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Assessing emotion beliefs with the Polish version of the Emotion Beliefs Questionnaire (EBQ): psychometric properties, norms, and links with emotional reactivity and psychopathology

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Abstract
Originally developed in English, the Emotion Beliefs Questionnaire (EBQ) is a self-report measure of beliefs about the controllability and usefulness of negative and positive emotions. In this study, we introduce the Polish version and examine its psychometric properties and links with emotional outcomes. Our sample was 914 Polish adults aged 18–70 from the general population. Confirmatory factor analysis was applied to verify the factor structure. Convergent and divergent validity were assessed based on the relationship between the EBQ and emotional reactivity traits as well as markers of anxiety, depression, and stress. We assessed internal consistency reliability. We also examined discriminant validity by conducting exploratory factor analyses of EBQ scores and emotional reactivity traits and psychopathology symptoms. We evaluated criterion validity by conducting a set of multiple regression analyses, examining whether EBQ scores could predict significant variance in psychopathology symptoms. Our factor analyses supported the EBQ's factorial validity, conforming to the intended 4-factor structure (subscales: negative-controllability, positive-controllability, negative-usefulness, positive-usefulness), with support also found for a higher-order general factor (e.g., CFI = 0.941, RMSEA = 0.063). This structure was invariant across gender and age categories. The EBQ subscales correlated in expected directions with emotional reactivity traits and psychopathology symptoms. The EBQ showed good internal consistency reliability (α = 0.77–0.88) and discriminant validity. Beliefs about the uncontrollability of negative emotions were the strongest unique predictor of psychopathology symptoms. We also presented percentile rank norms for Polish adults. The Polish version of the EBQ appears to have strong psychometric properties and good clinical relevance.

Keywords Controllability of emotions · Emotion beliefs · Psychometric properties · Psychopathology · Usefulness of emotions

Introduction

Emotion beliefs are a set of beliefs about emotions and their nature. Two main categories of beliefs about emotions were distinguished in the theoretical framework recently introduced by Ford and Gross's (2019). These are beliefs about the *controllability* of emotions and beliefs about the *usefulness* of emotions, both of which are hypothesized to be important in impacting down-stream emotion regulation patterns (Ford & Gross, 2019). Conceptually, strong beliefs that emotions are uncontrollable or useless are likely to be maladaptive, in terms of influencing whether people try to regulate their emotions and the ways in which they try to regulate (Becerra et al., 2020). To assess these sets of beliefs, the Emotion Beliefs Questionnaire (EBQ) was recently introduced by Becerra et al. (2020), based on the

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Ford and Gross (2019) framework. As emotion beliefs play an important role in emotional experiences, with associations with emotion regulation and psychopathology (Kneeland et al., 2016), the assessment of emotion beliefs is of high importance in both community samples (e.g., for the development of prevention programs) and clinical groups (Sasaki et al., 2023). To help facilitate the cross-cultural understanding and assessment of emotion beliefs, our aim in this study is to present a first Polish version of the EBQ and examine its psychometric properties and links with emotional outcomes in Polish adults.

Originally developed in English, the EBQ (Becerra et al., 2020) is a 16-item self-report questionnaire that assesses beliefs about the controllability and usefulness of emotions, and does so for negative and positive emotions separately. As such, all EBQ items ask about the extent to which the examinee considers that emotions are uncontrollable (i.e., not amenable to conscious control and managing) or useless (i.e., unhelpful, undesirable, and harmful). Four subscales, each with 4 items, were designed to be derived: Negative-Controllability (e.g., "*It doesn't matter how hard people try, they cannot change their negative emotions"*), Positive-Controllability (e.g., "*People cannot control their positive emotions"*), Negative-Usefulness (i.e., "*There is very little use for negative emotions"*) and Positive-Usefulness (i.e., "*Positive emotions are very unhelpful to people"*). These subscales can also be combined into various theoretically meaningful composite scores, including *General-Controllability* and *General-Usefulness* composites, and a total scale score as an overall marker of maladaptive beliefs about emotions (Becerra et al., 2020).

Recent psychometric studies conducted across different cultures have indicated that the intended 4-factor (subscale) structure of the EBQ performs well, and that these subscales have acceptable to high levels of internal consistency reliability (Becerra et al., 2020; Becerra et al., 2023; Ranjbar et al., 2023; Rogier et al., 2023). The original EBQ study in a small sample ($n = 161$) supported a 3-factor structure, whereby the valence distinction was not important for controllability (i.e., loading on a General-Controllability factor rather than valence specific factors); however, subsequent studies in larger samples have supported a valence split in the controllability domain, albeit those subscales correlate very highly (e.g., Ranjbar et al., 2023). Studies have also supported the tenability of a higher-order general factor, thus supporting the summing of all items into a total scale score and the coherence of the emotion beliefs construct (e.g., Becerra et al., 2020).

Studies conducted with the EBQ have also so far documented good convergent and divergent validity. It has been shown that maladaptive emotion beliefs are associated with emotion regulation difficulties, higher levels of negative affect, and lower levels of positive affect (e.g., Preece et al., 2022). Links between maladaptive beliefs and psychopathology symptoms have also been established, such as depression, anxiety, and stress, thus supporting the clinical relevance of emotion beliefs as assessed by the EBQ (e.g., Becerra et al., 2020). In a clinical sample, it was recently shown that people with schizophrenia-spectrum diagnoses had significantly higher beliefs about the uncontrollability of emotion than healthy controls (Berglund et al., 2023). These beliefs were associated with problematic emotion regulation patterns, in terms of higher use of expressive suppression, lower use of cognitive reappraisal, as well as higher levels of psychopathology symptoms.

