

Short communication

The Emotional Processing Scale: Scale refinement and abridgement (EPS-25)[☆]

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Abstract

Objective: The Emotional Processing Scale (EPS) is a 38-item, eight-factor self-report questionnaire designed to measure emotional processing styles and deficits. Scale development is an ongoing process and our aim was to (i) refine the scale by trying out items from a new item pool and (ii) shorten the scale to enhance its clinical and research utility. **Methods:** Fifteen new items were added to the original 38-item pool. The resulting 53-item scale was administered to four groups ($N=690$) (mental health, healthy controls, pain patients, and general medical practice attendees). Exploratory factor analysis was used to explore the underlying factor structure. **Results:** Maximum

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likelihood (ML) factor analysis was used to guide the process of item selection and scale reduction. Four of the previous eight factors remained in similar form, two of the original factors were discarded, and one new factor emerged incorporating items from two previous factors. The revised version of the scale (EPS-25) has a 25-item five-factor structure. Internal reliability was moderate to high for all five factors. **Conclusion:** The psychometric properties of the revised scale appear promising, particularly in relation to the detection of differences between diagnostic groups.

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Introduction

In a previous paper [1], we described the development of a 38-item self-report Emotional Processing Scale (EPS) that incorporates Rachman's conceptualization of emotional processing [2] along with other psychological mechanisms that may impede emotional processing [3].

Maximum likelihood (ML) factor analysis yielded an eight-factor solution relating to styles of emotional

experiencing (*Discordant, Externalized, Lack of Attunement*), mechanisms controlling the experience and expression of emotions (*Suppression, Dissociation, Avoidance, Uncontrolled*), and, finally, signs of inadequate processing (*Intrusion*) reflecting Rachman's conceptualization [2]. Internal reliability was moderate to high for six of eight factors, and convergent validity was satisfactory.

The EPS was designed to identify emotional processing styles and deficits and measure change in emotional processing dimensions during therapy. To date, it has been used to explore differences between diagnostic groups [4,5] and there is ongoing research in the area of predicting postnatal depression [6]. It has been translated into nine languages and validated in Italian and Japanese samples [7,8].

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While the EPS-38 appeared promising as a multifaceted measure, scale development is an ongoing process. Two of the factors (Avoidance and Externalized) possessed relatively lower internal reliability than the other six subscales. In addition, feedback from those using the EPS-38 suggested that an abridged version would confer benefits from both a research and a clinical perspective. Thus, the aims of the present research were to (i) refine the scale by trying out items from a new item pool; and (ii) shorten the scale to enhance its clinical and research utility.

Study 1: Item selection and scale redevelopment

Methods

Participants

Participants ($N=690$) were recruited from a number of settings to respond to a 53-item version of the questionnaire (Table 1).

- Healthy control group ($n=310$): recruited from workplaces and the community.
- General medical practice group ($n=86$): individuals attending an appointment at their local medical practice.
- Mental health group ($n=180$): individuals referred by general medical practitioners to a clinical psychologist or counselor for a range of mental health problems.

- Pain group ($n=114$): individuals attending a hospital outpatients appointment (fibromyalgia, $n=52$; rheumatoid arthritis, $n=34$; chronic lower back pain, $n=28$).

Item pool

An additional 14 items were added to the existing 38-item scale in order to:

- Seek to improve the *Externalized* and *Avoidance* factors and include items relating to an anti-emotionality/rationality construct [9] (e.g., “I was extremely rational and kept emotions out of the picture”).
- Try out additional items relating to emotional styles, regulation of emotion, and signs of inadequate processing.

Item analysis

Negatively keyed items were reverse scored prior to data analysis. Three items (15, 33, 52) were removed because they had corrected item-total correlations $<.20$ [10] and failed to show statistically significant between-group (mental health vs. pain vs. medical practitioner vs. control) differences.

After excluding participants who did not provide complete responses to all 49 remaining items, we were left with a sample of $n=603$, giving a participants-to-items ratio $>10:1$ [11].

