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Psychometric Properties of the Cognitive Emotion Regulation Questionnaire and Shortened Versions in Dutch Speaking Community-Dwelling Older Adults

Gina Rossi*[1], Xenia Brancart[1,2], Carmen Diaz-Batanero[3,4]

[1]Vrije Universiteit Brussel (VUB), Department of Psychology, Personality and Psychopathology Research Group, Belgium
[2]Ghent University, Department of Experimental Clinical and Health Psychology, Belgium
[3]University of Huelva, Department of Clinical and Experimental Psychology, Spain
[4]University of Huelva, Research Center for Natural Resources, Health and the Environment, Spain

Abstract
Most studies on the psychometric properties of the Cognitive Emotion Regulation Questionnaire (CERQ) were done in adolescents and adults. The scarce studies in older adults were mainly limited to associations of CERQ scales with internalising symptoms and wellbeing. Only one study explored the underlying factor structure in Spanish older adults and concluded that only a 27 item CERQ version showed adequate fit when tested with confirmatory factor analysis. The present study analyses the psychometric properties of all three versions of the CERQ in a sample of 451 community-dwelling older adults: the original 36 item CERQ, the short 18 item CERQ developed by the original authors and a Spanish 27 item CERQ version. Because gender differences among strategies used have been reported, the present study examined and provided first evidence for the gender invariance of the CERQ structure. Moreover, cognitive emotion regulation strategies correlated like hypothesized with clinical symptoms in general, and behavioural inhibition and activation systems and coping styles. The nomological net was highly similar for the original CERQ and shortened versions. The shortened versions of the CERQ consequently can be viable alternatives to the CERQ in settings where short assessment instruments are needed.

Keywords cognitive emotion regulation; CERQ; shortened versions; older adults

Emotion regulation can be defined as "*all the extrinsic and intrinsic processes responsible for monitoring, evaluating and modifying emotional reactions, especially their intensive and temporal features, to accomplish one's goals*" (Thompson, 1994, pp. 27-28). Among emotion regulation strategies, cognitive emotion regulation, specifically focuses on cognitive conscious self-regulative processes dealing with incoming emotionally arousing information (Garnefski et al., 2001; Lama, 2018; Thompson, 1991). The ability of an individual to cognitively control emotions when confronted with adversity has been widely linked to mental and psychological well-being across the lifespan (Compas et al., 2017; Garnefski, Legerstee, et al., 2002; Ochsner & Gross, 2005) and to the impact negative life events can have (Extremera & Rey, 2014; Wang et al., 2014).

Although these associations were also demonstrated among older adults (Carvajal et al., 2021; Garnefski et al., 2004; Kraaij et al., 2002) more evidence is needed for this age group, given the unique changes in emotion regulation at older age. There is robust evidence (based on longitudinal experience sampling) that overall emotional well-being and regulation improves with age, emotional variability reduces, and emotional experiences become more stable (Carstensen et al., 2011). According to socio-emotional selectivity theory the shorter time horizon of older adults explains the higher motivation for prioritizing emotional goals by focusing on what is

*Corresponding Author: Gina Rossi ✉ gina.rossi@vub.be
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most important (Carstensen et al., 2006). This can result in a positivity bias and thus paying more attention to positive than to negative aspects when regulating emotions (Carstensen et al., 2003). Older adults also show greater cognitive maturity. They are more flexible in using problem- as well as emotion-focused strategies and generally apply a more response-focused emotion regulation when negative life events happen (Blanchard-Fields et al., 1997; Carstensen et al., 2003; Heckhausen & Schulz, 1995; Labouvie-Vief & Blanchard-Fields, 1982).

To deepen the understanding of the role of cognitive emotional regulation in older adults, one useful instrument for measuring cognitive emotion regulation is the Cognitive Emotion Regulation Questionnaire (CERQ) (Garnefski et al., 2001). The CERQ assesses nine cognitive coping strategies with 36 items: *Acceptance*, assuming and resigning oneself to what happened; *Positive Refocusing*, thinking about pleasant experiences instead of what happened; *Positive Reappraisal*, considering the positive meaning of the event in terms of personal growth; *Refocus on Planning*, thinking about plans to handle the negative event; *Putting into Perspective*, downplaying the severity of the event by comparing it to other events; *Catastrophizing*, overemphasising the unpleasant thoughts related to the event; *Rumination*, thinking persistently about feelings and thoughts associated to the event; *Self-blame*, attributing the responsibility of stressful event to oneself; and *Blaming Others*, putting the blame of what happened on another person (Garnefski et al., 2001). Two shortened CERQ versions are currently also available: the short 18 item version developed by the original authors (Garnefski & Kraaij, 2006a) and a Spanish 27 item CERQ version proposed for use in older adults (Carvajal et al., 2021). Shortened versions of instruments are of relevance for older adults, especially in geriatric patients where comorbidity of psychiatric and cognitive problems is rather the rule than the exception (Rossi et al., 2014; van Alphen et al., 2015) and lengthy instruments can imply a too high burden.

Numerous studies examined the psychometric properties of the CERQ. Although most studies focused on the original 36 item version, overall results support acceptable to adequate internal consistency on all scales in all versions (Chamizo-Nieto et al., 2020; Domínguez-Sánchez et al., 2013; Garnefski & Kraaij, 2006a; Jermann et al., 2006; Medrano et al., 2013; Megreya et al., 2016; Perţe & Miclea, 2011; Tuna & Bozo, 2012; Wang et al., 2021; Xu et al., 2021; Zhu et al., 2008). However, in terms of structure, Confirmatory Factor Analysis (CFA) studies present mixed results with some studies favouring the original nine-factor structure (Betegón et al., 2022; Chamizo-Nieto et al., 2020; Megreya et al., 2016; Santos et al., 2021; Wang et al., 2021; Zhu et al., 2008), while others suggesting a second-order structure where the nine dimensions are grouped into two more general factors, referred to as adaptive strategies and less adaptive strategies (Domínguez-Sánchez et al., 2013; Jermann et al., 2006; Xu et al., 2021). Also, some of the studies point to certain items with lower factor loadings than recommended (Holgado-Tello et al., 2018; Medrano et al., 2013; Tuna & Bozo, 2012; Wang et al., 2021), indicating the need for further evidence on the structure of the instrument. Of all these studies, only three compare different versions of the CERQ on the same sample of adults (Betegón et al., 2022; Holgado-Tello et al., 2018; Ireland et al., 2017), indicating better fit on shortened versions compared to the original one. Only the study of Carvajal et al. (2021) specifically analysed the CERQ structure in older adults, finding unsatisfactory standardized factor loadings on the original structure and only an adequate fit for the 27 item Spanish version.

Furthermore, several authors reported gender differences in the use of the cognitive emotional regulation strategies (Abdi et al., 2012; Duarte et al., 2015; Jermann et al., 2006; Medrano et al., 2013; Wang et al., 2021) and some studies also included older adults. For example, studies in adults aged 18 to 71 years old (Garnefski et al., 2004) and aged 20 to 87 years old (Balzarotti et al., 2016) found women reported higher scores for Catastrophizing, Rumination and Positive Refocusing than men. A study specifically conducted among older adults aged 65 to 90 years found men to make more use of Self-blame and Positive Refocusing and women of Rumination (Carvajal et al., 2021). In order to corroborate that these differences are indeed due to different levels of strategies used by genders and not to construct bias in the assessment methods, various authors have provided evidence of the gender measurement invariance of the original 36 item CERQ (Chamizo-Nieto et al., 2020; Santos et al., 2021; Wang et al., 2021) and the short 18 item version of the CERQ (Santos et al., 2021). However, no study to date has provided evidence of gender measurement invariance of CERQ structure on all three versions.

