

Regulation of emotions in the community: suppression and reappraisal strategies and its psychometric properties

Emotionsregulation in der Allgemeinbevölkerung: Verwendung von Strategien zur Unterdrückung und Neubewertung von Emotionen und ihre psychometrischen Merkmale

Abstract

Objective: The German Version of the Emotion Regulation Questionnaire (ERQ) has recently been published. The questionnaire investigates two common emotion regulation strategies (10 items) on two scales (suppression, reappraisal). Major aims of the study were to assess the reliability and factor structure of the ERQ, to determine population based norms and to investigate relations of suppression and reappraisal to anxiety, depression and demographic characteristics.

Methods: In a representative community study (N=2524) we assessed emotion regulation strategies, anxiety, depression (Hospital Anxiety and Depression Scale), and demographic variables. The mean age of the participants was 49.4 (SD 18.2) years. 55.5% were female. The age-groups were represented in comparable proportions. The representativeness of the sample was ensured by drawings of ADM (Arbeitskreis Deutscher Marktforscher) samples and by comparison with the data of German Federal Statistical Office.

Results: Confirmatory factor analysis could not fully confirm the original factor structure, we kept the original scaling, except a modification regarding item 8. Internal consistencies were acceptable for the original and the modified version: reappraisal (Cronbach's alpha = 0.82) and suppression (alpha = 0.76). Norms are presented as percentile scores for age groups and gender. Reappraisal correlated negative with anxiety and depression, whereas we could find a positive relationship of suppression with anxiety and depression. In a linear regression model suppression was predicted by depression, a lower level of education, male gender, and lower income.

Conclusions: The ERQ is a short instrument to assess emotion regulation strategies economically, e.g. in larger community based studies. We could demonstrate sufficient psychometric properties of the German version of the ERQ: reliability, factor structure and indicators for construct validity. Because of the cross sectional character of our study it remains unclear whether reappraisal is protective and suppression is unfavourable regarding mental health or whether life circumstances and psychic symptoms lead to a suppression of emotions.

Keywords: Emotion Regulation Questionnaire (ERQ), community study, population based norms, German version

Zusammenfassung

Zielsetzung: Mit dem Emotion Regulation Questionnaire (ERQ) liegt ein deutschsprachiges, validiertes Kurzverfahren mit 10 Items zur Erfassung gewohnheitsmäßiger Präferenzen von Strategien zur Emotionsregulation (expressive Unterdrückung und Neubewertung) vor. Ziele der Studie waren die Untersuchung der Reliabilität und Faktorenstruktur des Verfahrens, Ermittlung von Alters- und Geschlechtsnormen und Überprüfung

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des Zusammenhangs beider Skalen mit Angst und Depression, sowie soziodemographischen Merkmalen.

Methodik: In einer repräsentativen Befragung an 2524 Personen aus der deutschen Allgemeinbevölkerung wurden neben den Strategien zur Emotionsregulation (ERQ) auch Angst und Depression als psychische Störungen (Hospital Anxiety and Depression Scale, HADS) sowie soziodemographische Merkmale erfasst. Das Durchschnittsalter der Teilnehmer war 49,4 (SD 18,2) Jahre, 55,5% waren weiblich. Die Altersgruppen waren in vergleichbaren Proportionen vertreten. Die Repräsentativität der Stichprobe wurde durch die Ziehung von ADM-Stichproben (Arbeitskreis Deutscher Marktforscher) und durch Vergleich mit den Angaben des statistischen Bundesamtes gesichert.

Ergebnisse: Obwohl die Faktorenstruktur durch eine konfirmatorische Faktorenanalyse nicht voll bestätigt werden konnte (komplexe Ladungen bei Item 8), wurde die ursprüngliche Faktorenstruktur aus Gründen der Vergleichbarkeit nur geringfügig bzgl. Item 8 modifiziert. Die internen Konsistenzen waren für beide Skalen akzeptabel (Cronbach's alpha = 0,82 bzw. 0,76, sowohl für die ursprüngliche, als auch für die modifizierte Version). Die Bevölkerungsnormen werden anhand von Prozenträngen getrennt für Altersgruppen und Geschlecht mitgeteilt. Neubewertung korrelierte negativ mit Angst und Depressivität, Unterdrückung dagegen positiv. Unterdrückung wurde in einer linearen Regressionsanalyse vorhergesagt durch Depressivität, geringeres Bildungsniveau, männliches Geschlecht und geringeres Haushaltseinkommen.

Fazit: Die Kürze des Fragebogens macht den ERQ zu einem ökonomischen Instrument zur Erfassung von Strategien der Emotionsregulation, das besonders für den Gebrauch bei großen Stichproben geeignet ist. Die deutsche Version des ERQ weist ausreichende psychometrische Eigenschaften (Reliabilität, Faktorenstruktur, Konstruktvalidität) auf. Aufgrund der querschnittlichen Betrachtung muss hier aber offen bleiben, ob Neubewertung als protektiver und Unterdrückung als ungünstiger Faktor hinsichtlich der psychischen Gesundheit (Depression) gelten können, oder ob Lebensumstände und psychische Symptome schließlich zu einer unterdrückenden Emotionsverarbeitung führen.

Schlüsselwörter: Emotion Regulation Questionnaire (ERQ), Allgemeinbevölkerung, Bevölkerungsnormen, Deutsche Version

Background

The German version of the Emotion Regulation Questionnaire (ERQ) [1] has recently been published by Abler & Kessler [2]. According to Gross [3] emotion regulation refers to "the processes by which individuals influence which emotions they have, when they have them, and how they experience or express these emotions". The ERQ assesses two common emotion regulation strategies with a 10 item self-report instrument: expressive suppression and reappraisal of aversive emotions. For the development of the original version of the ERQ Gross [4] assumed a characteristic model of the process of emotional reactions. In this model the author distinguishes antecedent-focused strategies, which act before an emotional reaction occurs and response-focused regulation strategies which act after emotions emerged.