In sum, the EBQ appears to have promising psychometric properties and the clinical relevance in understanding of the development of psychopathology. However, there are still relatively few data on the EBQ's psychometrics. There is also a need to develop more language versions, in order to enable cross-cultural research on the emotion beliefs construct. Because there is presently no Polish version of the EBQ, our central aims here were to introduce the first Polish version, examine its psychometric properties, and use the EBQ to explore the links between emotion beliefs and important emotional outcomes in Polish adults. We examined its factor structure, internal consistency reliability, convergent, divergent validity and discriminant validity, as well as the predictive role of EBQ scores for psychopathology symptoms. We were also interested in potential age and gender differences in emotion beliefs, and in presenting normative data for Polish general community adults to help facilitate the interpretation of EBQ scores.

Based on past findings (e.g., Becerra et al., 2020; Biel et al., 2023; Ranjbar et al., 2023; Rogier et al., 2023), we predicted that (1) the intended 4-factor subscale structure of the EBQ would be the best factor structure and the questionnaire would be invariant across age and gender, (2) that the EBQ subscale and composite scores would have good internal consistency reliability, (3) that EBQ scores would correlate positively with higher levels of negative emotional reactivity traits and psychopathology symptoms and with lower levels of positive reactivity traits, (4) that the EBQ would have good discriminant validity against psychopathology symptoms and negative and positive emotional reactivity traits, (5) that the controllability domain subscales would be the strongest predictors of psychopathology symptoms, as compared to the usefulness domain. As there are presently no studies on age and gender differences in EBQ scores, we have no specific hypotheses regarding these differences.

Materials and methods

Participants and procedure

Our sample included 914 Polish adults (657 females and 257 males) aged 18–70 ($M = 26.07$, $SD = 11.41$). People with a higher education degree made up 24.40% of the respondents, with those with secondary education 62.47%, those with vocational education 5.47%, and those with primary school level education 7.66%. Among the respondents, 52.19% were single, and 47.81% were in relationships. Large cities (above 100,000 inhabitants) were home to 37.09% of the respondents, medium-sized towns (from 20,000 to 100,000) to 20.68%, small towns (up to 20,000) to 13.57%, and villages to 28.67%.

Participants filled out a short battery of psychological questionnaires on emotion processing. None of these data on the EBQ have been published previously. Our study recruitment was conducted from February to November 2022 via social networks (Facebook, Instagram), where a link directed participants to the online anonymous survey (hosted on the Google Forms survey platform).

This study was conducted in accordance with the Declaration of Helsinki Ethical Principles. The Kazimierz Wielki University Ethics Committee approved the study (No. 1/13.06.2022). All participants provided informed consent digitally before answering the survey. To help avoid participant fatigue, not all respondents completed all measures.

Measures

In this study, our respondents filled out a demographic questionnaire (age, sex, education, marital status, and residence) as well as below-described measures. Internal reliability coefficients for all administered measures are displayed in Table 1.

1. The EBQ is a 16-item self-report measure of beliefs about emotions (Becerra et al., 2020). The EBQ assesses beliefs about the controllability of emotions and beliefs about the usefulness of emotions, and does so for negative and positive emotions. As above mentioned, the questionnaire consists of four subscales (Negative-Controllability, Positive-Controllability, Negative-Usefulness, Positive-Usefulness), as well as several composite scores, including a total scale score as an overall marker of maladaptive beliefs about emotions. All items are scored on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*), with higher scores indicating stronger beliefs that emotions are uncontrollable and useless. The original English version of the EBQ was translated into Polish by three independent translators, and a common Polish translation was then developed by combining these. Then, it was translated back into English, with this back translation compared with the original English version. Minor corrections were made at this stage to further align it with the original, hence resulting in the final Polish version of the EBQ (see Supplementary Materials for a copy of the Polish EBQ, it is freely available for use).
2. *The Perth Emotional Reactivity Scale-Short Form* (PERS-S) is an 18-item self-report questionnaire designed to measure trait levels of emotional reactivity (i.e., the ease of activation, intensity, and duration of emotions) across negative and positive emotions separately (Preece et al., 2019). The questionnaire consists of six subscales (each containing three items): Negative-activation (e.g., *"I tend to get upset very easily"*), negative-intensity (e.g., *"If I'm upset, I feel it more intensely than everyone else"*), Negative-duration (e.g., *"Once in a negative mood, it's hard to snap out of it"*), Positive-activation (e.g., *"I tend to get happy very easily"*), positive-intensity (e.g., *"When I'm joyful, I tend to feel it very deeply"*), and positive-duration (e.g., *"When I'm happy, the feeling stays with me for quite a while"*). The subscales in each valence domain can also be combined into *General Negative Reactivity* and *General Positive Reactivity* composite scores. The items are scored on a 5-point Likert scale ranging from 1 (*very unlike me*) to 5 (*very like me*), with higher scores indicating higher emotional reactivity levels (Preece et al., 2019). There are no reverse scored items. The Polish version of the PERS-S has demonstrated strong psychometric properties (Larionow & Mudło-Głagolska, 2022) and was applied in this study.
3. *The Patient Health Questionnaire-4* (PHQ-4) is a 4-item questionnaire for measuring anxiety and depressive symptoms in the previous two weeks (Kroenke et al., 2009). The PHQ-4 has two subscale scores: anxiety (two items; *"Feeling nervous, anxious, or on edge"*; *"Not being able to stop or control worrying"*) and depression (two items; *"Little interest or pleasure in doing things"*; *"Feeling down, depressed, or hopeless"*). A total PHQ-4 score, indicating overall level of negative affect or psychopathology symptoms, can also be calculated. The PHQ-4 uses a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*), with higher scores indicating higher symptoms levels. There are no reverse scored items. The Polish version of the PHQ-4 has strong psychometric properties (Larionow & Mudło-Głagolska, 2023) and was applied in this study.
4. *The Perceived Stress Scale-4* (PSS-4) is a 4-item questionnaire for measuring the level of perceived stress

Table 1 Descriptive statistics and internal consistency reliability coefficients for the EBQ, PERS-S, PHQ-4 and PSS-4 scores