Concerning the evidence for external validity of the CERQ, most of the extensive literature focused on the relation of the different cognitive emotion strategies and psychopathological symptoms. For example, maladaptive strategies such as Self-blame, Rumination and Catastrophizing have shown positive relations with symptoms of anxiety (Garnefski, Legerstee, et al., 2002), while adaptative strategies such as Acceptance, Positive Refocusing and Positive Reappraisal were inversely related (Garnefski & Kraaij, 2007) in general population samples. Depression symptoms, also, have been found to go together with more Rumination,

Catastrophizing, Blaming Others and Acceptance, and contrary, with less Positive Refocusing, Refocus on Planning and Positive Reappraisal (Carvajal et al., 2021; Garnefski & Kraaij, 2006b, 2007; Garnefski et al., 2004). These studies are in analogy to the results of the meta-analysis by Aldao and colleagues (2010): maladaptive strategies present more intense relationships with emotional disorders symptoms compared to adaptive ones. A study in six European countries also consistently demonstrated that maladaptive cognitive strategies (e.g. Rumination or Catastrophizing) predict both anxiety and depression symptoms (Potthoff et al., 2016). The relations between strategies measured by CERQ scales and anxiety and depression indicators have been found to be comparable across the original and shortened versions of the instrument (Holgado-Tello et al., 2018). Results available from older adult samples with the Spanish 27 item version of the CERQ (Carvajal et al., 2021) also pointed in the same direction. Positive Reappraisal and Refocus on Planning were positively related to subjective wellbeing. On contrary Rumination, Catastrophizing, Blaming Others and Self-blame were positively related to lower wellbeing. Besides, less use of Acceptance, Positive Refocusing, Refocus on Planning, Positive Reappraisal and Putting into Perspective were associated with poorer wellbeing (Balzarotti et al., 2016; Carvajal et al., 2021). Additionally, studies in older adults found Rumination as a strong predictor of depression and distress (Kraaij et al., 2002; Strutt et al., 2022) while Positive Reappraisal was negatively related to depression and anxiety (Kraaij et al., 2002; Nowlan et al., 2016).

Considering that most of the evidence provided up to date, in general population as well as in older adult samples, was related to symptoms of anxiety and depression, it is necessary to extend the studies to other relevant external variables. Cognitive emotional regulation has been directly related with coping, which more broadly includes strategies to deal with internal and external demands of stressful events and is made up of both cognitive and behavioural strategies (Folkman, 2010). Also, according to Gray's (1993) biopsychological theory two basic approaches control and motivate behaviour: the behavioural activation system (BAS) which is activated by rewarding stimuli and the behavioural inhibition system (BIS) which is activated by stimuli linked to punishment. Previous research has found a relation between BAS and externalising pathology, namely drug and alcohol abuse, and a connection between BIS and internalising pathology, namely depression and anxiety symptoms (Johnson et al., 2003). A recent study by Sun and colleagues (2020) also suggested a mediating role of cognitive emotional regulation (measured with the short 18 item version) in the relation between BIS/BAS sensitivities and internalizing symptoms. The analysis of the relationship between the CERQ and these measures could therefore provide additional relevant evidence of validity.

To summarize, although the clear importance for further evidence in older adults, scarce studies (Carvajal et al., 2021; Garnefski & Kraaij, 2006b; Kraaij et al., 2002; Lama, 2018; Nowlan et al., 2016; Sun et al., 2020) studied psychometric properties of the CERQ specifically in this population, with only one study (Carvajal et al., 2021) providing evidence regarding the factor structure. Also, evidence of validity based on the relation with other variables provided on older adults was mainly limited to associations with internalising symptoms and wellbeing. Thus, we extend existing research by also zooming in on relevant external measures of general clinical symptoms, coping and behaviour regulation. Therefore, the main objective of the present study is to provide cross-validity for the original CERQ (Garnefski et al., 2001) and the two existing shortened versions, the 18 item version developed by the original authors of the CERQ (Garnefski & Kraaij, 2006a) and the Spanish 27 item version (Carvajal et al., 2021). Specifically, we analyse the internal consistency, factor structure, gender invariance and nomological net. We hypothesize to find good internal consistency for the scales, a nine-factor structure for all versions, as well as to demonstrate gender measurement invariance. We assume a similar nomological net for the shortened versions (compared to the original CERQ) expecting BAS scores be associated with Positive Refocusing and BIS with Self-blame, Rumination and inversely with Positive reappraisal. Also, we expect adaptive emotion regulation strategies will relate to more active coping, and maladaptive emotion regulation strategies will correlate with more passive coping.

Method

Participants and Procedure

The study was approved by the medical ethical committee of the University Hospital Brussels and Vrije Universiteit Brussel (VUB) and is part of a large research project on personality and information processing in older adults. VUB undergraduate students, in context of completing a master thesis, collected data from community-dwelling older adults between January 2019 and July 2021. First contact was made by email or phone and a face-to-face meeting was arranged to explain the study and informed consent was signed by all participants before further data collection. In the VUB research project the community-dwelling older adults will serve as a control group to be compared with clinical samples. Therefore, participants with clinical diagnoses, as indicated by the

Table 1. Descriptive statistics CERQ-36

	CERQ-36				
Scale	*M(SD)*	*skew*	*kurt*	α	ω
Self-blame	8.47 (3.01)	0.63	0.13	.73	.74
Acceptance	11.31 (3.71)	0.31	-0.31	.77	.77
Rumination	9.89 (3.56)	0.38	-0.51	.79	.79
Positive Refocusing	10.97 (3.65)	0.41	-0.44	.79	.79
Refocus on Planning	12.24 (3.97)	-0.06	-0.72	.85	.85
Positive Reappraisal	12.21 (3.76)	0.03	-0.60	.80	.80
Putting into Perspective	12.97 (3.62)	-0.23	-0.32	.77	.77
Catastrophizing	7.26 (3.02)	1.20	1.24	.75	.74
Blaming Others	6.33 (2.65)	1.74	4.19	.79	.80

Note. N = 451; skew = skewness; kurt = kurtosis; α = Cronbach alpha based on standardized items; ω = McDonalds' omega; AIC = average inter item correlation.

Table 2. Descriptive statistics shortened versions

	CERQ-27					CERQ-18				
Scale	*M(SD)*	*skew*	*kurt*	α	ω	*M(SD)*	*skew*	*kurt*	α	ω
Self-blame	6.16 (2.31)	0.28	-0.46	.64	.66	4.34 (1.91)	0.78	0.11	.64	.66
Acceptance	8.52 (2.89)	0.83	0.65	.73	.72	5.54 (2.04)	0.43	-0.46	.67	.67
Rumination	7.44 (2.74)	0.41	-0.44	.74	.75	4.93 (1.93)	0.36	-0.58	.70	.70
Positive Refocusing	7.79 (2.97)	0.48	-0.41	.79	.79	5.03 (2.11)	0.53	-0.41	.74	.73
Refocus on Planning	8.90 (3.10)	0.07	-0.80	.82	.82	5.73 (2.24)	0.11	-0.90	.77	.76
Positive Reappraisal	9.03 (2.96)	0.09	-0.63	.78	.77	6.16 (2.10)	0.02	-0.77	.67	.68
Putting into Perspective	9.75 (2.80)	-0.28	-0.33	.72	.72	6.44 (2.04)	-0.29	-0.50	.71	.70
Catastrophizing	5.44 (2.43)	1.41	2.10	.76	.75	3.85 (1.71)	1.18	1.42	.70	.69
Blaming Others	4.51 (2.00)	2.05	5.98	.75	.75	3.07 (1.50)	2.06	5.12	.73	.73

Note. N = 451; skew = skewness; kurt = kurtosis; α = Cronbach alpha based on standardized items; ω = McDonalds' omega; AIC = average inter item correlation.

Mini International Neuropsychiatric Interview screener (MINI, Sheehan et al., 1992) were excluded for the current study. Also excluded were participants having a score < 24 on the Mini-Mental State Examination (Folstein et al., 1975; Kok & Verhey, 2002), thus showing cognitive deficits and probably not being able to fill in self-report questionnaires. Other exclusion criteria were diabetes or surgery/chemotherapy within the last three months (given within the larger project neuropsychological measures were administered which can be influenced by these conditions). Questionnaires were only administered when the older adult met all inclusion criteria (i.e. was not excluded based on the described exclusion criteria). Following this procedure, data was collected from 467 participants. A preliminary data screening indicated that for the primary outcome measure, the CERQ, 51 participants had missing items. Given that in case missing data are 5% or less, estimates of parameters are likely to be unbiased (Graham, 2009) and most participants missed less than two out of 36 CERQ items, profiles with more than one item missing were not retained for further analyses. The final sample consisted of 451 older adults, aged 60 to 94 (M = 69.59; SD = 7.58) of whom 56.1% were woman. Most were in a relationship (74.4%) and living independently at home (94.2%; 2.9 lived in a service flat and 2.9% in a nursing home). A large majority was retired (84.7%) and regarding education, 16.4% finished primary school, 25.6% had a lower secondary school degree, 51.9% obtained a higher secondary school degree and 6% received a university degree (one person did not provide information on educational background). All participants filled out the CERQ and SCL-90-R. Additionally 377 participants also completed measures of behavioural activation (i.e. BIS/BAS and coping measures).