The antecedent-focused strategies (situation selection, situation modification, attentional deployment, cognitive change; for a more detailed description of these regulation strategies, see Gross [3], [4]) regulate the experience

of emotion and its behavioural and physiological components at an early stage. Response-focused strategies (response modulation) occur after experiencing the emotion and aims at the alteration of emotion response tendencies.

Within the scale development process of the ERQ one antecedent-focused and one response-focused strategy were chosen. Criteria for choice were a high incidence of practicing these strategies in everyday life and the preciseness of the strategies definition permitting systematic research.

Gross & John [1] defined (cognitive) reappraisal as a cognitive strategy by which forthcoming situations are reappraised in a way to change their emotional impact. For example, the audience listening to a lecture could be perceived as interested in the topics presented instead of being evaluative and watchful for mistakes of the presenter.

Expressive suppression is defined as a response-focused regulation strategy suppressing the reactions in behaviour and/or the expression resulting from emotional experi-

ences. A typical example for this strategy is to hide anxiety during an examination and instead keep a neutral facial expression suppressing anxiety characteristic behaviour (agitation and other signs of nervousness).

Gross & John [1] derived the 10 items of the ERQ rationally. Both scales included at least one item about regulating negative emotion and one item about regulating positive emotion.

The authors examined the factor structure in 4 undergraduate samples with a total of 1484 participants (mean age 20 years; percentage of women ranging from 50% to 67%). In a first step the authors did exploratory factor analyses with varimax-rotation in each sample. The two factors indicated by the items "I control my emotions by changing the way I think about the situation I'm in" (reappraisal) and "I control my emotions by not expressing them" (suppression) accounted for more than 50% of the variance in each sample. The intended loadings were substantially higher than the highest cross-loadings (mean cross-loadings $r=.16$). The authors did not report single cross loadings in their paper. The two factors were independent in each sample (mean $r=-.01$). In a series of confirmatory factor analyses (CFA) best fit was provided by a two factor model with independent factors. Men and women did not differ in their factor structure.

Cronbach's alpha for reappraisal was .79, for suppression it was .73. Women had lower mean scores in the suppression scale. There were no gender differences in the reappraisal scale.

Gross & John [1] could demonstrate in self- and peer-ratings that reappraisal is positively related with the experience of positive mood (Positive and Negative Affect Schedule, PANAS [5]) and negatively with the experience of negative mood (PANAS).

In a further study individuals who habitually used reappraisal were less depressed and reappraisal was positively correlated with positive functioning (e.g. life satisfaction). Individuals who preferred suppression showed more symptoms of depression and a lower degree of positive functioning [1].

The examination of the reliability of the German version of the ERQ by Abler & Kessler [2] was accomplished in three samples with a total of 454 students. Internal consistencies of both scales were in the range of the original version (Cronbach's alpha = 0.74 for suppression and alpha = 0.76 for reappraisal). Particularly, the bifactorial structure (reappraisal and suppression) of the American original could be replicated. Abler & Kessler [2] found a positive relation between suppression and the depression scale of the SCL90-R. Furthermore, suppression was also related with expressive inhibition.

Previous validation and research on the ERQ has been limited to student samples. Therefore, the evaluation of the questionnaire in a population based sample is strongly required.

The aims of our study were: a) to assess the reliability and the factorial structure of the Emotion Regulation Questionnaire (ERQ), b) to determine population based norms for age groups and gender and c) to examine the

relation of the scales suppression and reappraisal to negative affect (anxiety, depression) and demographic characteristics.

Methods

Sample

The survey was conducted in May/June of the year 2009. A representative sample of the general population of Germany was selected with the assistance of a demography consulting company (USUMA, Berlin). 258 sample points (210 sample points in the western parts and 48 sample points in the eastern parts of Germany) were used. Households of the respective areas were selected by random route procedure; finally members of the households fulfilling the inclusion criteria were again selected randomly. Inclusion criteria were German as a native language and 14 or more years of age. The representativeness of the sample was ensured by drawings of ADM (Arbeitskreis Deutscher Marktforscher) samples und by comparison with the data of German Federal Statistical Office. The sample was representative for the German community regarding age, gender, and education. A first attempt was made for 4630 addresses following a random route procedure. From the 4630 selected addresses, 4572 were valid. All participants were visited by an interviewer who informed about the investigation and provided written informed consent. The interviewer waited until participants answered all questionnaires and offered help in case of difficulties to understand single questions. If not at home, up to three attempts were made to contact the selected person. A total of 2524 persons agreed to participate (55.2% of the valid addresses) and 2512 interviews and questionnaires were suitable for evaluation. Because of missing data the responses of 49 (1.1%) participants could not be analyzed. Therefore, 2475 participants were included into further analysis.

The mean age of the participants was 49.4 (SD 18.2) years. 55.5% were female. The age-groups were represented in comparable proportions: 14 to 24 years: 10.3%, 25 to 34 years: 14.1%, 35 to 44 years: 17.0%, 45 to 54 years: 17.7%, 55 to 64 years: 16.2%, 65 to 74 years: 15.9% and 75 years and older: 8.7%. The age and gender distribution is comparable to the data of the German Federal Bureau of statistics. Table 1 gives an overview of the demographic data.