Scales	Total sample							Females			Males		
	n	ω (95% confidence interval)	α (95% confidence interval)	*M*	*SD*	Skewness	Kurtosis	*n*	*M*	*SD*	*n*	*M*	*SD*
EBQ													
EBQ Negative-Controllability	914	0.81 (0.79; 0.83)	0.81 (0.79; 0.83)	10.24	5.49	0.91	0.36	657	10.13	5.45	257	10.52	5.61
EBQ Positive-Controllability	914	0.77 (0.75; 0.80)	0.77 (0.74; 0.79)	10.17	5.31	0.86	0.33	657	9.97	5.21	257	10.70	5.55
EBQ Negative-Usefulness	914	0.82 (0.80; 0.84)	0.82 (0.80; 0.83)	10.71	6.10	0.87	-0.04	657	10.66	6.06	257	10.84	6.22
EBQ Positive-Usefulness	914	0.81 (0.79; 0.83)	0.81 (0.79; 0.83)	6.38	3.88	2.59	8.39	657	6.15	3.60	257	6.95	4.46
EBQ General-Controllability	914	0.88 (0.87; 0.89)	0.88 (0.87; 0.89)	20.41	10.16	0.85	0.31	657	20.10	9.96	257	21.21	10.62
EBQ General-Usefulness	914	0.72 (0.69; 0.74)	0.78 (0.76; 0.80)	17.09	8.05	1.110	1.50	657	16.81	7.81	257	17.79	8.61
EBQ Total scale score	914	0.88 (0.87; 0.89)	0.88 (0.87; 0.89)	37.50	15.93	0.90	0.95	657	36.91	15.46	257	39.00	17.02
PERS-S													
PERS-S General negative reactivity	157	0.92 (0.90; 0.94)	0.92 (0.89; 0.93)	34.44	8.76	-0.84	-0.13	143	34.53	8.80	14	33.50	8.63
PERS-S Negative-activation	157	0.79 (0.73; 0.84)	0.78 (0.71; 0.83)	11.57	3.11	-0.84	-0.16	143	11.59	3.18	14	11.36	2.37
PERS-S Negative-intensity	157	0.87 (0.84; 0.91)	0.87 (0.83; 0.90)	11.64	3.45	-0.89	-0.29	143	11.71	3.43	14	10.86	3.74
PERS-S Negative-duration	157	0.81 (0.76; 0.86)	0.80 (0.74; 0.85)	11.23	3.15	-0.74	-0.34	143	11.22	3.15	14	11.29	3.29
PERS-S General positive reactivity	157	0.90 (0.88; 0.92)	0.90 (0.88; 0.92)	27.30	8.34	-0.27	-0.47	143	27.43	8.52	14	26.00	6.30
PERS-S Positive-activation	157	0.78 (0.72; 0.84)	0.77 (0.70; 0.83)	9.68	2.94	-0.35	-0.58	143	9.69	2.99	14	9.50	2.41
PERS-S Positive-intensity	157	0.90 (0.88; 0.93)	0.90 (0.87; 0.92)	9.54	3.55	-0.26	-0.96	143	9.62	3.59	14	8.71	3.20
PERS-S Positive-duration	157	0.83 (0.79; 0.88)	0.82 (0.77; 0.87)	8.09	3.18	0.16	-0.74	143	8.12	3.28	14	7.79	1.97
PHQ-4													
PHQ-4 Anxiety subscale	312	0.65 (0.57; 0.74)	0.65 (0.57; 0.72)	3.86	1.74	-0.30	-1.03	281	3.88	1.72	31	3.65	1.92
PHQ-4 Depression subscale	312	0.80 (0.74; 0.84)	0.80 (0.75; 0.84)	3.46	1.98	-0.17	-1.21	281	3.43	1.97	31	3.65	2.07
PHQ-4 Total score	312	0.83 (0.79; 0.86)	0.82 (0.78; 0.85)	7.31	3.37	-0.25	-0.99	281	7.32	3.34	31	7.29	3.71
PSS-4													
PSS-4 Stress	165	0.73 (0.65; 0.80)	0.72 (0.65; 0.79)	8.95	3.36	-0.28	-0.39	148	8.94	3.39	17	9.00	3.22

Note. EBQ = Emotion Beliefs Questionnaire; PHQ-4 = Patient Health Questionnaire-4; PSS-4 = Perceived Stress Scale-4; PERS-S = Perth Emotional Reactivity Scale-Short Form; ω = McDonald's omega; α = Cronbach's alpha; *M* = mean; *SD* = standard deviation

during the previous month (Cohen et al., 1983). The PSS-4 has four items (e.g., *"In the last month, how often have you felt that you were unable to control the important things in your life?"*). The statements are scored on a 4-point scale ranging from 0 (*never*) to 4 (*very often*), with higher scores indicating higher stress levels. The PSS-4 has two reverse-scored items. The Polish version of the PSS-4 has strong psychometric properties (Kleszczewska et al., 2018) and was applied in this study.

Statistical analysis

There were no missing data. Statistical analysis was carried out using *Statistica* (version 13.3) and *R* (version 4.3.0). In R the following packages were used: *lavaan* (Rosseel, 2012) for confirmatory factor analysis (CFA), *psych* (Revelle, 2023) for reliability analysis, *EFAtools* (Steiner & Grieder, 2020) for exploratory factor analysis (EFA), and *EFA.dimensions* (O'Connor, 2023) for calculating the determinant of the correlation matrix. We calculated effect sizes for the Mann-Whitney *U* test (rank-biserial correlation coefficient) and for Student's *t*-test for paired samples (Cohen's *d*). Cohen's *d* values of 0.15–0.36 were judged as small effect size, 0.37–0.65 as medium, and > 0.65 as large (Lovakov & Agadullina, 2021).