Instruments

The Cognitive Emotion Regulation Questionnaire (CERQ). Permission to use the CERQ for research purposes was granted by www.cerq.leidenuniv.nl). The CERQ (Garnefski, Kraaij, et al., 2002) is a self-report questionnaire measuring nine cognitive regulation strategies in response to negative life events, scored on a five point Likert scale from 1 (almost never) to 5 (almost always). Items are summed up to obtain total scores (range 0-20). Each scale consists of four items (thus a total of 36 items), and internal consistency of the scales varied from .68 to .71. In the current sample Cronbach alpha values were within the range of .73 to .85.

Shortened 18 and 27 item versions of the CERQ (see below) were calculated from this original 36 item version of the CERQ for the current study.

A 27 item version was developed in Spain (Holgado-Tello et al., 2018) by selecting items from the original CERQ (i.e. items 5, 6, 7, 8,19, 20, 21, 27

and 31 were removed) and measures the same nine strategies: Self-blame, Acceptance, Rumination, Positive Refocusing, Refocusing on Planning, Positive Reappraisal, Putting in Perspective, Catastrophizing and Blaming Others and proposed for use in older adults (Carvajal et al., 2021). Applying the same 1-5 Likert scale, total scale scores can range from 0 to 15. Composite reliability scores were reported and ranged from .70 to .84. In the current sample Cronbach alpha values were within the range of .64 to .82.

The CERQ-short was developed by Garnefski and Kraaij (Garnefski & Kraaij, 2006a), original authors of the CERQ, by reducing the number of items per scale from four to two, resulting in an 18 item version to measure the nine strategies. Alpha values of the scales varied from .62 to .85. In the current sample Cronbach alpha values were within the range of .64 to .77.

To clearly indicate the number of items used, we labelled the original CERQ, the Spanish version with 27 CERQ items and the CERQ-short of the original authors with 18 items respectively the CERQ-36, CERQ-27 and CERQ-18 in the current study from now on.

The Symptom Checklist (SCL-90-R). The SCL-90-R (Arrindell & Ettema, 2003) is a multidimensional questionnaire for self-reporting psychological and physical complaints. Participants indicate to which extent they suffer from 90 items on a five-point Likert scale ranging from 1 (not at all) to 5 (extremely). The total score of all complaints, Psychoneuroticism, has excellent reliability (α = .97). There are eight subscales, Agoraphobia, Anxiety, Depression, Somatic Complaints, Insufficiency of Thinking and Acting, Interpersonal Sensitivity, Hostility and Sleep problems with Cronbach alpha values from .77 to .90. In the current sample the Cronbach alpha value of Psychoneuroticism was .97 and for the subscales, values varied .78 from to .90.

The Behavioural Inhibition System and Behavioural Activation System Scales (BIS/BAS scale). The BIS/BAS scale (Franken et al., 2005) is a self-report questionnaire assessing the tendency of an individual to show reward approaching (BAS) and punishment avoiding (BIS) behaviour and comprises 24 items (there are four filler items), which must be rated on a four-point Likert scale (1= 'totally disagree', to 4= 'totally agree'). 20 items form a BIS scale (7 items, α= .79) and three BAS subscales, BAS-Drive (4 items, α= .68), BAS-Fun Seeking (4 items, α= .59), and BAS-Reward Responsiveness (5 items, α= .61), which can also be summed to a total BAS scale. Franken and colleagues (2005) also reported average item-total correlations (AIC) for the BIS and BAS subscales, which varied from .37 to .51, indicating the more modest Cronbach alpha values were probably an effect of the limited number of items of these scales. In the current sample internal consistency values were poor to acceptable (George & Mallery, 2003) when considering Cronbach alpha values, yet all AIC were ≥ .15 (Clark & Watson, 2019) and thus can be considered acceptable: BIS (α= .75, AIC = .30), BAS-Drive (α= .73, AIC = .40), BAS-Fun Seeking (α= .50, AIC = .20) and BAS-Reward Responsiveness (α= .58, AIC = .22). We additionally calculated internal consistency values for the total BAS scale (α= .79, AIC = .22), which had acceptable reliability.

The Utrecht Coping List (UCL). The UCL is a self-report questionnaire assessing the characteristic way someone deals with problems or stressful events (UCL; Scheurs et al., 1993). The questionnaire comprises 47 items to be rated on a four-point Likert scale ranging from 1 (rarely or never) to 4 (very often) and assesses seven types of coping, namely Active Confronting, Seeking Social Support, Reassuring Thoughts, Expressing Emotions, Palliative Reaction, Passive Reaction and Avoiding. Cronbach alpha values were reported for men (range .52 to .84) and women (range .64-.79). Cronbach alpha values in the current study ranged from .55 to .81, yet all AIC were ≥ .15 (range .22 - .42).

Data Analyses

Analyses were done with Mplus (version 8.6) and SPSS (version 28.0). For all instruments total scale scores were only computed if no more than 33% of the items of the respective scale were missing (for the CERQ-36 and CERQ-27 scales this implies no more than one missing item; in case of missingness on these versions mean imputation was done on scale level; for the CERQ-18 this implies no missing items).

Reliability of Scales and Descriptive Statistics. Internal consistency and descriptive statistics including means, standard deviations, skewness and kurtosis statistics were calculated for the CERQ-36 and shortened scales (CERQ-27 and CERQ-18). To allow comparison with previous studies reporting on internal consistency, Cronbach alpha values were calculated and interpreted using the guidelines of George and Mallery (2003): ≥ .90 – excellent; ≥ .80 – good; ≥ .70 – acceptable; ≥ .60 – questionable; ≥ .50 – poor; and ≥ .50 – unacceptable. Additionally, McDonalds' omega (McDonald, 1999) or in other words composite reliability was estimated given this was also reported by the Spanish study on the CERQ versions in older adults (Carvajal et al., 2021) and recent studies (Goodboy & Martin, 2020; Hayes & Coutts, 2020; Ravinder & Saraswathi, 2020) indicate this is a more optimal measure.

Construct Validity: Factor Structure and Measurement Invariance Across Gender. Given that skewness and kurtosis values estimated at item level exceeded the critical values of respectively 2 and 7 for

normality (Ryu, 2011), Weighted Least Squares Means and Variances (WLSMV) adjusted estimation was applied when performing the confirmatory factor analyses. WLSMV makes no distributional assumptions about the observed variables (i.e. items) and is well-suited for ordinal data (Li, 2016). Missing data was handled using full information maximum likelihood (FIML), an approach resulting in unbiased parameter and error estimates in case of data missing (completely) at random (Enders & Bandalos, 2001).

Given the χ^2 statistic is sensitive to sample size, leading to rejection of the model, even with trivial misfit, in large sample sizes, the goodness-of-fit of our nine-factor models solutions was evaluated additionally by other more suitable indices for large sample sizes (West et al., 2012). We used the sample size independent parsimony-adjusted RMSEA, for which values ≤ .05 indicate close model fit and values ≤ .08 suggest good model fit (Chen et al., 2008; Kline, 2005). Even more informative than the RMSEA point estimate, is the confidence interval for the RMSEA value for which the upper bound should be ≤ .10 for acceptable model fit (Chen et al., 2008). Additionally, we used the CFI, TLI and Standardized Root Mean Square Residual (SRMR). Cut-off values for CFI and TLI are ≥ .90 for adequate model fit and ≥ .95 for good model fit (Hu & Bentler, 1999; Kline, 2005). In case of the SRMR, values < .08 are indicative for good model fit (Hu & Bentler, 1999).