Assessment

Participants answered questions regarding their demographic background (age, gender, partnership, education, employment, household income, and residence). In addition to the Emotion Regulation Questionnaire (ERQ) the *Hospital Anxiety and Depression Scale (HADS)* was administered to assess anxiety and depression. The two factor analytically derived scales of the HADS are represented by seven items each. Example: "I get sudden

Table 1: Participants (N=2475)

		Total M (SD) / N (%)
Age (years)		49.4 (18.2)
Gender	female	1374 (55.5)
Partnership		1381 (55.8)
Education	less than 10th grade completed 10th grade completed high school college or university degree	1171 (47.3) 890 (36.0) 246 (9.9) 168 (6.8)
Employment	full-time pension part-time unemployed schooling household other	924 (37.3) 746 (30.1) 226 (9.1) 191 (7.7) 168 (6.8) 151 (6.1) 69 (2.8)
Household income ¹⁾	<750 Euro 750–1249 Euro 1250–1999 Euro ≥2000 Euro	135 (5.6) 462 (19.2) 819 (34.0) 991 (41.2)
Region	East West	574 (23.2) 1901 (76.8)

¹⁾ Missing data for N=68

feelings of panic.” The answers range from 1 “very often indeed” to 4 “not at all”. Good internal consistencies for both scales could be demonstrated for the German version of the HADS (Cronbach’s alpha: anxiety 0.80; depression 0.81) [6], [7].

Statistical analysis

Means and standard deviations, skewness and kurtosis were calculated for each item of the ERQ. Additionally, we determined the corrected item-scale correlation for each single item and Cronbach’s alpha for both scales. For the population norms of the ERQ we used cumulated percentages of the sum score of both scales separately for age and gender. For parametric analyses we used t-tests, regression analyses and Pearson’s correlations. Non-parametric analyses were done by χ^2 -tests.

To test for potential differences, we analysed our data in regard to region (eastern vs. western parts of Germany), household income (<2000 Euro, ≥2000 Euro), education (high school or less vs. university degree) und urbanity (urban vs. rural). All statistical computations were done with SPSS (Version 17.0).

The bifactorial structure of the ERQ was tested by confirmatory factor analysis using LISREL 8.72 [8]. The initial estimates of covariances and means were obtained by EM procedure and approximated to the data by FIML. In order to scale the latent variables the variances of both factors were fixed (to “1”), furthermore all factor-loadings had an equality constraint imposed, as long as they

loaded on the same factor (to ensure tau equivalence); no further a-priori restrictions were made. Given the deviation from the data (its bad model-fit, see below), the following alterations were made: Item 8 was allowed to load on both factors and it’s equality constrained was altered in a way that its factor loadings should equal another, but were allowed to deviate from all other factor loadings. The allowance of this cross loading was stipulated by the results of the LaGrange Multiplier Tests. They also indicated another decrease in the overall χ^2 of the model, if another cross loading was allowed for item 9; we refrained from doing so, as we had reached an acceptable model fit. In an alternative approach we excluded item 8, as well as item 9 completely from the analysis to avoid all cross-loadings at all. The global model fit to the data was tested by χ^2 (should not be significant), the Root Mean Square Error of Approximation (RMSEA; should be <.08), the Comparative Fit Index (CFI, should be >.95) and the Standardized Root Mean Square Residual (SRMR, should be <.05).

The level of significance was set to $p < .05$. We did not adjust alpha because of the exploratory character of our analyses regarding the relationship between the ERQ scales and mental conditions and demographic characteristics.

Results

Internal consistencies

For both scales of the ERQ we found acceptable internal consistencies (original coefficients are identical with the modified): reappraisal (Cronbach's alpha = 0.82) and suppression (alpha = 0.76). Item 8 and 9 had lower corrected item-scale correlations than the remaining items. They loaded on both scales: cross-loading of item 8 on suppression $r=.39$, $p<.01$, and item 9 on reappraisal $r=.20$; $p<.01$. Table 2 displays the item characteristics and internal consistencies of the 10 items of the ERQ. For better reading we reported scale means not sum scores (c.f. Table 3).

Factor structure

The two factorial solutions of the original version of the ERQ could not be replicated in detail ($\text{Chi}^2_{(42)}=1172.44$, $p<.001$; RMSEA=0.11; CFI=0.90; SRMR=.097). The results of the Lagrange Multiplier (LM)-tests indicated a substantial decrease in the overall chi^2 of the model, if item 8 is allowed to load on both factors (alongside with this, item 8 was freed from the equality constraint with the other factor loadings and only fixed to load on both factors equally). The fit of the resulting model, depicted in Figure 1 is: $\text{Chi}^2_{(41)}=662.95$, $p<.001$; RMSEA=.078; SRMR=.064; CFI=.95). Alternatively, the elimination of item 8 and 9 (where the LM-tests also stipulate the allowance of a cross loading) and thereby the retention of distinct allocation of the items to the two factors also leads to a good fit to the data ($\text{Chi}^2_{(25)}=346.73$, $p<.001$; RMSEA=.072; CFI=.96; SRMR=.048). The factors showed significant interrelations (starting model: $r=.20$, $p<.001$; model with item 8 cross loading on both factors: $r=.12$, $p<.001$; model without item 8 and 9: $r=.05$, $p<.01$).

Relations to negative affect and demographic characteristics

The modified scales of the ERQ – reappraisal and suppression – were moderately interrelated ($r=.21$, $p<.001$). We found a negative relation between reappraisal and anxiety ($r=-.10$, $p<.001$) and depression ($r=-.16$, $p<.001$). Positive correlations could be observed between suppression and anxiety ($r=.08$, $p<.001$) and depression ($r=.16$, $p<.001$). These relations were relatively small compared to the interrelations between the scales of the HADS (anxiety and depression; $r=.68$, $p<.001$).

Considering demographic characteristics we found a positive relation between suppression and age ($r=.09$, $p<.001$). Participants without a partner had higher suppression scores than those living in a partnership ($M=18.26$ ($SD=4.95$) vs. $M=17.78$ ($SD=5.08$), $T_{(2489)}=2.32$, $p=.021$). Male participants had higher suppression scores than women ($M=18.28$ ($SD=4.90$) vs. $M=17.76$ ($SD=5.11$), $T_{(2489)}=2.54$, $p=.011$); those with an academic

degree had lower scores as those without ($M=17.22$ ($SD=4.94$) vs. $M=18.12$ ($SD=5.03$), $T_{(2489)}=3.08$, $p=.002$) just as participants with a higher household income ($M=17.48$ ($SD=5.13$) vs. $M=18.31$ ($SD=4.95$), $T_{(2420)}=3.99$, $p<.001$). Regional differences (eastern vs. western parts of Germany; urban vs. rural) could not be found.