CFA and measurement invariance

Factor models of the EBQ were tested by CFA), using maximum likelihood estimation with robust standard errors and the Satorra-Bentler scaled test statistic. This estimation method does not assume normality (i.e., is robust against deviations from normality), and thus is well suited for the examination of Likert scale data. We used CFA, rather than EFA here, as CFA is more appropriate when there are established theories and data on the expected structure (Brown & Moore, 2012). The fit of the factor models was assessed based on the following common fit indexes (Hu & Bentler, 1999): root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), comparative fit index (CFI), and Tucker–Lewis index (TLI). RMSEA and SRMR values below 0.08, as well as CFI and TLI values greater than 0.90 indicate an acceptable fit, whereas RMSEA values below 0.06 and CFI and TLI values greater than 0.95 indicate excellent fit (Hu & Bentler, 1999). The Akaike Information Criterion (AIC) values were also used in the comparison of EBQ factor models, with lower AIC values indicating a better fit (Byrne, 2016).

We tested seven different theoretically informed factor models of the EBQ: (1) a 1-factor model, where all 16 EBQ items load on a general emotion beliefs factor, (2) a 2-factor model, where negative emotion beliefs factor and positive emotion beliefs factors are correlated, (3) an alternative 2-factor model, where a general-controllability factor and a general-usefulness factor specified, (4) a 3-factor model, with a negative-controllability factor, positive-controllability factor, and general-usefulness factor, (5) another 3-factor model, with a negative-usefulness factor, positive-usefulness factor, and general-controllability factor, (6) the intended 4-factor model corresponding to the subscale structure of the measure, with negative-controllability, positive-controllability, negative-usefulness, and positive-usefulness factors, (7) and a 4-factor model with a higher-order factor, where the negative-usefulness, positive-usefulness, negative-controllability, and positive-controllability factors load on a higher-order factor of general emotion beliefs (Becerra et al., 2020; Ranjbar et al., 2023; Rogier et al., 2023).

The measurement invariance of the EBQ across age and gender was examined. We assessed the goodness-of-fit separately in two gender groups (females vs. males), and two age groups (younger people vs. older people). Next, the configural, metric and scalar invariance were tested. Models were compared in terms of CFI, where an absolute difference in CFI (ΔCFI) of less than 0.01 supports invariance (Cheung & Rensvold, 2002).

Internal consistency reliability

McDonald's omega values (ω) and Cronbach's alpha coefficients (α) with 95% confidence intervals were calculated to assess internal consistency reliability. Values ≥ 0.70 were judged as acceptable, ≥ 0.80 as good, and ≥ 0.90 as excellent (Groth-Marnat, 2009).

Convergent and divergent validity

For assessing convergent and divergent validity, we calculated Pearson correlations between EBQ scores and positive and negative emotional reactivity traits, and psychopathology symptoms in terms of anxiety, depression, and stress symptoms.

Discriminant validity

For evaluating discriminant validity, we conducted two series of second-order EFA (principal axis factoring with direct oblimin rotation). In the first series, a second-order EFA of four EBQ subscales, two PHQ-4 subscales, and the PSS-4 scores was carried out. In the second series, a second-order EFA of the four EBQ subscales and the six PERS-S subscales was conducted. We expected that emotion beliefs would extract on to a different higher-order factor

compared to these other measures of emotional reactivity and psychopathology.

Predictive role of emotion beliefs in mental health symptoms

We were also interested in examining the predictive role of emotion beliefs in anxiety, depression, and stress symptoms (controlling for demographic variables). Therefore, we conducted a set of multiple regression analyses in two steps using the forward entry method. In the first step, age, gender, and education were input as predictors to control for demographic effects, whereas in the second step the four EBQ subscales were input as predictors Anxiety and depression symptoms (two PHQ-4 subscales), the PHQ-4 total score, and stress symptoms were the dependent variables across these multiple regression analyses.

Group norms

We calculated current Polish percentile rank norms. Percentile ranks indicate the rank of an individual within a reference group (i.e., they show how many percent of the individuals in the reference group scored lower than the individual; Baumgartner, 2009). Percentile ranks of ≤15 indicate low levels of measured characteristics, percentile ranks from 16 to 84 indicate average levels, and percentile ranks of ≥85 indicate high levels (Flanagan & Caltabiano, 2004).

Results

Descriptive statistics and internal consistency reliability

Descriptive statistics for all measures in females and males are presented in Table 1. In the total sample, all analyzed variables (except the Positive-Usefulness subscale) were reasonably normally distributed (skewness values from −0.17 to 1.11, kurtosis values from −0.04 to 1.50). The Positive-Usefulness subscale was not normally distributed (skewness = 2.59, kurtosis = 8.39).

All the EBQ scores showed acceptable to good internal consistency reliability (ω ≥ 0.72; α ≥ 0.77). All other questionnaire scores showed acceptable to excellent internal consistency reliability, and only the 2-item PHQ-4 Anxiety subscale showed relatively low internal consistency reliability (ω = 0.65; α = 0.65; see Table 1).

The Mann-Whitney *U* test indicated that there were no statistically significant differences between females and males in all the examined study variables ($p > 0.05$), except the EBQ Positive-Usefulness subscale ($p < 0.004$, rank-biserial correlation coefficient = -0.116). These results indicated that compared to females, males tended to have stronger beliefs that positive emotions were useless.

Age was not reasonably normally distributed (skewness = 2.14, kurtosis = 3.89), thus we calculated Spearman correlations between age and EBQ scores. Age was weakly negatively associated with Negative-Controllability (r_s = -0.08, $p = 0.013$), Positive-Controllability (r_s = -0.08, $p = 0.012$), and General-Controllability scores (r_s = -0.08, $p = 0.011$), indicating that younger people tended to have stronger beliefs that emotions were uncontrollable. Age was not statistically significant correlated with other EBQ subscale and composite scores ($p > 0.05$).