Next, construct equivalence across gender was explored in terms of degree of invariance of estimated parameters of nested models across groups. More concretely we examined up to which level the scales operated equivalently across groups by measurement models with different restraint levels (Schmitt & Kuljanin, 2008; Steinmetz, 2013). The configural model only assumes the same number of factors and pattern of loadings (i.e. the same set of indicators is specified to load on the same factor). Based on this model, one can conclude that there is no construct bias. If configural invariance is supported, in a next step metric invariance is evaluated. At this level, factor loadings are constrained to be equal, which means that respondents across groups attribute the same meaning to the latent construct (i.e. a factor is calibrated in the same way across groups). If metric invariance holds, the next level to be tested is scalar invariance. In this level, besides factor loadings, intercepts are also constrained to be equal. If this level holds, comparison of latent group means is allowed. To test if a level of invariance holds, differences in the CFI values (ΔCFI) between increasingly restrictive models were used and ΔCFI should be less than or equal to .002 (Meade et al., 2008). We additionally computed a χ^2 difference test yet given the χ^2 statistic is sensitive to sample size (West et al., 2012), we applied a strict p level of p <.01 for non-invariance.

Next, after establishing metric scalar invariance, gender differences were explored with independent sample t tests (with the exception of a skewness value ranging from 1.74 to 2.06 on CERQ versions for Blaming others, all CERQ-36, CERQ-27 and CERQ-18 scales had a skewness value ≤ 2 and a kurtosis value ≤ 7 indicating a normal distribution (West et al., 1995)). Cohen d effect sizes were used to interpret gender differences (d = 0.20 indicates a small effect, d = 0.50 indicates a moderate effect, and d > 0.80 indicates a large effect; (Cohen, 1988)).

Nomological Net. The nomological net of the CERQ-36, CERQ-27 and CERQ-18 scales were explored with partial Pearson r correlations (controlling for gender[1]), with exception of the relationships with the SCL-90-R scales given their non-normal distribution. For those relationships partial Spearman rank correlations were used.

To examine if the CERQ-36 and shortened versions (CERQ-27 and CERQ-18) scales correlate equally with relevant external measures the Steiger (1980) test for comparing dependent correlations measured on the same subjects was used to compare correlations of the CERQ-36 with correlations of 1) the CERQ-27 and 2) the CERQ-18.

Cohen r effect sizes were used to interpret correlations (r = .10 indicates a small effect, r = .30 indicates a moderate effect, and r = .50 indicates a large effect; (Cohen, 1988).

We reported different p values (i.e. p < .05, p <.01, p < .001) to allow comparisons with previous studies, yet given the large number of correlational analyses, we corrected for multiple testing by only interpreting

Table 3. Fit indices

	χ^2(df)	RMSEA	90% C.I.	TLI	CFI	SRMR
Nine-factor (correlated)						
CERQ-36	11990.36 (630)	.057	[.053, .061]	.918	.918	.059
CERQ-27	8318.60 (351)	.067	[.062, .073]	.910	.926	.057
CERQ-18	4568.53 (153)	.061	[.053, .070]	.941	.962	.038
Second order factor						
CERQ-36	2129.43 (584)	.077	[.073, .080]	.853	.864	.089
CERQ-27	1407.72 (314)	.088	[.083, .093]	.847	.863	.091
CERQ-18	699.36 (125)	.101	[.094, .108]	.841	.870	.081

results at a strict p level of $p < .001$ and when having at least a moderate effect.

Results

Descriptive Statistics

Internal consistency and descriptive statistics including means, standard deviations, skewness and kurtosis statistics are displayed in table 1 for the original version (CERQ-36) and in table 2 for the shortened versions (CERQ-27 and CERQ-18).

Construct validity: confirmatory factor structure and measurement invariance across gender

Fit indices for the confirmatory factor models are reported in table 3.

The nine-factor model showed a good model fit on all three versions (see table 4 for the completely standardized factor loadings). The second order models (where nine dimensions are grouped into two more general factors, referred to as adaptive strategies and less adaptive strategies) did not reach adequate fit (and were thus not further tested for gender invariance).

An overview of fit indices for the models across gender and invariance testing of the different models is displayed in Table 5[2]. Results showed scalar invariance across for all CERQ versions.

Gender Differences

Gender differences on CERQ scales are reported in table 6 and on scales of shortened versions in table 7. Men scored significantly higher than women on Self-blame and women scored significantly higher than men on Rumination on both the CERQ-36 and both short CERQ versions with a small effect size.

Table 4. Completely standardized factor loadings for the CERQ versions

Factor	CERQ item	CERQ-36	CERQ-27	CERQ-18
Self-blame	CERQ01	.46	.50	-
	CERQ10	.73	.72	.78
	CERQ19	.83	-	-
	CERQ28	.71	.79	.72
Acceptance	CERQ2	.59	.60	.64
	CERQ11	.71	.74	.84
	CERQ20	.71	-	-
	CERQ29	.82	.80	-
Rumination	CERQ3	.63	.64	.72
	CERQ12	.73	.75	.84
	CERQ21	.75	-	-
	CERQ30	.83	.82	-
Positive Refocusing	CERQ4	.71	.73	-
	CERQ13	.75	.79	.77
	CERQ22	.79	.82	.83
	CERQ31	.70	-	-
Refocus on Planning	CERQ5	.74	-	-
	CERQ14	.85	.85	-
	CERC23	.79	.77	.81
	CERQ32	.81	.81	.83
Positive Reappraisal	CERQ6	.76	-	.78
	CERQ15	.74	.76	.72
	CERQ24	.72	.75	-
	CERQ33	.79	.82	-
Putting into Perspective	CERQ7	.72	-	-
	CERQ16	.65	.65	-
	CERQ25	.74	.76	.75
	CERQ34	.79	.76	.81
Catastrophizing	CERQ8	.57	-	-
	CERQ17	.83	.83	.80
	CERQ26	.71	.71	-
	CERQ35	.80	.80	.77
Blaming Others	CERQ9	.71	.74	-
	CERQ18	.85	.90	.92
	CERQ27	.83	-	-
	CERQ36	.77	.76	.74

Note. N = 451; all factor loadings significant at $p < .001$

Table 5. Fit indices for the models and invariance testing.

	χ^2	*df*	RMSEA	90% CI	TLI	CFI	SRMR	ΔCFI	$\Delta\chi^2$	*df*	*p*
CERQ-36											
Men	889.57	558	.055	[.048; .061]	.924	.933	.069				
Women	1024.55	558	.057	[.052; .063]	.916	.926	.069				
Configural	1905.16	1116	.056	[.052; .060]	.920	.929	.069				
Metric	1930.40	1143	.055	[.051; .060]	.922	.930	.069	.001	31.41	27	.254
Scalar	2014.67	1241	.053	[.048; .057]	.930	.931	.070	.001	118.74	98	.075
CERQ-27											
Men	542.25	288	.067	[.058; .075]	.914	.930	.068				
Women	622.14	288	.068	[.060; .075]	.908	.924	.065				
Configural	1163.01	576	.067	[.062; .073]	.911	.927	.067				
Metric	1177.61	594	.066	[.060; .072]	.914	.927	.067	<.001	19.18	18	.380
Scalar	1235.30	665	.062	[.056; .067]	.925	.929	.067	.002	80.13	71	.214
CERQ-18											
Men	166.62	99	.059	[.043; .074]	.944	.964	.047				
Women	209.08	99	.066	[.054; .079]	.935	.958	.046				
Configural	373.39	198	.063	[.053; .072]	.940	.961	.046				
Metric	380.23	207	.061	[.051; .070]	.943	.961	.046	<.001	7.86	9	.548
Scalar	437.98	252	.057	[.048; .066]	.950	.959	.048	.002	65.86	45	.022

Table 6. Gender differences scales of CERQ-36

	CERQ-36				
	Gender	*M*	*SD*	*t*	*d*
Self-blame	M	8.89	3.06	2.69[b]	0.26
	W	8.13	2.93		
Acceptance	M	10.99	3.74	-1.60	0.15
	W	11.55	3.66		
Rumination	M	9.42	3.21	-2.58[b]	0.24
	W	10.27	3.77		
Positive Refocusing	M	10.91	3.46	-0.30	0.03
	W	11.02	3.79		
Refocus on Planning	M	12.41	4.01	0.78	0.07
	W	12.11	3.95		
Positive Reappraisal	M	12.15	3.58	-0.28	0.03
	W	12.25	3.91		
Putting into Perspective	M	12.94	3.30	-0.17	0.02
	W	13.00	3.85		
Catastrophizing	M	7.11	2.88	-0.93	0.09
	W	7.38	3.12		
Blaming Others	M	6.42	2.36	0.66	0.06
	W	6.25	2.25		