For *reappraisal* we did not find differences regarding age, existence of a partnership, gender, household income, educational level, residence (urban vs. rural; eastern vs. western parts of Germany).

We performed a linear regression analysis (stepwise procedure) for both ERQ scales as dependent variables and anxiety and depression (HADS) and demographic characteristics (age, gender, partnership, region (eastern vs. western parts of Germany), household income (<2000 Euro vs. ≥2000 Euro), Education (high school or less vs. university degree) and urbanity (urban vs. rural)) as predictors. *Reappraisal* was only predicted by lower depression scores (HADS; $\text{beta}=-.16$, $p<.001$) with a total of 2.6% of the variance explained ($R^2=.026$; $F_{(1,2362)}=63.50$, $p<.001$). *Suppression* was predicted by depression (HADS; $\text{beta}=.14$, $p<.001$), lower educational level ($\text{beta}=-.05$, $p=.016$), male gender ($\text{beta}=-.05$, $p=.012$) and lower household income ($\text{beta}=-.05$, $p=.024$). A total of 3.1% of the variance could be explained by this model ($R^2=.031$; $F_{(4,2376)}=19.90$, $p<.001$).

Population based norms of the ERQ

Table 3 provides a detailed illustration of the population based norms for both scales of the ERQ. The cross loading of item 8, was taken into account, by adding half of its score to each scale. We displayed norms separately for gender (female, male) and age groups (<25, 25–34, 35–44, 45–54, 65–74, >74 years). Percentiles (cumulative percentages) are displayed for the sum scores of both scales.

Discussion

In this paper we could not completely verify the factor structure of the ERQ found by Abler & Kessler [2] by confirmatory factor analysis. Item 8 loaded equally on both factors and item 9 also had a substantial loading on reappraisal. In order to remain as closely as possible to the original version, we only included a cross loading for item 8 and partitioned it between both scales (adding half of its score on each scale). Alternative procedures to our approach might be a) elimination of the two critical items from the scale b) a different statistical analysis for the determination of scale scores allowing loadings of single items on two factors. The last mentioned variant would result in a much more sophisticated scoring system not realistically applicable in common practice. The reason for the difference of the factor structure in our study compared to Abler & Kessler [2] might be due to the different samples (student sample vs. general population) studied for scale construction purposes. It seems

Table 2: Item and scale characteristics of the ERQ

Scale	Original item by Gross (2002)	German items by Abler & Kessler (2009)	Total sample						Female						Male					
			M	SD	Skew	Kurt	r_{it}	M	SD	Skew	Kurt	r_{it}	M	SD	Skew	Kurt	r_{it}			
Reappraisal	1. When I want to feel more positive emotion (such as joy or amusement), I change what I'm thinking about.	1. Wenn ich mehr positive Gefühle (wie Freude oder Heiterkeit) empfinden möchte, ändere ich, woran ich denke.	4.36	1.57	-0.28	-0.30	.57	4.41	1.61	-0.31	-0.34	0.56	4.30	1.54	-0.26	-0.24	0.58			
	3. When I want to feel less negative emotion (such as sadness or anger), I change what I'm thinking about.	3. Wenn ich weniger negative Gefühle (wie Traurigkeit oder Ärger) empfinden möchte, ändere ich, woran ich denke.	4.45	1.39	-0.24	.10	.62	4.49	1.39	-0.24	.07	0.61	4.40	1.40	-0.24	.14	0.64			
	5. When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm.	5. Wenn ich in eine stressige Situation gerate, ändere ich meine Gedanken über die Situation so, dass es mich beruhigt.	4.33	1.39	-0.25	.06	.56	4.39	1.38	-0.22	.07	0.53	4.26	1.42	-0.29	-0.01	0.59			
	7. When I want to feel more positive emotion, I change the way I'm thinking about the situation.	7. Wenn ich mehr positive Gefühle empfinden möchte, versuche ich über die Situation anders zu denken.	4.48	1.38	-0.34	.13	.67	4.52	1.39	-0.30	.06	0.68	4.43	1.37	-0.42	.21	0.64			
	8. I control my emotions by changing the way I think about the situation I'm in.	8. Ich halte meine Gefühle unter Kontrolle, indem ich über meine aktuelle Situation anders nachdenke.	4.23	1.37	-0.28	.16	.42	4.23	1.35	-0.25	.23	0.41	4.22	1.40	-0.32	.08	0.44			
	10. When I want to feel less negative emotion, I change the way I'm thinking about the situation.	10. Wenn ich weniger negative Gefühle empfinden möchte, versuche ich, über die Situation anders zu denken.	4.52	1.32	-0.28	.29	.67	4.52	1.32	-0.24	.23	0.65	4.50	1.32	-0.33	.32	0.69			
	Scale reappraisal (mean)			4.40	1.02	-0.34	1.28	.82/ .82 ¹⁾	4.42	1.01	-0.23	1.13	.81/ .81	4.35	1.03	-0.46	1.43	0.83 / .83		
	2. I keep my emotions to myself.			3.97	1.55	-0.03	-0.54	.60	3.89	1.59	.03	-0.58	0.61	4.06	1.50	-0.08	-0.47	0.58		
	4. When I am feeling positive emotions, I am careful not to express them.			3.44	1.62	.21	-0.71	.49	3.36	1.63	.24	-0.74	0.50	3.53	1.61	.18	-0.68	0.47		
	6. I control my emotions by not expressing them.			4.09	1.54	-0.16	-0.49	.66	4.03	1.55	-0.11	-0.56	0.67	4.15	1.51	-0.21	-0.40	0.63		
Suppression	9. When I am feeling negative emotions, I make sure not to express them.	9. Wenn ich negative Gefühle empfinde, Sorge ich dafür, sie nicht nach außen zu zeigen.	4.39	1.48	-0.27	-0.29	.48	4.36	1.50	-0.26	-0.32	0.50	4.42	1.46	-0.28	-0.26	0.47			
	Scale suppression (mean)			3.97	1.18	-0.21	.36	.76/ .76 ¹⁾	3.91	1.20	-0.17	.30	.76/ .77	4.04	1.14	-0.23	.41	.75/ .74		

