emotions during a stressful speech and math task. Specifically, those high in positive body beliefs reported less intense highly aroused emotions when their sympathetic nervous system reactivity was low, but more intense highly aroused emotions when their sympathetic nervous system reactivity was high, suggesting greater coherence between physiology and emotional experience for individuals with positive interoceptive beliefs. In contrast, those with negative beliefs reported greater intensely aroused emotions regardless of their level of sympathetic nervous system reactivity (MacCormack et al. under review).

Study 2 (Bonar et al., 2021; in prep): In a second study, we developed a more comprehensive version of the BSBQ and tested its internal validity in a larger sample. 634 adults ($M_{age} = 32.5$ years, $SD_{age} = 11.4$ years, 65.3% female, 84.7% White) completed an online survey via Prolific. The survey included 43 items aimed at assessing perceived intensity, distress, and low efficacy in managing bodily sensations. We also included other measures of interoceptive sensibility to demonstrate discriminant validity such as the Body Awareness Questionnaire (BAQ; $\alpha = .79$), Interoceptive Sensitivity Questionnaire (ISQ; $\alpha = .93$), and several subscales of the Multidimensional Assessment of Interoceptive Awareness (MAIA; $\alpha s = .75-.77$). We also included measures of emotional complexity to demonstrate predictive validity such as the emotional clarity ($\alpha = .93$) and attention ($\alpha = .86$) subscales of the Trait Meta-Mood Scale. The expressive suppression subscale of the Emotion Regulation Questionnaire ($\alpha = .77$) was included to index maladaptive emotion regulation strategies. Final BSBQ item selection was determined using exploratory and confirmatory factor analyses. We found that the final factor analysis model demonstrated excellent model fit, with 22 items ($\chi^2 = 464.2$ (df=182), $p < .05$, RMSEA=.049 ($p = .551$), CFI=.96, TLI=.95) and three latent factors: “intensity”, “distress”, and “efficacy” related items. Hierarchical regressions examined the extent to which the BSBQ uniquely explained facets of emotional complexity, controlling for measures of interoceptive sensibility. We found that greater negative beliefs about interoceptive intensity ($\alpha = .86$) were significantly associated with less expressive suppression ($b = -0.86$, $p < .01$), less emotional attention ($b = -0.09$, $p < .01$). Similarly, greater distress beliefs ($\alpha = .93$) were related to greater expressive suppression ($b = 0.73$, $p < .01$) and greater emotional clarity ($b = .10$, $p < .01$). Finally, greater negative beliefs about one’s own efficacy at managing interoceptive sensations ($\alpha = .82$) was associated with greater emotional clarity ($b = 0.20$, $p < .01$), but significant relations with expressive suppression and emotional attention did not survive when adjusted for other measures of interoceptive sensibility (i.e., BAQ, ISQ, and MAIA trusting subscale).

Use and Collaboration Statement

This questionnaire is free to use with appropriate attribution and citation (see below). As this questionnaire is still in development, we are open to collaborations with others to examine the construct or predictive validity of this measure in other samples or studies.

Please get in touch with **Adrienne Bonar** (adrienne.bonar@unc.edu), **Jennifer MacCormack** (jkmaccor@ncsu.edu), and **Kristen Lindquist** (kristen.lindquist@unc.edu) to collaborate.

MacCormack, J. K., Bonar, A. S., & Lindquist, K. A. (under review). Interoceptive beliefs moderate the link between physiological reactivity and emotion during acute stress.

Bonar, A.S.*, MacCormack, J.K.*, Feldman, M.J., Inagaki, T.K., & Lindquist, K.A. (2021). Assessing the role of interoceptive beliefs in emotion: Development of the Body Signal Beliefs Questionnaire (BSBQ). Flash Talk presented at the Annual Conference for the Society for Affective Science [<https://osf.io/z75gn/>]

Bonar, A.S.*, MacCormack, J.K.*, Feldman, M.J., Inagaki, T.K., & Lindquist, K.A. (in prep).
Assessing beliefs about the value and management of interoceptive sensations: The
Body Signal Beliefs Questionnaire (BSBQ).