Exploratory factor analysis (EFA) was used because our primary aim was to explore and refine the underlying structure of the items [12]. As our sample was heterogeneous, it should be noted we have assumed the same factor

Table 1
Demographics of sample

	Group			
	Control ($n=310$)	Medical practitioner ($n=86$)	Mental health ($n=180$)	Pain ($n=114$)
Gender, n (%)				
Males	86 (30%)	14 (19%)	64 (36%)	8 (7%)
Females	201 (70%)	59 (81%)	114 (64%)	105 (93%)
Total	287 (100%)	73 (100%)	178 (100%)	113 (100%)
Missing data	23	13	2	1
Age				
≤25	92 (33%)	9 (13%)	42 (26%)	31 (27%)
26–35	75 (27%)	8 (11%)	43 (26%)	59 (52%)
36–45	47 (17%)	14 (19%)	32 (20%)	6 (5%)
46–55	39 (14%)	15 (21%)	30 (18%)	4 (4%)
56–65	16 (6%)	12 (17%)	8 (5%)	8 (7%)
66+	10 (4%)	14 (19%)	8 (5%)	5 (4%)
Total	279 (100%)	72 (100%)	163 (100%)	113 (100%)
Missing data	31	14	17	1
Education (highest formal qualification obtained)				
None	5 (2%)	10 (13%)	8 (9%)	34 (31%)
1 or more GCSE (or equivalent) ^a	78 (28%)	36 (45%)	47 (51%)	29 (26%)
1 or more A level ^a	54 (19%)	13 (16%)	23 (25%)	5 (5%)
First/higher degree	134 (48%)	21 (26%)	14 (15%)	16 (14%)
Other	9 (3%)	0 (0%)	1 (1%)	27 (24%)
Total	280 (100%)	80 (100%)	93 (100%)	111 (100%)
Missing data	30	6	87	3

^a The General Certificate of Secondary Education (GCSE) is the name of a set of qualifications, generally taken by students at age 14–16 in England, Wales, and Northern Ireland. The A level (Advanced level) is a qualification in England, Wales, and Northern Ireland, usually taken at age 16–18.

structure across the groups. Examination of individual item skew and kurtosis (mean skew=0.27, S.D.=0.41, range=-0.55 to 1.43; mean kurtosis=-0.83, S.D.=0.47, range=-1.35 to 1.22) confirmed the suitability of the ML factor extraction procedure [12]. An oblique rotation (Promax) was chosen to allow for correlation between factors. Given the suitability of the data, we conducted a ML factor analysis [13] with Promax rotation ($\kappa=4$) selecting a nine-factor solution to explore the underlying structure of the 49 items. Items with loadings $<.40$ were discarded ($n=12$) as were any factors comprising three or fewer items ($n=5$). The factor analysis was recomputed on the remaining 32 items and a five-factor solution was selected. The same criteria were applied as previously, leading to the removal of five additional items. The factor analysis was recomputed (again selecting a five-factor solution) producing an eight-

item first factor, a six-item second factor, a five-item third factor, and fourth and fifth factors, each with four items.

The rationale underlying the next step was to shorten the scale. We strived for a balanced scale with equal numbers of items per factor. To achieve this, (i) the three lowest loading items were removed from Factor 1; (ii) the only remaining reverse scored item (8) was removed; (iii) an item (20) was added to Factor 4 by returning to the initial eight-factor solution and selecting the item that possessed the next highest loading in relation to the other four items; (iv) an item (17) was added to Factor 5, using the same criteria as for Factor 4. The factor analysis was recomputed on these 25 items. One further factor analysis confirmed that a stable, five-factor, five items-per-factor structure was obtained accounting for 59.4% of the total variance (Table 2).

Table 2
Maximum likelihood analysis with Promax rotation ($\kappa=4$)

Item no. and description		Factors				
		I	II	III	IV	V
<i>I</i>	<i>Suppression</i> ($\alpha=.84$)					
41	Kept quiet about feelings	<i>.91</i>				
44	Bottled up emotions	<i>.83</i>				
50	Tried not to show feelings	<i>.70</i>				
36	Could not express feelings	<i>.51</i>				
20	Smothered feelings	<i>.39</i>				
<i>II</i>	<i>Unregulated emotion</i> ($\alpha=.76$)					
13	When upset difficult to control what I said		<i>.76</i>			
37	Felt urge to smash something		<i>.71</i>			
21	Reacted too much to what people said or did		<i>.68</i>			
29	Wanted to get own back on someone		<i>.63</i>			
38	Hard to wind down		<i>.46</i>			
<i>III</i>	<i>Impoverished emotional experience</i> ($\alpha=.82$)					
24	Seemed to be a big blank in feelings			<i>.93</i>		
3	Emotions felt blunt/dull			<i>.76</i>		
23	Hard to work out if I felt ill or emotional			<i>.58</i>		
16	Strong feelings but not sure if emotions			<i>.54</i>		
7	Feelings did not seem to belong to me			<i>.51</i>		
<i>IV</i>	<i>Signs of unprocessed emotions</i> ($\alpha=.85$)					
10	Emotional reactions lasted more than a day				<i>.79</i>	
48	Thinking about same emotion again and again				<i>.79</i>	
6	Unwanted feelings kept intruding				<i>.60</i>	
42	Repeatedly experienced the same emotion				<i>.60</i>	
46	Overwhelmed by emotions		<i>.31</i>		<i>.42</i>	
<i>V</i>	<i>Avoidance</i> ($\alpha=.74$)					
25	Tried to talk only about pleasant things					<i>.78</i>
47	Tried to avoid things that might make me upset					<i>.67</i>
26	Could not tolerate unpleasant feelings					<i>.60</i>
9	Avoided looking at unpleasant things					<i>.51</i>
17	Talking about negative feelings made them worse					<i>.30</i>
Eigenvalue		8.7	2.3	1.4	1.3	1.1
% of Variance		34.9	9.1	5.8	5.3	4.3