r_{it} = corrected item-scale correlation; 1) Cronbach's alpha: with/without item 8; Possible answers: 1="strongly agree", 4="neutral", 7="strongly disagree". Item 8 is, following our suggestion, equally partitioned to both scales.

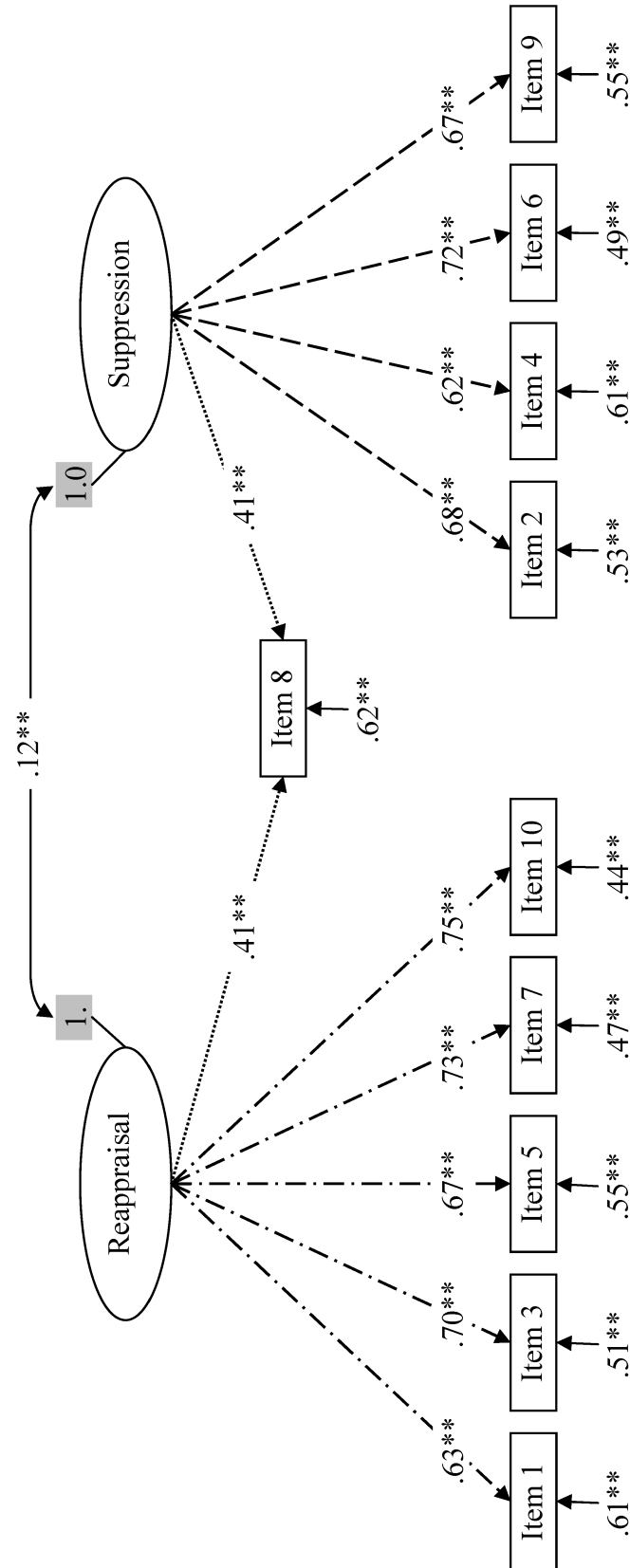


Figure 1: The modified factorial structure of the ERQ. Depicted are the standardized coefficients. Free effects are presented with drawn-through connections (the disturbances and the inter-correlation of the factors), whereas the dashed lines indicate the presence of equality constraints (the factor loadings; the deviations stems from the diverging error rates of the indicator variables). A grey shade depicts fixed effects (the variances of the factor). Asterisks indicate the statistical significance (***: $p < .001$). The overall model fit is $\chi^2(41) = 662.95$, $p < .001$; RMSEA = .078; SRMR = 0.06; CFI = .95.

Table 3: Population based norms of the scales of the ERQ (N=2475)