We also conducted paired *t*-tests to compare the Negative-Controllability and the Positive-Controllability scores, and the Negative-Usefulness and the Positive-Usefulness scores, in order to examine whether emotional valence influenced the extent of people's emotion beliefs. The participants reported significantly higher levels of beliefs about how useless negative emotions were compared to beliefs about how useless positive emotions are ($t(913) = 20.769$, $p < 0.001$, Cohen's $d = 0.687$). No statistically significant differences were found between the Negative-Controllability and the Positive-Controllability scores ($t(913) = 0.575$, $p = 0.566$, Cohen's $d = 0.019$).

CFA and measurement invariance

Our CFAs indicated that, amongst the lower order models, the 4-factor model reflecting the intended subscale structure was the best fitting model (see Fig. 1 for completely standardized factor loadings, and Table 2 for a list of fit index values for all tested models, and Supplementary Table 2 for estimated correlations between the EBQ subscales in

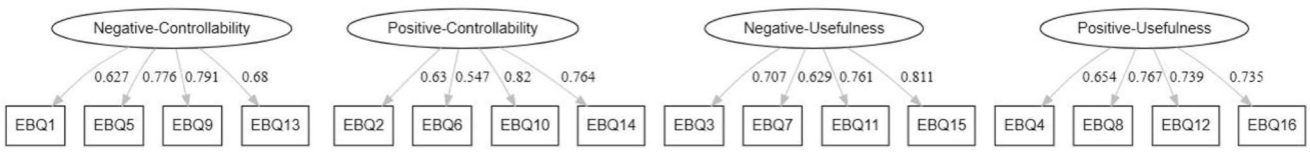

Fig. 1 CFA factor loadings (all *ps* < 0.001) for the 4-factor correlated EBQ model ($n = 914$). *Note*. In this 4-factor correlated EBQ model, all the factors (subscales) were allowed to correlate (see Supplementary Table 2 for estimated correlations between the EBQ subscales in this model)

Table 2 Goodness-of-fit indices for the EBQ models and measurement invariance across age and gender groups

Models	χ^2/df	CFI	TLI	RMSEA (90% confidence interval)	SRMR	AIC
1-factor model: all 16 EBQ items load on a general emotion beliefs factor ($n = 914$)	1245.052/104	0.669	0.618	0.146 (0.139; 0.153)	0.113	51438.634
2-factor model: negative emotion beliefs factor and positive emotion beliefs factor ($n = 914$)	1217.954/103	0.677	0.623	0.145 (0.138; 0.152)	0.111	51391.548
2-factor model: general-controllability factor and general-usefulness factor ($n = 914$)	890.454/103	0.770	0.732	0.122 (0.115; 0.130)	0.093	50820.271
3-factor model: negative-controllability factor, positive-controllability factor, and general-usefulness factor ($n = 914$)	873.094/101	0.775	0.732	0.122 (0.115; 0.130)	0.092	50794.820
3-factor model: negative-usefulness factor, positive-usefulness factor, and general-controllability factor ($n = 914$)	326.672/101	0.936	0.925	0.065 (0.057; 0.073)	0.049	49798.785
4-factor model: negative-controllability factor, positive-controllability factor, negative-usefulness factor, and positive-usefulness factor ($n = 914$)	307.315/98	0.941	0.928	0.064 (0.056; 0.072)	0.048	49773.365
4-factor model with a higher-order factor: negative-usefulness factor, positive-usefulness factor, negative-controllability factor, and positive-controllability factor load on a higher-order factor of general emotion beliefs ($n = 914$)	310.808/100	0.941	0.929	0.063 (0.055; 0.071)	0.050	49772.961
Measurement invariance across age and gender groups (4-factor correlated model)						
People aged 18–24 ($n = 645$)	253.242/98	0.939	0.925	0.065 (0.056; 0.075)	0.049	34876.736
People aged 25–70 ($n = 269$)	141.204/98	0.958	0.949	0.052 (0.031; 0.070)	0.063	14818.432
Females ($n = 657$)	235.763/98	0.941	0.928	0.061 (0.051; 0.071)	0.049	35670.838
Males ($n = 257$)	190.117/98	0.927	0.911	0.077 (0.061; 0.093)	0.069	14033.128
Age invariance						
Configural	397.340/196	0.944	0.932	0.062 (0.053; 0.071)	0.050	49759.168
Metric	413.060/208	0.943	0.934	0.061 (0.052; 0.069)	0.055	49762.784
Scalar	454.998/220	0.937	0.931	0.062 (0.054; 0.070)	0.056	49785.892
Gender invariance						
Configural	427.643/196	0.936	0.922	0.066 (0.058; 0.075)	0.052	49767.966
Metric	451.357/208	0.933	0.922	0.066 (0.058; 0.074)	0.056	49789.608
Scalar	472.679/220	0.932	0.926	0.064 (0.056; 0.072)	0.056	49781.105

Note. CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; AIC = Akaike information criterion

the 4-factor correlated model), thus supporting the value of differentiating between the different belief categories and valence domains. Moreover, the higher-order version of this model also had strong fit index values, thus supporting that these lower-order factors were components of a coherent higher-order emotion beliefs construct (see Table 2). All item factor loadings were strong and loaded on intended subscales in these 4-factor models (e.g., higher order model loadings ≥ 0.547, all $ps < 0.001$; refer to Supplementary Table 1). Subscale loadings on the higher-order factor were good in the higher-order model, and ranged from 0.497 to 0.995 (all $ps < 0.001$). Thus, the 4-factor correlated model and the 4-factor model with a higher-order factor appeared to be the best solutions in our data-set.

In Supplementary Table 2, we also present estimated correlations between the EBQ subscales in the 4-factor model. As in past work, the Negative-Controllability subscale and the Positive-Controllability subscale were highly positively intercorrelated (estimated $r = 0.982$, $p < 0.001$), whereas the Negative-Usefulness subscale and the Positive-Usefulness subscale were moderately positively intercorrelated (estimated $r = 0.303$, $p < 0.001$). The Negative-Controllability subscale and the Positive-Controllability subscale were moderately positively intercorrelated with the Negative-Usefulness subscale and the Positive-Usefulness subscale (estimated r from 0.448 to 0.497, $p < 0.001$). As such, whilst the correlations between the two controllability factors were particularly high, the superiority of the 4-factor models over the 3-factor models indicates some statistical value in separating them.