Factor loadings in italics indicate the assignment of items to factors. Only loadings $\geq .30$ (after rounding) are shown. Loadings $\times 100$ (decimal points have been omitted).

Results

In terms of the eight factors found in our developmental work on the scale, four factors remain in very similar form: “Signs of unprocessed emotion” (previously labeled *Intrusion*); Unregulated emotion (previously labeled *Uncontrolled*); Suppression; and Avoidance. The factor analysis did not support either the *Lack of Attunement* or the *Externalized* factor; hence these factors were removed.

One new factor emerged (“Impoverished emotional experience”) that incorporates items from two previous factors, a *Discordant* attitude to emotions (e.g., “It was hard to work out if I felt ill or emotional”) and *Dissociation* of emotional experience (e.g., “My emotions felt blunt/dull”).

Factor scores were computed by summing the scores for those items comprising each factor and dividing by the number of items (higher scores represent greater levels of emotional processing deficits). A total score was calculated by summing scores for all items and dividing by the number of items. Individual factor scores (and total EPS scores) were produced so long as 60% of the items constituting the respective factor (or entire scale) were completed.

Internal reliability

The coefficient α value for the scale was .92. Internal consistency was high ($\alpha > .80$) for three factors and moderate for two ($\alpha > .70$).

Correlations between subscales

Correlations (r) between the five subscale scores (Suppression, Unregulated emotion, Impoverished emotional experience, Signs of unprocessed emotion, Avoidance) and EPS total score were .76, .73, .83, .81, and .73, respectively. Correlations between the five subscales ranged from 0.34 to 0.59. The Impoverished emotional experience factor correlated most highly with the other subscales (all $r_s > .5$, $P_s < .01$). The two lowest intersubscale correlations were those for Unregulated emotion–Suppression (.35) and Unregulated emotion–Avoidance (.34).

Study 2: Between-group differences

It was expected that individuals with physical or mental health problems would tend to score more highly on the EPS than healthy controls. A series of paired t tests were conducted using the same sample as in Study 1.

Results

Table 3 shows that the mental health sample scored significantly more highly than the control group on all EPS subscales. The chronic pain group scored more highly on two of the EPS subscales (Impoverished emotional experience, Avoidance). The medical practitioner group scored significantly more highly than healthy controls on three of

the subscales (Impoverished emotional experience, Signs of unprocessed emotion, Avoidance). The total EPS scores of all three groups were significantly higher than those of the healthy control group. Where significant differences were found, we controlled for age and gender and all differences remained significant.

Study 3: Test–retest reliability

Participants

Test–retest reliability was assessed over a 4- to 6-week period and was based on a sample of 17 individuals recruited via a social networking website (mean age=27.8; S.D.=8.9; range=22–61; nine female; 71% first degree or higher).

Results

The Pearson’s test–retest correlation coefficient obtained for the entire scale was .74 [95% confidence interval (CI), .43–.89; $P < .001$]. Test–retest reliabilities for individual subscales were Suppression, $r = .72$ [95% CI, .39–.88; $P < .001$]; Signs of unprocessed emotion, $r = .48$ [95% CI, .03–.77; $P = .04$]; Unregulated emotion, $r = .55$ [95% CI, .13–.80; $P = .02$]; Avoidance, $r = .59$ [95% CI, .19–.82; $P = .01$]; Impoverished emotional experience, $r = .84$ [95% CI, .62–.94; $P < .001$]. However, the CIs for these correlations are wide because of the small sample size.