Score	Female										Male									
	< 25 y	25-34 y	35-44 y	45-54 y	55-64 y	65-74 y	> 74 y	total	< 25 y	25-34 y	35-44 y	45-54 y	55-64 y	65-74 y	> 74 y	Total				
	N=127	N=200	N=230	N=261	N=211	N=202	N=143	N=1374	N=128	N=150	N=190	N=178	N=190	N=192	N=73	N=1101				
5.5	0.5	0.9	1.1	1.1	0.5	0.5	1.4	0.7	3.9	0.7	1.1	1.1	1.1	1.0	2.7	1.5				
6																				
6.5			1.3					0.8	4.7	1.3				1.6		1.7				
7		1.0		2.3				1.1						2.1		1.8				
7.5		1.5		2.7				1.2					1.6			1.9				
8										1.6						2.2				
8.5	0.8			3.4	0.9		2.1	1.6			2.2					2.5				
9				3.8		1.0		1.7			3.4					2.6				
9.5				4.2	1.4	1.5		2.0			3.9	2.1				2.9				
10				4.6		2.0	2.8	2.2			5.1	3.2		3.1	4.1	3.2				
10.5											5.6				5.4	3.4				
11			2.2		1.9		3.5	2.5	5.5						6.8	3.5				
11.5					2.4		4.2	2.6	6.3							3.6				
12		2.5						3.0	7.0				3.7			3.8				
12.5				5.0				3.8	7.8	2.0						4.1				
13		3.0	2.6		4.3	2.5		3.3	8.6	2.7					8.1	4.4				
13.5		4.0		5.7	4.7		4.9	3.8	9.4	4.0						4.9				
14	1.6			6.1				3.9	10.9							5.3				
14.5		4.5	3.0		5.2	4.0		4.4		4.7					9.5	5.7				
15		5.0	3.5	6.5				4.6			7.3				10.8	6.2				
15.5	2.3	5.5	3.9	7.7				5.1	11.7		2.6				12.2	6.5				
16	3.1	8.0		8.0		4.5		5.8	14.1	5.3	3.2					7.0				
16.5	3.9	8.5	4.8	9.2	6.6	6.9	6.9	6.9	14.8	6.0						7.7				
17	4.7		5.2		7.1	8.4		7.3		6.7						8.3				
17.5	5.5	9.0		9.6	7.6	8.9		7.7	16.4	7.3						8.3				
18	7.8	10.5	6.5	10.7	9.0	10.4	8.3	9.2		10.7	4.2					9.3				
18.5	8.6	15.0	7.8	11.9	10.4	12.9	9.7	11.0	17.2	12.0	5.8					10.7				
19	10.9	18.5	9.5	14.6	11.8			12.8	21.1	15.3	7.4					11.7				
19.5	12.5	21.0	10.8	17.2	13.7	13.9	11.1	14.6	21.9	16.7	8.9				14.9	14.0				
20	14.1	22.5	13.9	18.8	16.1	16.8	13.9	16.8	23.4	20.0	11.1				17.6	15.8				
20.5	17.2	24.0	15.2	19.5	19.9	18.8	16.0	18.8	26.6	13.2	11.6				18.9	17.3				
21	21.9	27.5	19.2	23.8	22.3	20.8	19.4	22.3	33.6	23.3	19.5				23.0	19.9				
21.5	23.4	30.5	22.1	26.1	25.1	22.3	22.2	24.7	35.2	25.3	23.7				27.0	24.4				
22	35.2	38.5	35.9	40.6	37.9	34.7	40.3	37.7	43.0	38.7	33.2				28.4	27.4				
22.5	39.1	40.0	39.4	43.3	41.7	37.6	43.1	40.7	45.3	40.7	38.4				35.9	39.8				
23	44.5	44.0	42.4	47.5	47.9	44.1	47.2	45.4	46.9	43.3	45.8				50.0	43.3				
23.5	47.7	49.5	43.7	49.8	51.2	45.5	50.0	48.1	50.8	44.7	47.9				54.1	47.5				
24	50.0	53.5	48.5	51.0	55.5	50.0	52.8	51.6	51.6	48.7	52.1				58.1	51.4				
24.5	53.9	57.0	51.5	55.6	59.7	54.5	55.6	55.4	53.9	52.0	56.3				59.5	54.6				
25	57.0	59.5	55.0	58.6	63.0	58.9	59.0	58.8	55.5	54.0	61.6				60.8	57.4				
25.5	59.4	65.0	57.6	62.1	64.9	62.4	61.8	61.9	58.6	56.7	64.7				63.5	60.3				
26	62.5	67.0	61.5	66.3	69.2	66.8	64.6	65.6	58.6	60.7	66.8				68.9	63.2				
26.5	66.4	68.5	66.7	69.7	72.5	71.8	67.4	69.2	71.1	64.0	68.9				70.3	66.7				
27	67.2	73.5	68.8	72.0	75.8	71.5	71.5	71.8	76.6	66.0	74.2				78.4	70.1				
27.5	68.0	76.5	72.7	73.2	78.7	77.2	77.1	74.9	78.1	72.0	75.8				81.1	73.7				
															83.8	76.6				

(Continued)

Table 3: Population based norms of the scales of the ERQ (N=2475)

Score	Reappraisal (cumulative %)															
	Female						Male						Total			
	< 25 y	25-34 y	35-44 y	45-54 y	55-64 y	65-74 y	> 74 y	total	< 25 y	25-34 y	35-44 y	45-54 y	55-64 y	65-74 y	> 74 y	Total
28	68.8	78.0	74.9	75.5	81.0	79.2	81.3	77.1	78.9	76.7	77.4	77.5	81.1	79.7	85.1	79.0
28.5	73.4	80.5	75.8	80.8	83.4	79.7	84.7	79.9	81.6	77.3	80.5	79.8	83.7	82.8	86.5	81.4
29	76.6	82.0	77.5	82.4	85.3	81.7	86.1	81.7	82.8	78.0	83.2	82.0	86.8	84.9	89.2	83.6
29.5	78.9	82.5	79.7	83.9	88.2	83.2	86.8	83.4	85.2		85.3	86.0	87.9	85.9	90.5	85.3
30	81.3	83.0	81.4	85.8	89.6	84.7	87.5	84.8	85.9	80.0	86.8	87.1	89.5	87.5		86.7
30.5	83.6	84.5	82.3	86.6		87.1	88.9	86.1	87.5	83.3	87.9	88.2	92.1	89.6	93.2	88.7
31	87.5	87.0	83.5	87.4	91.0	88.6	92.4	87.9	88.3	84.0	88.4	89.3	93.2	91.1		89.6
31.5	88.3	88.5	85.7	88.9	92.4	89.1		89.2	89.1	84.7	89.5	90.4	95.3	93.2	95.9	91.0
32	92.2	91.0	88.3	91.2	93.4	90.6	93.1	91.2	91.4	86.7	91.6	92.1	96.3	94.3	97.3	92.6
32.5		93.0	89.6	92.3	94.8	92.1	93.8	92.4	92.2	89.3	93.2	93.8	96.8	94.8	98.6	93.9
33		95.5	91.8	94.3	95.7	94.1	94.4	94.0	93.8	92.0	94.2	94.9	97.4	97.4		95.4
33.5	93.0			95.0	96.2	95.0	95.8	94.6	96.1	92.7		95.5			100	95.9
34	93.8	96.5	93.5				96.5	95.2	97.7	94.7	94.7	96.6				96.6
34.5	95.3			95.4			97.9	95.6	98.4	96.0	95.8		97.9	98.4		97.4
35	96.1	97.0	94.4		97.2			96.0	98.4					99.0		97.5
35.5	96.9	97.5	95.7	97.3	98.1	96.5	98.6	97.2	99.2		96.3		98.4			97.8
36	97.7		96.5	97.7	98.6			97.5			96.8					98.0
36.5	98.4	98.0	97.0	98.5		97.0		98.0		97.3						98.2
37	99.2			98.9				98.3		98.7						98.5
37.5			97.8				100	98.6				98.9				98.8
38			98.7	99.2				98.8	100		97.9	99.4				99.1
38.5	100	100	100	100	100	100		100		100	100	100	100	100		100