Note. N = 451; M = men (*n* = 198); W = women (*n* = 253); [a]*p* < .05, [b]*p* < .01, [c]*p* < .001; *d* = Cohens' *d*

Table 7. Gender differences scales of shortened versions

	CERQ-27					CERQ-18				
	Gender	*M*	*SD*	*t*	*d*	Gender	*M*	*SD*	*t*	*d*
Self-blame	M	6.47	2.36	2.52[b]	0.24	M	4.67	1.98	3.25[c]	0.31
	W	5.92	2.25			W	4.08	1.81		
Acceptance	M	8.31	2.87	-1.40	0.13	M	5.36	1.99	-1.69	0.16
	W	8.69	2.90			W	5.69	2.08		
Rumination	M	7.06	2.50	-2.71[b]	0.25	M	4.69	1.79	-2.43[a]	0.23
	W	7.75	2.89			W	5.12	2.02		
Positive Refocusing	M	7.68	2.80	-0.69	0.07	M	4.90	2.01	-1.22	0.12
	W	7.88	3.09			W	5.14	2.18		
Refocus on Planning	M	9.00	3.15	0.62	0.06	M	5.83	2.24	0.91	0.09
	W	8.81	3.07			W	5.64	2.24		
Positive Reappraisal	M	8.91	2.82	-0.75	0.07	M	6.07	1.99	-0.79	0.08
	W	9.13	3.06			W	6.22	2.18		
Putting into Perspective	M	9.79	2.59	0.26	0.02	M	6.46	1.86	0.13	0.01
	W	9.72	2.96			W	6.43	2.18		
Catastrophizing	M	5.26	2.33	-1.34	0.13	M	3.70	1.63	-1.63	0.16
	W	5.57	2.50			W	3.97	1.77		
Blaming Others	M	4.59	2.05	0.74	0.07	M	3.12	1.51	0.62	0.06
	W	4.45	1.97			W	3.03	1.49		

Note. N = 451; M = men (*n* = 198); W = women (*n* = 253); [a]$p < .05$, [b]$p < .01$, [c]$p < .001$; *d* = Cohens' *d*

Nomological Net

Partial Spearman rank correlations (controlled for gender) between the CERQ-36, -27, -18 and SCL-90-R scales are displayed in table 8. Most significant correlations (at $p<.001$) between CERQ versions and SCL-90-R scales were small to medium effect sizes. Most positive relationships between clinical symptoms and cognitive emotion regulation strategies were found for Self-Blame, Acceptance, Rumination, Catastrophizing and Blaming Others. Significant differences ($p<.001$) across CERQ versions for significant correlations ($p<.001$) were limited to correlations of CERQ-18 and CERQ-36 Blaming others with SCL-90-R Interpersonal Sensitivity (yet both correlations were of a medium effect) and Psychoneuroticism. For the latter there was a small effect size for the correlation (.26) of CERQ-18 Blaming Others with SCL-90-R Psychoneuroticism and a medium effect size for the correlation (.32) of CERQ-36 Blaming others with SCL-R Psychoneuroticism.

Partial Pearson correlations (controlled for gender) between the CERQ-36, -27, -18 scales and BIS/BAS scales are displayed in table 9. Most significant relationships ($p<.001$) were of a small to medium effect size, with the exception of the relationship between the cognitive emotion regulation strategies of Positive Refocusing and Positive Reappraisal with BAS Reward Responsiveness which reached a large effect for all versions with the exception of the correlation (.45) between CERQ-18 Positive Reappraisal and BAS Reward Responsiveness (which was a medium effect and significantly different from the correlation of .52 found for the CERQ-36).

Partial Pearson correlations (controlled for gender) between the CERQ-36, -27, -18 and UCL scales are displayed in Table 10. All coping scales were related significantly with at last small effect sizes with certain emotion regulation strategies. Large effects were found for the relationship between Active Coping and Refocus on Planning and Positive Reappraisal for all CERQ versions, with the exception of the correlation of CERQ-18 Refocus on Planning and Active Coping which was a medium effect (.49) and significantly different from the correlation (.55) of the CERQ-36 Refocus on Planning and Active coping scale.

Discussion

The present findings are promising for the CERQ's utility in community-dwelling older adults for the original and shortened versions (calculated based on a selection of items from the full version). All scales showed adequate internal consistency, the nine-factor structures proposed for the CERQ-36, -27 and -18 reached a good fit to the data and the nomological net for all versions was largely comparable and demonstrated logical relationships with relevant measures (controlled for gender).

Construct Validity: Factor Structure and Measurement Invariance Across Gender

Some studies (Domínguez-Sánchez et al., 2013; Jermann et al., 2006; Xu et al., 2021) proposed a model with second order adaptive and maladaptive strategies, yet most studies corroborated the nine-factor structures of the original CERQ with 36 items (Chamizo-Nieto et al., 2020; Garnefski et al., 2001; Megreya et al., 2016; Zhu et al., 2008).

Table 8. Partial rank correlations CERQ-36, -27, -18 with SCL-90-R scales

	CERQ-	SCL_AGO	SCL_ANX	SCL_DEP	SCL_SOM	SCL_INS	SCL_SEN	SCL_HOS	SCL_SLEEP	SCL_PSNEUR
Self-blame	36	.10[a]	.20[c]	.26[c]	.15[b]	.30[c]	.29[c]	.18[c]	.20[c]	.27[c]
	27	.10[a]	.21[c]	.27[c]	.15[b]	.30[c]	.29[c]	.20[c]	.20[c]	.29[c]
	Z	-0.15	0.52	0.98	0.29	-0.15	0.15	1.26	-0.30	0.38
	p	.883	.602	.325	.768	.879	.879	.207	.766	.705
	18	.07	.17[c]	.20[c]	.13[b]	.26[c]	.23[c]	.16[c]	.18[c]	.22[c]
	*Z**	-1.76	-1.73	-2.97	-0.99	-1.99	-3.00	-0.84	-1.05	-2.66
	*p**	.078	.083	.003	.322	.047	.003	.402	.293	.008
Acceptance	36	.02	.15[b]	.14[b]	.11[a]	.17[c]	.14[b]	.11[a]	.15[b]	.17[c]
	27	.02	.15[b]	.12[b]	.11[a]	.15[b]	.14[b]	.11[a]	.16[c]	.17[c]
	Z	0.22	-0.15	-1.54	0.29	-1.40	-0.07	-0.37	0.59	-0.30
	p	.827	.883	.123	.769	.160	.941	.714	.555	.767
	18	.01	.11[a]	.13[b]	.12[a]	.15[b]	.12[a]	.10[a]	.15[b]	.16[b]
	*Z**	-0.42	-1.57	-0.17	0.51	-0.98	-0.89	-0.55	-0.13	-0.73
	*p**	.674	.116	.875	.611	.327	.373	.582	.898	.468
Rumination	36	.15[b]	.29[c]	.35[c]	.23[c]	.25[c]	.29[c]	.22[c]	.20[c]	.33[c]
	27	.16[c]	.30[c]	.37[c]	.25[c]	.27[c]	.31[c]	.23[c]	.23[c]	.36[c]
	Z	0.37	0.53	1.48	1.43	1.66	1.68	0.75	1.72	1.79
	p	.712	.593	.138	.154	.097	.092	.454	.086	.073
	18	.17[c]	.32[c]	.39[c]	.28[c]	.29[c]	.36[c]	.25[c]	.21[c]	.39[c]
	*Z**	0.68	1.29	2.14	2.36	1.75	3.27	1.21	0.22	2.59
	*p**	.495	.198	.032	.018	.080	.001	.225	.830	.009
Positive Refocusing	36	.01	.08	.01	.05	.06	.06	.02	.03	.06
	27	.00	.06	.01	.05	.06	.07	.02	.03	.06
	Z	-0.51	-0.95	0.44	-0.36	0.44	0.80	0.00	-0.29	0.00
	p	.609	.342	.662	.715	.661	.422	1	.771	1
	18	.01	.04	.01	.05	.07	.06	.04	.02	.06
	*Z**	0.05	-1.81	0.26	0.05	0.62	0.21	1.08	-0.41	-0.15
	*p**	.959	.071	.797	.959	.535	.836	.279	.680	.877
Refocus on Planning	36	-.03	.05	-.02	-.04	.07	.07	.05	.04	.02
	27	-.04	.03	-.02	-.04	.07	.05	.05	.03	.01
	Z	-1.55	-1.65	0.31	-0.21	-0.31	-1.65	-0.31	-1.03	-1.03
	p	.122	.099	.757	.837	.757	.098	.757	.302	.303
	18	-.02	.03	-.00	-.04	.08	.06	.05	.04	.02
	*Z**	0.65	-0.89	0.95	-0.18	0.36	-0.60	0.12	-0.12	-0.12
	*p**	.512	.372	.341	.858	.720	.551	.905	.905	.905
Positive Reappraisal	36	-.09	-.08	-.13[b]	-.08	-.02	-.05	-.02	-.08	-.09
	27	-.09[a]	-.09	-.14[b]	-.08	-.04	-.06	-.02	-.11[a]	-.10[a]
	Z	-0.68	-1.35	-0.85	0.08	-1.26	-0.67	0.34	-2.96	-0.93
	p	.459	.177	.396	.933	.207	.500	.736	.003	.352
	18	-.04	-.04	-.07	-.01	.02	-.01	-.00	.01	-.03