We also tested the configural, metric, and scalar invariance of the 4-factor correlated model across gender and age categories (Table 2). In two age and two gender groups, the fit indices were strong (CFI from 0.927 to 0.958, TLI from 0.911 to 0.949, RMSEA from 0.052 to 0.077, and SRMR from 0.049 to 0.069). Both across age and gender, an absolute ΔCFI between metric and configural models, and between scalar and metric models, was less than 0.01. Our findings thus support configural, metric, and scalar invariance across these demographic categories.

Convergent and divergent validity

Pearson correlations between the EBQ and the PERS-S, PHQ-4, and PSS-4 scores are presented in Table 3. Among the four EBQ subscales, the Negative-Controllability and Positive-Controllability subscales were positively correlated with negative reactivity traits and psychopathology symptoms, and were negatively correlated with positive reactivity traits. The Negative-Usefulness and Positive-Usefulness subscales showed only a few and small correlations with the study correlates. Thus, it was the controllability domain that appeared to be most relevant to emotional reactivity and psychopathology in these data.

Discriminant validity

Discriminant validity was evaluated by conducting two second-order EFAs (principal axis factoring with direct oblimin rotation). In the first series, EFA of the four EBQ subscales, the anxiety and depression subscales of the PHQ-4, and the PSS-4 score was conducted. It was expected that the EBQ subscales would load on an emotion beliefs factor, whereas the two PHQ-4 subscales and the PSS-4 score on a separate psychological distress factor. In the second series, EFA of the four EBQ subscales, the six PERS-S subscales (three for negative and three for positive reactivity traits) was applied. It was expected that the EBQ subscales would load on an emotion beliefs factor, whereas negative reactivity traits and positive reactivity traits would load on separate general negative and general positive reactivity factors, respectively.

In the first series, the Bartlett's test of sphericity ($\chi^2(21) = 665.57$, $p < 0.001$) and the Kaiser–Meyer–Olkin (KMO) criterion (the overall KMO value = 0.69) indicated that the data were suitable for factor analysis. The determinant was 0.016, which is > 0.00001, indicating factorability. As expected, the second-order EFA of the EBQ, PHQ-4, and PSS-4 subscales indicated that two factors should be extracted (i.e., factor 1 "psychological distress" and factor 2 "emotion beliefs"). All the EBQ subscales loaded cleanly on the "emotion beliefs" factor (loadings from 0.449 to 0.853) and did not load on the "psychological distress" factor, supporting good discriminant validity of the EBQ against markers of current psychological distress (Supplementary Table 3).

In the second series, the Bartlett's test of sphericity ($\chi^2(45) = 720.75$, $p < 0.001$) and the KMO criterion (the overall KMO value = 0.74) indicated that the data were suitable for factor analysis. The determinant was 0.009 which is > 0.00001, indicating factorability. According to expectations, the second-order EFA of the EBQ and PERS-S subscales extracted three factors (i.e., factor 1 "negative reactivity", factor 2 "positive reactivity", and factor 3

Table 3 Pearson correlations between the EBQ, the PERS-S, the PHQ-4, and the PSS-4 scores

Variables	EBQ Negative-Controllability subscale	EBQ Positive-Controllability subscale	EBQ Negative-Usefulness subscale	EBQ Positive-Usefulness subscale	EBQ General-Controllability	EBQ General-Usefulness	EBQ Total scale score
PERS-S General negative reactivity	**0.35*** **	**0.23** **	0.13	0.07	**0.31*** **	0.14	**0.28*** **
PERS-S Negative-activation	**0.31*** **	**0.21** **	0.14	0.06	**0.28*** **	0.14	**0.26** **
PERS-S Negative-intensity	**0.27*** **	0.16	0.10	0.04	**0.23** **	0.10	**0.20***
PERS-S Negative-duration	**0.37*** **	**0.25** **	0.11	0.10	**0.34*** **	0.14	**0.29*** **
PERS-S General positive reactivity	**-0.20***	-0.03	0.15	**-0.19***	-0.13	0.02	-0.08
PERS-S Positive-activation	**-0.21** **	-0.04	0.09	**-0.24** **	-0.14	-0.05	-0.12
PERS-S Positive-intensity	-0.07	0.06	**0.18***	-0.14	-0.01	0.07	0.03
PERS-S Positive-duration	**-0.24** **	-0.12	0.09	-0.12	**-0.20***	0.01	-0.13
PHQ-4 Anxiety subscale	**0.28*** **	**0.16** **	0.05	0.07	**0.24*** **	0.07	**0.19*** **
PHQ-4 Depression subscale	**0.23*** **	**0.12***	0.09	0.10	**0.19*** **	**0.11***	**0.18** **
PHQ-4 Total score	**0.28*** **	**0.15** **	0.08	0.09	**0.24*** **	0.10	**0.21*** **
PSS-4 Stress	**0.33*** **	**0.21** **	**0.16***	0.05	**0.29*** **	0.14	**0.26*** **

Note. EBQ = Emotion Beliefs Questionnaire; PHQ-4 = Patient Health Questionnaire-4; PSS-4 = Perceived Stress Scale-4; PERS-S = Perth Emotional Reactivity Scale-Short Form. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Significant correlations are shown in bold. To avoid participant fatigue, not all respondents completed all measure. As such, correlations between the EBQ scores and PERS-S scores were calculated based on a sample of 157 people, correlations between the EBQ scores and PHQ-4 scores were calculated based on a sample of 312 people, and Correlations between the EBQ scores and PSS-4 scores were calculated based on a sample of 165 people

"emotion beliefs"). All the EBQ subscales loaded cleanly on the "emotion beliefs" factor (loadings from 0.383 to 0.904) and did not load on the "negative reactivity" or "positive reactivity" factors, thus supporting good discriminant validity of the EBQ against markers of negative and positive reactivity traits. In sum, the emotion beliefs construct, as measured by the EBQ, was statistically separable from one's current level of psychological distress, and negative and positive reactivity traits.