(Continued)

Table 3: Population based norms of the scales of the ERQ (N=2475)

Score	Suppression (cumulative %)														
	Female						Male						Total		
	< 25 y N=127	25-34 y N=200	35-44 y N=230	45-54 y N=261	55-64 y N=211	65-74 y N=202	> 74 y N=143	total N=1374	< 25 y N=128	25-34 y N=150	35-44 y N=190	45-54 y N=178		55-64 y N=190	65-74 y N=192
4.5	0.8	1.5	2.2	2.3	2.4	2.0	0.7	1.7	2.3	0.5	0.6	1.1	3.1	1.4	1.3
5	3.1	2.5	2.6	3.0	3.4	2.4	1.9	2.5	3.1	1.0	1.6	2.1	3.6	1.9	1.6
6	3.9	4.4	3.4	3.0	2.8	3.9	2.7	3.2	3.9	1.3	1.1	4.1	4.1	2.2	2.2
6.5	4.7	4.4	3.8	3.8	3.8	3.9	3.5	3.5	4.7	3.3	2.1	5.2	5.2	2.5	2.5
7	6.3	4.9	4.3	6.1	4.5	4.4	5.0	4.3	4.7	2.6	3.1	6.2	6.2	3.0	3.1
7.5	7.1	5.4	7.4	7.2	4.7	4.9	5.4	5.4	5.5	4.2	2.2	7.3	7.3	3.3	3.3
8	8.7	8.3	6.1	8.7	5.7	5.4	6.6	6.6	7.0	3.4	3.4	8.3	8.3	4.2	4.2
9	9.4	9.3	6.5	10.6	6.2	5.9	7.2	7.2	7.0	4.0	4.5	10.4	10.4	4.6	4.6
10	10.2	10.3	10.4	11.7	6.6	6.3	8.2	8.2	12.5	5.2	6.7	12.6	12.6	6.0	6.0
10.5	12.6	11.3	13.0	12.9	8.1	7.8	9.1	9.1	14.1	6.8	8.4	14.2	14.2	7.3	7.3
11	12.6	11.3	13.0	14.0	8.1	7.8	10.5	10.5	18.0	9.3	8.4	18.8	18.8	9.0	9.0
11.5	14.2	12.3	13.4	14.8	10.0	9.8	11.8	11.8	18.8	12.0	8.4	20.3	20.3	9.9	9.9
12	16.5	15.7	15.6	15.9	12.8	11.2	13.6	13.6	20.3	13.3	9.4	23.4	23.4	11.0	11.0
12.5	18.1	17.6	16.5	17.0	14.7	12.2	15.0	15.0	23.4	16.0	10.5	25.8	25.8	12.6	12.6
13	20.5	18.1	18.6	19.3	17.1	12.2	16.6	16.6	25.8	19.3	12.0	29.7	29.7	15.2	15.2
13.5	21.3	19.6	19.5	22.3	19.4	13.7	18.4	18.4	29.7	20.0	14.1	32.0	32.0	17.1	17.1
14	25.2	21.1	20.8	24.6	24.2	16.1	21.1	21.1	32.0	20.7	15.2	35.2	35.2	18.3	18.3
14.5	26.8	24.0	23.4	27.7	26.1	20.0	23.6	23.6	35.2	24.0	15.7	38.3	38.3	20.4	20.4
15	27.9	27.9	26.0	31.1	28.9	23.4	26.6	26.6	38.3	29.3	18.3	41.4	41.4	23.2	23.2
15.5	28.3	33.3	19.9	34.1	31.3	25.4	29.7	29.7	39.1	32.0	22.3	43.0	43.0	25.2	25.2
16	31.5	34.3	35.5	36.0	36.0	28.3	32.8	32.8	41.4	34.7	25.7	44.4	44.4	28.2	28.2
16.5	34.6	38.2	39.0	40.2	40.3	31.7	36.7	36.7	43.0	37.3	27.2	46.7	46.7	31.2	31.2
17	44.1	44.1	45.5	44.3	44.1	36.6	42.1	42.1	48.4	43.3	31.9	49.5	49.5	36.0	36.0
17.5	47.2	47.1	50.6	47.7	47.4	39.0	45.4	45.4	53.1	46.7	36.6	53.1	53.1	39.5	39.5
18	57.5	54.4	62.3	56.8	58.8	51.2	55.4	55.4	58.6	57.3	50.3	60.7	60.7	50.0	50.0
18.5	58.3	60.3	66.2	59.5	60.7	53.7	58.7	58.7	60.9	59.3	55.0	64.3	64.3	54.6	54.6
19	63.8	65.2	71.4	65.5	66.4	58.5	64.3	64.3	63.3	66.0	59.3	68.7	68.7	59.8	59.8
19.5	67.7	67.2	74.0	70.1	68.7	63.4	67.7	67.7	65.6	68.7	63.9	70.9	70.9	62.9	62.9
20	70.9	69.6	75.8	73.5	72.5	66.8	70.9	70.9	68.8	72.0	68.1	74.7	74.7	66.9	66.9
20.5	75.6	73.0	78.4	76.5	76.8	69.8	74.2	74.2	74.2	74.7	71.2	76.7	76.7	71.0	71.0
21	81.1	77.5	80.5	79.9	78.7	74.6	77.9	77.9	77.3	76.7	75.9	78.8	78.8	74.7	74.7
21.5	83.5	80.4	83.5	82.2	81.0	77.6	80.6	80.6	79.7	77.3	78.0	81.2	81.2	77.0	77.0
22	85.0	82.8	87.4	85.6	83.4	80.5	83.8	83.8	81.3	81.3	81.2	81.2	81.2	79.7	79.7