	*Z**	1.99	1.66	2.50	3.19	1.94	1.98	0.92	3.74	2.87
	*p**	.047	.096	.012	.001	.053	.047	.356	<.001	.004
Putting into Perspective	36	-.03	-.02	-.03	-.02	.08	.00	-.03	.05	.00
	27	-.04	-.04	-.04	-.04	.06	-.02	-.03	.06	-.02
	Z	-0.06	-1.02	-1.02	-1.24	-1.90	-1.90	0.16	0.44	-1.46
	p	.512	.307	.307	.215	.057	.057	.884	.661	.145
	18	-.06	-.02	-.07	-.05	.06	-.04	-.04	.03	-.03
	*Z**	-1.48	0.05	-2.17	-1.25	-1.06	-2.08	-0.74	-0.88	-1.66
	*p**	.140	.963	.030	.212	.288	.038	.460	.381	.097
Catastrophizing	36	.28[c]	.31[c]	.42[c]	.27[c]	.31[c]	.39[c]	.25[c]	.14[b]	.34[c]
	27	.26[c]	.30[c]	.42[c]	.26[c]	.30[c]	.39[c]	.24[c]	.14[b]	.39[c]
	Z	-1.42	1.23	0.07	-0.34	-0.55	-0.07	-0.67	0.00	-0.64
	p	.155	.217	.943	.735	.583	.944	.500	1	.522
	18	.24[c]	.33[c]	.44[c]	.27[c]	.31[c]	.41[c]	.25[c]	.16[b]	.41[c]
	*Z**	-1.88	0.85	0.94	-0.04	-0.27	0.88	-0.22	0.60	0.56
	*p**	.060	.397	.349	.965	.790	.381	.828	.551	.578
Blaming Others	36	.25[c]	.24[c]	.27[c]	.17[c]	.29[c]	.39[c]	.29[c]	.16[c]	.32[c]
	27	.25[c]	.23[c]	.25[c]	.13[b]	.27[c]	.35[c]	.29[c]	.14[b]	.29[c]
	Z	0.15	-1.13	-2.04	-2.66	-1.98	-2.52	0.30	-1.33	-2.22
	p	.880	.260	.041	.008	.048	.012	.761	.184	.026
	18	.23[c]	.21[c]	.21[c]	.10[a]	.24[c]	.30[c]	.25[c]	.14[b]	.26[c]
	*Z**	-0.97	1.81	-3.76	-3.90	-2.75	-4.85	-1.89	-1.28	-3.75
	*p**	.334	.070	<.001	<.001	.005	<.001	.059	.200	<.001

Note. n(CERQ-18) = 427; n(CERQ-27) = 447; n(CERQ-36) = 447; SCL_AGO = Agoraphobia; SCL_ANX= Anxiety; SCL_DEP= Depression; SCL_SOM= Somatic Complaints; SCL_INS= Insufficiency of Thinking and Acting; SCL_SEN= Interpersonal Sensitivity; SCL_HOS= Hostility; SCL_SLEEP= Sleep Problems; SCL_PSNEUR= Psychoneuroticism *comparison CERQ-18 and -36; [a]$p < .05$, [b]$p < .01$, [c]$p < .001$

Table 9. Partial correlations CERQ-36, -27, -18 and BIS/BAS scales

	CERQ-	BIS_TOT	BAS_TOT	BAS_FUN	BAS_REW	BAS_DRIVE
Self-blame	36	.14[b]	.03	.03	.14[b]	.00
	27	.13[a]	.03	.04	.12[a]	.01
	Z	-0.74	0.29	0.36	-1.54	0.58
	p	.462	.771	.715	.122	.560
	18	.07	.04	.02	.14[a]	.05
	*Z**	-3.32	0.57	-0.77	-0.36	2.37
	*p**	<.001	.571	.439	.716	.018
Acceptance	36	.03	-.03	-.05	.24[c]	.00
	27	.03	-.03	-.06	.24[c]	.01
	Z	-0.15	0.44	-0.44	0.38	0.51
	p	.884	.662	.661	.707	.610
	18	.02	-.01	-.02	.24[c]	.00
	*Z**	-0.76	-3.08	1.31	0.17	-0.13
	*p**	.449	.002	.192	.862	.900
Rumination	36	.22[c]	.10	.05	.33[c]	.07
	27	.24[c]	.10	.04	.34[c]	.05
	Z	1.35	-0.44	-0.58	1.01	-1.02
	p	.177	.660	.559	.314	.307
	18	.24[c]	.06	.04	.29[c]	.01
	*Z**	0.95	-1.48	-0.29	-1.95	-2.32
	*p**	.340	.139	.768	.051	.020
Positive Refocusing	36	-.06	.25[c]	.16[b]	1[c]	.20[c]
	27	-.07	.22[c]	.15[b]	.964[c]	.19[c]
	Z	-0.80	-1.80	-0.89	-37.49	-0.67
	p	.422	.072	.376	<.001	.503
	18	-.04	.23[c]	.14[b]	.923[c]	.20[c]
	*Z**	0.93	-0.90	-0.99	-43.70	0.00
	*p**	.353	.366	.322	<.001	1
Refocus on Planning	36	.05	.23[c]	.08	.41[c]	.22[c]
	27	.03	.23[c]	.10	.41[c]	.22[c]
	Z	-1.55	0.32	1.45	-0.90	-0.42
	p	.122	.751	.147	.366	.672
	18	.03	.24[c]	.10	.37[c]	.22[c]
	*Z**	-1.31	0.49	1.08	-3.05	-0.31
	*p**	.190	.624	.282	.002	.760
Positive Reappraisal	36	-.06	.27[c]	.15[b]	.52[c]	.25[c]
	27	-.09	.26[c]	.16[b]	.53[c]	.24[c]
	Z	-2.19	-1.05	0.77	1.59	-1.13
	p	.028	.295	.443	.113	.259
	18	-.05	.27[c]	.11[a]	.45[c]	.26[c]
	*Z**	0.41	-0.14	-1.95	-3.52	0.29
	*p**	.678	.886	.051	<.001	.775
Putting into Perspective	36	.04	.07	.00	.39[c]	.10
	27	.02	.10	.04	.37[c]	.10[a]
	Z	-1.46	1.32	2.33	-1.34	0.22
	p	.145	.188	.020	.179	.826
	18	-.00	.13[a]	.04	.32[c]	.17[b]
	*Z**	-1.89	2.64	1.80	-3.48	3.31
	*p**	.059	.008	.072	<.001	<.001
Catastrophizing	36	.15[b]	.05	.01	.17[b]	.04
	27	.14[b]	.08	.04	.13[a]	.07
	Z	-1.19	1.89	1.96	-2.44	1.89
	p	.235	.058	.050	.015	.058
	18	.16[b]	.03	.01	.13[a]	.01
	*Z**	0.21	-0.80	-0.17	-1.53	-1.56
	*p**	.831	.424	.866	.125	.119
Blaming Others	36	.12[a]	.05	.04	.09	.07
	27	.12[a]	.04	.03	.08	.08
	Z	-0.15	-0.44	-0.73	-0.73	0.29
	p	.883	.662	.466	.465	.770
	18	.09	.05	.05	.07	.07
	*Z**	-1.72	0.17	0.17	-0.94	0.17
	*p**	.086	.869	.869	.347	.868