Predictive role of emotion beliefs in mental health symptoms

We conducted a set of multiple regression analyses (forced entry method) to examine whether emotion beliefs could predict significant variance in anxiety, depression and stress symptoms (controlling for age, gender, and education) (Table 4).

The Negative-Controllability subscale scores were the strongest unique predictor, explaining from 4.7% (depression symptoms) to 9.9% (stress symptoms) of the variance beyond demographic variables (see ΔR^2 adjusted between two steps in regressions). The other EBQ subscale scores were not statistically significant unique predictors of psychopathology symptoms.

Group norms

We calculated percentile rank norms for Polish adults for all EBQ subscale and composite scores in the total sample (see Supplementary Tables 4 and 5).

Discussion

The aim of this study was to introduce and validate the first Polish version of the EBQ. Overall, our data suggest that the Polish EBQ has strong psychometric properties. The EBQ demonstrated a theoretically congruent factor structure, good validity and reliability, as well as highlighting the clinical relevance of distinguishing between emotional valences and the controllability and usefulness domains of emotion beliefs.

Table 4 Regression models for predicting psychopathology symptoms

Predictors	PHQ-4 Anxiety symptoms	PHQ-4 Depressive symptoms	PHQ-4 Total score	PSS-4 Stress
First step: age, gender, and education	Beta coefficients			
Age	**-0.20****	**-0.17****	**-0.20****	-0.16
Gender	-0.03	0.04	0.01	0.01
Education	0.01	-0.06	-0.03	-0.07
Model parameters, the proportion of variance explained (R^2 and R^2 adjusted)	$F(3, 308) = 4.165$, $p = 0.007$, $R^2 = 3.9\%$, R^2 adjusted = 3.0%	$F(3, 308) = 4.293$, $p = 0.005$, $R^2 = 4.0\%$, R^2 adjusted = 3.1%	$F(3, 308) = 4.903$, $p = 0.002$, $R^2 = 4.6\%$, R^2 adjusted = 3.6%	$F(3, 161) = 2.341$, $p > 0.05$, $R^2 = 4.2\%$, R^2 adjusted = 2.4%
Second step: age, gender, education, and four EBQ subscales	Beta coefficients			
Age	**-0.20*****	**-0.18****	**-0.21*****	**-0.16***
Gender	-0.03	0.04	0.01	0.02
Education	0.03	-0.04	-0.01	-0.05
EBQ Negative-Controllability	**0.41*****	**0.32*****	**0.40*****	**0.40****
EBQ Positive-Controllability	-0.12	-0.13	-0.14	-0.09
EBQ Negative-Usefulness	-0.05	0.01	-0.02	0.09
EBQ Positive-Usefulness	-0.02	0.02	0.00	-0.11
Model parameters, the proportion of variance explained (R^2 and R^2 adjusted), and ΔR^2 and ΔR^2 adjusted between the second and first steps	$F(7, 304) = 6.529$, $p < 0.001$, $R^2 = 13.1\%$, R^2 adjusted = 11.1%, $\Delta R^2 = 9.2\%$, ΔR^2 adjusted = 8.1%	$F(7, 304) = 4.760$, $p < 0.001$, $R^2 = 9.9\%$, R^2 adjusted = 7.8%, $\Delta R^2 = 5.9\%$, ΔR^2 adjusted = 4.7%	$F(7, 304) = 6.678$, $p < 0.001$, $R^2 = 13.3\%$, R^2 adjusted = 11.3%, $\Delta R^2 = 8.8\%$, ΔR^2 adjusted = 7.7%	$F(7, 157) = 4.289$, $p < 0.001$, $R^2 = 16.1\%$, R^2 adjusted = 12.3%, $\Delta R^2 = 11.9\%$, ΔR^2 adjusted = 9.9%

Note. EBQ = Emotion Beliefs Questionnaire; PHQ-4 = Patient Health Questionnaire-4; PSS-4 = Perceived Stress Scale-4. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Gender was coded as following: females = 1, males = 2. Education was coded as following: primary school level education = 1, vocational education = 2, secondary education = 3, and higher education degree = 4. Significant predictors are shown in bold

Factor structure, measurement invariance, and internal consistency reliability

Our CFA showed that the Polish version of the EBQ was characterized by an intended 4-factor (subscale) structure, with support also found for a higher-order general factor. This structure thus supported the utility of a distinction between the controllability and usefulness domains of emotion beliefs, and between positive and negative valence. This model also shows support for the tenability of a general factor, and these set of beliefs therefore all being part of a coherent emotion beliefs construct. Overall, our results in this respect are in line with previous studies on the EBQ conducted in Australia (Becerra et al., 2020), Italy (Rogier et al., 2023), Iran, and the United States of America (Ranjbar et al., 2023).

We also examined the measurement invariance of the EBQ's factor structure across age and gender categories, which was supported in a series of analyses. The questionnaire was fully invariant at the scalar level. This supports that latent EBQ scores can be meaningfully compared across females and males, as well as younger people and older people. Our results are therefore in line with those of Ranjbar et al.'s (2023) study, where the EBQ was also found to be invariant across age and gender groups.

Like past studies, the Polish version of the EBQ had acceptable to good internal consistency reliability for all subscale and composite scores, thus supporting that robust scores can be extracted to examine the emotion beliefs construct at different levels of specificity (Becerra et al., 2020; Biel et al., 2023; Ranjbar et al., 2023; Rogier et al., 2023).