(Continued)

Table 3: Population based norms of the scales of the ERQ (N=2475)

Score	Suppression (cumulative %)															
	Female						Male									
	< 25 Y	25-34 Y	35-44 Y	45-54 Y	55-64 Y	65-74 Y	> 74 Y	total	< 25 Y	25-34 Y	35-44 Y	45-54 Y	55-64 Y	65-74 Y	> 74 Y	Total
22.5	86.6	86.3	89.2	87.5	86.3	84.9	82.6	86.4	84.4	85.3	84.3	86.6	84.2	83.4	85.1	84.7
23	88.2	89.7	90.0	89.0	87.2	85.9	85.4	88.1	88.3	88.0	85.3	91.1	88.4	86.5	86.5	87.8
23.5	89.8	91.2	90.5	90.2	87.7	87.3	86.1	89.1	89.1	89.3	86.9	91.6	89.5	90.2	87.8	89.3
24	91.3	92.2	92.6	91.3	88.6	89.8	88.2	90.7	91.4	90.0	88.0	92.2	90.5	91.7	90.4	90.4
24.5	93.7	93.1	93.1	92.0	91.5	92.7	89.6	92.3	91.4	91.3	88.0	93.3	92.1	92.7	91.9	91.5
25		94.1	94.4	93.2	93.4	93.7	90.3	93.4	93.0	92.7	90.1	93.3	92.6	93.3	94.6	92.6
25.5	97.6		94.8	94.3	94.8	94.1	91.0	94.4	96.1	95.3	92.1	95.0	93.2	94.8	98.6	94.6
26	98.4	95.1	96.1	95.8		94.6	91.7	95.2	96.1	96.0	93.2	96.1	93.7	95.3	95.2	95.2
26.5		96.1	97.4	96.6	95.3		92.4	95.9	97.7	96.7			94.2	96.4	95.7	95.7
27		98.5	97.8	97.7	95.7	95.1	93.1	96.8	99.2	97.3	95.3	97.2	94.7	96.9	100	96.8
27.5			98.3	98.1	96.2		94.4	97.1		98.0	95.8	97.8	95.3	97.4		97.3
28			98.7				96.5	97.4		98.7			96.3			97.6
28.5			99.1	98.5	97.2	95.6	97.2	97.8			97.4	98.3	97.9	97.9		98.3
29		99.0	99.6			96.6	98.1	98.1		99.3				98.4		98.5
29.5				98.9	97.	97.6	97.9	98.5	100.0							98.6
30		99.5		99.2	98.0	98.0	98.6	98.8					98.4	99.0		98.7
30.5					98.1		99.3	98.9			97.9	98.9	98.9	100		99.2
31						98.5	100	99.1								
31.5	100	100	100	100	100	100	100	100		100	100	100	100			100

plausible that item 8 truly captures elements of both scales. Its unusual opening phrase (“I control my emotions...”) sets it apart from the other items, which usually starts with “When I want to...”. The essence “of controlling something” has a stronger response-focus as the other formulation, as controlling is usually done ex-post facto or, at its best, during the process.

Still, both scales of the ERQ reappraisal and suppression show good internal consistencies indicating for acceptable reliability in the general population.

The positive relationship between suppression and distress (anxiety and depression) could be demonstrated in our community based study as well as in the student sample of Abler & Kessler [2]. The positive relation between depressive symptoms and suppression has also been pointed out by Gross & John [1].

In our linear regression analysis we found plausible relations between reappraisal and lower depression and between suppression and higher depression, lower education, male gender and low household income. However, the total variance explained by these variables has to be considered as small: 2.4 and 3.6%.

Because of the cross-sectional character of our study it remains unclear whether reappraisal is a protective factor and suppression is unfavourable regarding mental health (depression), or alternatively whether life circumstances (e.g. lower education, male gender, low household income) and distress lead to a suppressed emotion regulation in the long run. Prospective studies are required to answer this question.

Conclusions

The shortness of the ERQ makes it to an instrument that is able to assess emotion regulation strategies economically, e.g. in larger community based studies. We could demonstrate sufficient psychometric properties of the German version of the ERQ: reliability, factor structure and indicators for construct validity, but strongly recommend a modification of the scoring algorithm by allocating item 8 to both scales. Because of the cross sectional character of our study it remains unclear whether reappraisal is protective and suppression is unfavourable regarding mental health or whether life circumstances and psychic symptoms lead to a suppression of emotions.

Notes

Authorship

The authors Wiltink J and Glasemer H contributed equally to this work.

Competing interests

The authors declare that they have no competing interests.

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