*Note. n(*CERQ-18) = 357*; n*(CERQ-27) = 374*; n*(CERQ-36) = 374; BIS_TOT= BIS total score; BAS_TOT= BAS total score; BAS_rew= BAS Reward Responsiveness; BAS_fun= BAS Fun Seeking; BAS_drive= BAS Drive; *comparison CERQ-18 and -36; [a]$p < .05$, [b]$p < .01$, [c]$p < .001$

In the case of the 27 item version, only the two-factor structure has shown an optimal fit (Betegón et al., 2022; Carvajal et al., 2021; Holgado-Tello et al., 2018). Our data provide for the first time evidence of good model fit for the original nine-factor structure for the CERQ-36, -27 and -18 (not for the second order model). Important to notice is the very high intercorrelation between the Refocus on Planning and Positive Reappraisal factor (varying from .85 to .91 over the CERQ versions). On one hand, taking into account the positivity effect formulated by socio-emotional selectivity theory (Carstensen et al., 2003), it might be that Refocus on Planning in older adults goes hand in hand with Positive Reappraisal, given the focus on positive aspects when regulating emotions. On the other hand, previous CFA studies (Holgado-Tello et al., 2018; Ireland et al., 2017) have also found that the Refocus on Planning latent factor correlated highly with the Positive Reappraisal latent factor.

In analogy to previous studies (Chamizo-Nieto et al., 2020; Holgado-Tello et al., 2018; Santos et al., 2021), we could demonstrate gender measurement invariance. The CERQ-36, -27, and -18 were all invariant at the scalar level, implying comparison of latent group means is allowed and eventual gender differences on scales are not due to construct bias.

Gender Differences

Findings were in line with gender differences reported by an earlier study focusing on older adults (Carvajal et al., 2021): women scored higher on Rumination, whereas men scored higher on Self-blame when compared with each other. We could not confirm men scored higher Positive Refocusing. However, in contrast to this finding by Carvajal and colleagues (2021), studies (Balzarotti et al., 2016; Garnefski et al., 2004) also including younger adults found women to report higher scores on Positive Refocusing. Results appear to be inconsistent across studies. Probably gender differences on this scale are culture-bound yet confirming or rejecting this hypothesis requires cross-cultural research in older adults.

Nomological Net

Overall, differences between the correlations of CERQ-36 and the shortened versions (CERQ-27 and CERQ-18) with relevant external measures were either non-significant or were of a similar effect size. Only a very limited number of correlations differed in terms of effect size, but the direction of the relationship did never differ. Our results suggest that the relations the shortened versions demonstrated with external variables largely mirrored the relations that the original CERQ with 36 items exhibited. This similarity in the nomological net suggests the CERQ-36, -27 and -18 tap highly comparable constructs. Therefore, when a short measure is to be preferred (for example in geriatric populations), we advice to use the shortest version, namely the CERQ-18 (called CERQ-short by its developers (Garnefski & Kraaij, 2006a)).

Using the SCL-90-R as measure for clinical symptoms we could corroborate relationships between Anxiety and Depression symptoms and emotion regulation strategies, as found in a meta-analysis (Aldao et al., 2010) and across European countries (Potthoff et al., 2016), as well as in other studies that included older adults. More specifically, in the current sample there was a medium correlation between Anxiety and Catastrophizing and Rumination and a small correlation with Self-blame and Acceptance, which corresponds to findings in adults aged 18 to 71 years old (Garnefski, Legerstee, et al., 2002). Additionally, there was a small correlation in the current sample with Blaming Others, which is actually also more often a maladaptive strategy for regulating emotions. Depression showed medium correlations with Rumination and Catastrophizing, small correlations with Blaming Other and Acceptance and was inversely related with Positive Reappraissal, confirming earlier findings in (older) adults (Carvajal et al., 2021; Garnefski & Kraaij, 2006b, 2007; Garnefski et al., 2004; Kraaij et al., 2002; Strutt et al., 2022). We extended the knowledge on relationships of cognitive regulation strategies with clinical symptoms, by demonstrating relations between clinical symptoms and more maladaptive strategies. Self-blame, Acceptance, Rumination, Catastrophizing and Blaming Others showed positive correlations with Somatic Complaints, Insufficieny of Thinking, Interpersonal Sensitivity, Hostility, Sleep Problems, Agoraphobia (with the exception of Acceptance) and Psychoneuroticism with small to medium effect sizes.

Like hypothesized based on findings of BIS and BAS with internalizing and externalizing pathology (Johnson et al., 2003; Sun et al., 2020), we did find BAS to be associated with Positive Refocusing, and additionally also with other more adaptive strategies such as Refocus on Planning and Positive Reappraisal with small effects. Similarly, BIS was correlated with small effects with Self-blame and Rumination and also with Catastrophizing and Blaming Others, which are considered to be more maladaptive strategies. What also deserves special attention are the medium and large effects of BAS Reward with several adaptive strategies: Positive Refocusing, Refocus on Planning, Positive Reappraisal and Putting into Perspective. There was actually a perfect relation of BAS Reward Responsiveness and CERQ-36 Positive Refocusing, and correlation of respectively .96 for the CERQ-27 and .92 for the CERQ-18 between BAS Reward Responsiveness and CERQ-27 and a correlation of .92

Table 10. Partial correlations CERQ-36, -27, -18 with UCL

	CERQ-	UCL_ACT	UCL_PAL	UCL_AVO	UCL_SOC	UCL_PAS	UCL_EXP	UCL_REA
Self-blame	36	.20[c]	.23[c]	.15[b]	.162[b]	.311[c]	.176[c]	.082
	27	.18[c]	.18[c]	.16[b]	.13[a]	.31[c]	.14[b]	.05
	Z	-1.63	-3.73	0.86	-2.58	0.08	-2.36	-2.27
	p	.102	<.001	.376	.001	.939	.018	.024
	18	.22[c]	.17[b]	.15[b]	.15[b]	.24[c]	.13[a]	.08
	*Z**	0.95	-3.32	-0.16	-0.89	-3.71	-2.19	-0.31
	*p**	.342	<.001	.876	.375	<.001	.028	.756
Acceptance	36	.20[c]	.22[c]	.26[c]	.05	.25[c]	.06	.32[c]
	27	.22[c]	.22[c]	.24[c]	.05	.23[c]	.01	.33[c]
	Z	1.49	-0.30	-1.51	-0.15	-1.73	-3.94	1.16
	p	.146	.765	.132	.884	.084	<.001	.247
	18	.24[c]	.21[c]	.26[c]	.09	.19[c]	-.02	.35[c]
	*Z**	1.94	-0.65	0.04	1.56	-2.55	-3.46	1.30
	*p**	.051	.518	.965	.118	.011	.001	.194
Rumination	36	.19[c]	.31[c]	.07	.19[c]	.39[c]	.09	.23[c]
	27	.16[b]	.26[c]	.07	.18[c]	.40[c]	.08	.23[c]
	Z	-2.08	-3.43	0.07	-0.45	1.11	-0.44	0.15
	p	.038	.001	.942	.656	.265	.661	.881
	18	.08	.22[c]	.12[a]	.15[b]	.46[c]	.07	.22[c]
	*Z**	-4.77	-3.64	2.16	-1.54	3.48	-0.93	-0.13
	*p**	<.001	<.001	.031	.124	.001	.353	.897
Positive Refocusing	36	.29[c]	.31[c]	.06	.20[c]	-.05	.07	.28[c]
	27	.26[c]	.29[c]	.09	.17[c]	-.02	.06	.25[c]
	Z	-1.97	-1.30	1.83	-1.56	1.97	-0.51	-2.35
	p	.049	.194	.068	.119	.049	.609	.019
	18	.27[c]	.30[c]	.04	.17[b]	.01	.05	.23[c]
	*Z**	-0.59	-0.49	-0.88	-1.57	2.94	-0.83	-2.94
	*p**	.554	.626	.380	.116	.003	.409	.003
Refocus on Planning	36	.55[c]	.32[c]	-.02	.31[c]	-.18	.11[a]	.35[c]
	27	.53[c]	.30[c]	-.03	.29[c]	-.01	.07	.36[c]
	Z	-2.33	-1.41	-0.52	-1.73	0.10	-4.35	0.33
	p	.020	.158	.606	.083	.918	<.001	.741
	18	.49[c]	.34[c]	-.02	.30[c]	.01	.08	.36[c]
	*Z**	-3.87	1.39	0.18	-0.88	0.65	-1.91	0.32
	*p**	<.001	.165	.858	.381	.513	.056	.750
Positive Reappraisal	36	.53[c]	.32[c]	0.00	.27[c]	-.17[b]	.11[a]	.35[c]
	27	.51[c]	.30[c]	-.03	.29[c]	-.01	.07	.36[c]
	Z	-2.58	-1.60	-2.19	1.93	13.42	3.57	0.36
	p	.010	.110	.029	.053	<.001	<.001	.719
	18	.50[c]	.34[c]	.03	.24[c]	-.07	.15[b]	.38[c]