Discussion

This short communication describes the refinement of the Emotional Processing Scale from a 38-item, eight-factor structure to a 25-item, five-factor structure (see Baker et al. [1] for a detailed description of the emotional processing model). Although new items were devised in an attempt to enhance the Externalized factor, the factor analysis did not support its retention. Three of the five factors relate to emotional control or dysregulation (Avoidance, Suppression, Unregulated emotion). A new factor (Impoverished emotional experience) emerged that incorporates items from two previous factors (Discordant and Dissociation) from the preliminary eight-factor structure. This factor captures some aspects of the alexithymia construct [14]. The Signs of unprocessed emotion factor relates to Rachman’s conceptualization of the concomitants of inadequate emotional processing (persistent, intrusive emotional phenomena) [2] and is similar to the original *Intrusion* factor. Overall, internal reliability for the scale was high ($\alpha = .92$) and ranged from moderate to high for individual subscales.

EPS-25 scores significantly distinguished a healthy control group from mental health, pain, and medical practitioner groups. It should be acknowledged that a potential limitation of the item selection procedure is that we brought back two items that we had previously discarded

Table 3
Comparison of EPS subscale and total scores across subsamples

	\bar{x} (S.D.)	Vs. healthy controls		
		\bar{x} difference (95% CI)	<i>t</i> (<i>df</i>)	<i>P</i> value
<i>Suppression</i>				
Control	3.5 (2.0)	–	–	–
Mental health	5.1 (1.8)	1.5 (1.2 to 1.9)	8.3 (485)	<.001 *
Pain	4.1 (2.1)	0.6 (–0.1 to 1.0)	2.5 (422)	.02
Medical practitioner	4.1 (1.9)	0.6 (0.1 to 1.1)	2.4 (393)	.02
<i>Unregulated emotion</i>				
Control	3.2 (1.9)	–	–	–
Mental health	4.4 (2.0)	1.1 (0.8 to 1.5)	6.2 (486)	<.001 *
Pain	3.5 (2.1)	0.3 (–0.1 to 0.7)	1.3 (422)	.19
Medical practitioner	3.5 (2.1)	0.3 (–0.2 to 0.8)	1.2 (121.8)	.23
<i>Impoverished emotional experience</i>				
Control	2.5 (1.8)	–	–	–
Mental health	4.1 (2.0)	1.6 (1.2 to 1.9)	8.7 (322.5) ^a	<.001 *
Pain	3.4 (2.1)	0.9 (0.5 to 1.3)	4.2 (173.7) ^a	<.001 *
Medical practitioner	3.2 (2.0)	0.7 (0.2 to 1.1)	3.1 (392)	.002 *
<i>Signs of unprocessed emotions</i>				
Control	4.0 (2.2)	–	–	–
Mental health	6.0 (1.9)	2.0 (1.6 to 2.4)	10.7 (416.5) ^a	<.001 *
Pain	4.0 (2.2)	–0.0 (–0.5 to 0.5)	–0.1 (422)	0.95
Medical practitioner	4.7 (2.3)	0.7 (0.2 to 1.2)	2.6 (393)	.01 *
<i>Avoidance</i>				
Control	3.2 (1.8)	–	–	–
Mental health	4.8 (1.6)	1.6 (1.3 to 1.9)	10.1 (387.1) ^a	<.001 *
Pain	4.2 (2.0)	0.9 (0.5 to 1.4)	4.3 (178.7) ^a	<.001 *
Medical practitioner	3.9 (1.9)	0.7 (0.2 to 1.1)	3.1 (394)	.002 *
<i>Total EPS score</i>				
Control	3.3 (1.5)	–	–	–
Mental health	4.9 (1.3)	1.6 (1.3 to 1.8)	12.3 (408.7) ^a	<.001 *
Pain	3.9 (1.6)	0.5 (0.2 to 0.9)	3.2 (422)	.001 *
Medical practitioner	3.9 (1.5)	0.6 (0.3 to 1.0)	3.4 (394)	.001 *

The sample size differs from the total sample of participants due to missing data across subscales.

^a Levene's test suggested that variances were not equal; modified *t* test was used.

* Significant at a Bonferroni-adjusted critical *P* value of .05/3 to allow for three pairwise comparisons.

(due to possessing loadings <.4). However, we felt that the advantages of having equally weighted factors justified this decision.

To conclude, we hope that a refined and shortened version of the EPS will confer benefits clinically, and from a research perspective, in terms of ease of administration, scoring, and completion. Further psychometric evaluation on new samples using confirmatory factor analysis is ongoing.

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