Convergent, divergent and discriminant validity

The four EBQ subscales showed statistically significant correlations with emotional reactivity traits and psychopathology symptoms, however, it was the Negative-Controllability subscale that was consistently the strongest correlate, as has also been found in other studies (e.g., Berglund et al., 2023; Ranjbar et al., 2023; Rogier et al., 2023). This EBQ subscale was positively correlated with negative reactivity traits and psychopathology symptoms, and was negatively correlated with positive reactivity traits. The Positive-Controllability subscale was also a strong correlate in these same directions, albeit slightly weaker than Negative-Controllability. The usefulness domains of emotion beliefs showed only a few (and generally small) correlations with our study variables. In general, our results therefore reinforce the separability of controllability and usefulness beliefs, and suggest that controllability beliefs may have the highest relevance for understanding psychopathology (see also, Becerra et al., 2020; Biel et al., 2023; Ranjbar et al., 2023; Rogier et al., 2023).

Moreover, we have presented, for the first time in the field, results on the discriminant validity of the EBQ. Our series of second-order EFAs supported empirically that the emotion beliefs construct, as measured by the EBQ, was statistically separable from one's current level of mental health symptoms (i.e., markers of anxiety, depression, and stress) and trait levels of emotional reactivity. These results therefore supported the strong discriminant validity of the EBQ, and the separability of the emotion beliefs construct from related emotional variables.

The predictive role of emotion beliefs in mental health symptoms

As EBQ scores were correlated with psychopathology symptoms, we were interested in examining the predictive power of the EBQ scores in predicting these symptoms within a regression model. Our results indicated that the Negative-Controllability scores were the strongest unique predictor of anxiety, depression, and stress symptoms, accounting for (beyond the effects of demographic variables, including age, gender, and education) about 5 to 10% of the variance in these symptoms. In past work, it has similarly been found that the controllability domain is the strongest predictor of psychopathology and emotion regulation (see Becerra et al., 2020). Recent studies have also supported that believing emotions are uncontrollable was linked to psychopathology symptoms via usage of maladaptive emotion regulation strategies (De Castella et al., 2013; Vuillier et al., 2021). Therefore, our results are in line with previous reports (Becerra et al., 2020), in so far supporting a more significant role of the controllability beliefs domain in predicting symptoms of psychopathology. Ford and Gross's (2019) theoretical framework specifies that strong beliefs that emotions are uncontrollable are likely to impair downstream emotion regulation attempts, as people may not try to regulate their emotions when needed (i.e., because they assume there will be no chance of success), thus contributing to psychopathology risk; our data are consistent with these specifications.

Age and gender differences in emotion beliefs

Our results suggested that, in general, only the controllability domain of emotion beliefs is associated with age. We revealed that younger people tended to have stronger beliefs that emotions are uncontrollable. This is in line with literature reviews on the role of age in processing emotions (Charles & Carstensen, 2009). However, the size of these correlations was very small, and it may be that emotion

beliefs are reasonably stable across lifespan. As our study was cross-sectional, so our conclusions are tentative, and longitudinal research is needed to examine these patterns empirically.

In terms of gender, our data suggested that males tend to believe that positive emotions are more useless compared to females. We noted no statistically significant difference between females and males across other belief domains on the EBQ. This indicates that females and males generally tend to have similar emotion beliefs. Our results are in line with the systematic review by Somerville et al. (2023), who indicated mixed results on any gender effect on emotion beliefs.

Practical implications of assessing emotion beliefs

According to the process model of emotion regulation, emotion beliefs can affect emotion regulation processes via increased or decreased motivation in regulation processes, which in turn may lead to different mental health outcomes (Ford & Gross, 2019; Monsoon et al., 2022). Elsewhere, it has been shown that beliefs that emotions can be controlled are associated with lowered psychological distress via higher emotional regulation flexibility (Monsoon et al., 2022). Our analyses highlight the potential clinical relevance of emotion beliefs in the development and maintenance of depression and anxiety symptoms, with beliefs about the controllability of negative emotions appearing to have the most central role. Recent research has indicated that psychological interventions can adjust beliefs about emotions (e.g., Glisenti et al., 2023). In the context of our data, and theoretical frameworks hypothesizing links between emotion beliefs, emotion regulation, and psychopathology (Ford & Gross, 2019), the assessment and targeting of emotion beliefs in therapy may therefore be relevant for many patients. Our data suggest that the EBQ could be a useful tool to facilitate assessments in this context, informing the need for intervention around beliefs, as well as the impact of interventions on different categories of beliefs (see also, Kneeland et al., 2016). As we developed current percentile rank norms for EBQ subscale and composite scores in Polish adults, as well as indicating cut-off scores for high levels of maladaptive emotion beliefs, these norms might help guide the identification of issues with emotion beliefs and subsequent implementation of psychotherapeutic strategies in a Polish context.

Limitations of the study

Our study's sample were Polish adults from the general community, however, there was a higher portion of females and younger people. Future work in more diverse demographic samples would be beneficial. We did not test the EBQ in clinical settings, as such future studies are needed to examine how emotion beliefs might differ between non-clinical and clinical samples, and the psychometrics of the EBQ in such settings (e.g., Berglund et al., 2023). Formal testing of measurement invariance across clinical and non-clinical samples would also be useful. Moreover, our study is cross-sectional, therefore no casual inferences can be drawn about emotion beliefs and their correlates.

Conclusions

In this paper, we introduced the Polish version of the EBQ, and found it to have strong psychometric properties and clinical relevance. Our findings further establish the multidimensional structure of the emotion beliefs construct, and the utility of assessing emotion beliefs across multiple categories (i.e., controllability and usefulness beliefs) and valence domains. Moving forward, the EBQ therefore seems strong choice for comprehensive assessments of emotions beliefs. The percentile rank norms presented here for Polish adults should help to facilitate the interpretation of the EBQ scores in future work.

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Data availability The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Declarations

Ethics statement The study was conducted in accordance with the Declaration of Helsinki Ethical Principles. The Kazimierz Wielki University Ethics Committee approved the study (No. 1/13.06.2022).

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