* indicates shared authorship

Scoring of Current 22-Item Scale

The current 22-item validated and finalized Body Signal Beliefs Questionnaire is presented on the next page. Items noted below should be reverse scored. After reversing appropriate items, researchers can average together specific items to create an Intensity Beliefs subscale score, a Distress Beliefs subscale score, and a Low Efficacy Beliefs subscale score. If interested in overall interoceptive beliefs measure, all items can be averaged together to create a general index of negative interoceptive beliefs about the value and manageability of interoceptive sensations.

Items to reverse:

1. **Item #6:** It takes a lot to get a bodily reaction from me. (R)
2. **Item #7:** My bodily sensations rarely disrupt my life. (R)
3. **Item #11:** I always know what to do to make my body feel better. (R)
4. **Item #12:** If my body feels bad, I know what to do. (R)
5. **Item #20:** My body always lets me know exactly what it needs. (R)
6. **Item #21:** I can rely on what my body is telling me. (R)

Subscales, after reversing appropriate items:

- **Intensity Beliefs:** Average together items 1,2,3,4,8
- **Distress Beliefs:** Average together items 5,7,9,10,13,14,15,16,17,18,19
- **Low Efficacy Beliefs:** Average together items 6,11,12,20,21,22

If measuring the questionnaire in Qualtrics or some other computerized questionnaire software, please randomize the order of items.

The Body Signal Beliefs Questionnaire

Instructions: Below you will find a list of statements which may or may not apply to your experiences with your body. For each statement, circle or select a number from 1 (strongly disagree) to 7 (strongly agree) that best describes how the statement applies to you.

	1	2	3	4	5	6	7
	Strongly Disagree	Somewhat Disagree	A Little Disagree	Neither Agree nor Disagree	A Little Agree	Somewhat Agree	Strongly Agree
1.	My body is an intense place.						
	1	2	3	4	5	6	7
2.	My body tends to have strong reactions.						
	1	2	3	4	5	6	7
3.	I feel my bodily sensations much more intensely than other people seem to do.						
	1	2	3	4	5	6	7
4.	When I experience a bodily sensation, it tends to be very strong.						
	1	2	3	4	5	6	7
5.	My body's reactions tend to be so strong that they interfere with my life.						
	1	2	3	4	5	6	7
6.	It takes a lot to get a bodily reaction from me.						
	1	2	3	4	5	6	7
7.	My bodily sensations rarely disrupt my life.						
	1	2	3	4	5	6	7
8.	Compared to other people, my body's reactions are very strong when I'm feeling emotional.						
	1	2	3	4	5	6	7
9.	I have a hard time handling my bodily sensations.						
	1	2	3	4	5	6	7
10.	My body's reactions are often overwhelming.						
	1	2	3	4	5	6	7

	1	2	3	4	5	6	7
	Strongly Disagree	Somewhat Disagree	A Little Disagree	Neither Agree nor Disagree	A Little Agree	Somewhat Agree	Strongly Agree
11.	I always know what to do to make my body feel better.						
	1	2	3	4	5	6	7
12.	If my body feels bad, I know what to do.						
	1	2	3	4	5	6	7
13.	Sometimes I'm afraid of my bodily feelings.						
	1	2	3	4	5	6	7
14.	I often feel distressed by my body's sensations.						
	1	2	3	4	5	6	7
15.	I feel distressed when my body reacts strongly.						
	1	2	3	4	5	6	7
16.	I hate how intense my bodily sensations tend to be.						
	1	2	3	4	5	6	7
17.	I get more upset by unpleasant bodily sensations than other people seem to do.						
	1	2	3	4	5	6	7
18.	Sometimes I feel threatened by my body's reactions.						
	1	2	3	4	5	6	7
19.	I feel a lot of distress when my body feels bad.						
	1	2	3	4	5	6	7
20.	My body always lets me know exactly what it needs.						
	1	2	3	4	5	6	7
21.	I can rely on what my body is telling me.						
	1	2	3	4	5	6	7
22.	It's difficult for me to understand what my body is trying to tell me.						
	1	2	3	4	5	6	7