	*Z**	-2.01	1.13	1.20	-1.34	-10.77	1.95	1.54
	*p**	.044	.259	.231	.181	<.001	.051	.123
Putting into Perspective	36	.30[c]	.26[c]	.14[b]	.15[b]	-.09	.03	.47[c]
	27	.30[c]	.25[c]	.11[a]	.16[b]	-.11[a]	.02	.42[c]
	Z	-0.23	-0.15	-1.99	0.22	-1.91	-0.66	-3.92
	p	.818	.880	.047	.825	.057	.512	<.001
	18	.29[c]	.26[c]	.04	.14[a]	-.14[a]	.05	.36[c]
	*Z**	-0.48	0.29	-4.83	-0.79	-2.14	0.92	-5.64
	*p**	.628	.774	<.001	.428	.033	.356	<.001
Catastrophizing	36	-.12[a]	.01	.14[b]	-.12[a]	.38[c]	-.02	.01
	27	-.11[a]	.02	.15[b]	-.14[b]	.34[c]	.01	-.01
	Z	1.12	1.17	0.66	-1.25	0.71	2.22	-1.56
	p	.264	.241	.510	.211	.479	.027	.118
	18	-.09	.05	.13[a]	-.11[a]	.44[c]	.01	.03
	*Z**	1.65	1.94	-0.21	0.55	3.07	1.26	0.59
	*p**	.099	.053	.832	.581	.002	.207	.556
Blaming Others	36	.01	.11[a]	.19[c]	-.03	.40[c]	.16[b]	.07
	27	-.03	.08	.18[c]	-.06	.37[c]	.15[b]	.03
	Z	-3.12	-2.20	0.22	-2.04	-1.90	-0.74	-2.34
	p	.001	.028	.824	.041	.057	.460	.020
	18	-.03	.09	.19[c]	-.02	.33[c]	.12[a]	.06
	*Z**	-2.15	-1.11	0.67	0.77	-4.11	-2.34	-0.50
	*p**	.032	.268	.501	.440	<.001	.019	.619

*Note. n(*CERQ-18) =356*; n*(CERQ-27) =373*; n*(CERQ-36) =373; ACT= Active Problem Solving; PAL= Palliative Coping; AVO= Avoidance; SOC= Social Support Seeking; PAS= Passive/Depressive Coping; EXP= Expression of Emotions; REA= Reassuring Thoughts; *comparison CERQ-18 and -36; [a]$p < .05$ [b]$p < .01$ [c]$p < .001$

between BAS Reward Responsiveness and Positive Refocusing. In older adults Positive Refocusing is apparently characterised by Responsiveness to Rewards. Unexpected BAS Reward Responsiveness also showed a medium positive correlation with Rumination. On the other hand, Rumination on both negative and positive affect has been pointed out as a transdiagnostic risk factor for mood symptoms. Reward hyperresponsive older adults possibly experience increased physiological arousal during reward pursuit which can be further intensified by rumination on positive affect (Boland et al., 2016; Liu & Alloy, 2010; Moriarity et al., 2020).

Finally, all coping scales were related significantly with at least small effect sizes with several regulation strategies, which is not illogical since coping is a broader concept than cognitive regulation, including both cognitive and behavioural strategies (Folkman, 2010). Less adaptive strategies, like Self-blame, Rumination, Catastrophizing and Blaming Others showed, like hypothesized, medium correlations with Passive/Depressive coping. More adaptive strategies like Refocus on Planning, Positive Reappraisal and Putting into Perspective showed medium to large correlations with Active Problem Solving. Other medium-sized correlations also seemed plausible given the scales' content, like for example the medium correlation between Acceptance and Putting into Perspective and Reassuring Thoughts as coping mechanism. Finally Palliative coping or seeking distraction, so as not to have to think about the problem, was related to Rumination with a medium effect size, but also demonstrated medium correlations with Positive Refocusing, Refocus on Planning and Positive Reappraisal. We suppose the latter can be explained by the positivity effect (Carstensen et al., 2003) often coming into play when older adults regulate emotions.

Limitations

Although this study makes several contributions to the literature, some limitations of the current study should be mentioned. First, older adults are indeed a very heterogeneous group differing greatly on various aspects like life experiences, psychological characteristics, social skills and physical abilities. An older adult of let's say 60 years old cannot be compared directly with one of 90 years old. Although we included a broad age range in our sample with older adults being from 60 up to 90 years old, the so called "old-old" and "oldest old" (Segal et al., 2006) were underrepresented in our sample. We had 78.3% "young-old" (up to 74), 17.3% "old-old" (age between 75 and 84), and 4.4 % "oldest-old" (aged 85 and older). Moreover, the current study was confined to community-dwelling older adults. These are generally higher functioning individuals than clinical samples, which might influence score variance of adaptive versus maladaptive cognitive emotion regulation strategies.

Second, all measures included in the present research were self-report measures, which can imply that due to common method variance, the correlations in the nomological net might be somewhat inflated. Also, in some older adults the introspective ability might be limited due to cognitive deterioration. Furthermore, self-report is only one viewpoint which is probably more suited for reporting internalising problems, whereas externalising problems might be more captured by informants (Rossi et al., 2014).

Third, it is also worth considering that our study was cross-sectional. Therefore, we do not know if relations found in the nomological net would be retained if we could include predictors over time, like for example, negative life events or prior clinical symptoms. However, it should be mentioned that in a previous longitudinal study with older adults (Kraaij et al., 2002), Acceptance and Positive Reappraisal remained significantly related with current depressive symptoms after controlling for negative life events and prior depressive symptoms.

Finally, although the current results suggested very high similarity in terms of construct validity for the original and shortened CERQ versions, based on the current study results one cannot conclude if all scales across versions capture the strategies at all possible levels. Therefore, it would be useful to evaluate CERQ items of the original and shortened versions in future studies with an Item Theory Approach, which can also provide information on item difficulty (Ashraf & Jaseem, 2020). Namely by using item information functions one could evaluate if the item provides more information on a lower or higher value of the underlying strategy, and thus evaluate with test functioning if items of a scale provide information at all levels of the underlying strategy.

Conclusion

The current study could corroborate a similar nine-factor structure for the original and shortened versions of the CERQ and of note is that Refocus on Planning seemed intermingled with Positive Reappraisal in older adults. Yet, the nomological net was highly similar for shortened versions when compared to the nomological net of the original CERQ. This implies the original and shortened CERQ versions largely tap the same construct in older adults. We therefore advice to use the shortest form (CERQ-short with 18 items) when a 'large' test battery is administered or in settings were short assessments instruments are needed, like for example in mental health care for older adults, where cognitive problems are rather the rule than the exception (Rossi et al., 2014; van Alphen et al., 2015).

Footnotes

[1]On the external measures, there were gender differences on the BIS total, SCL-90-R Somatic Complaints, UCL Active Problem Solving, UCL Palliative Coping, UCL Avoidance, UCL Social Support Seeking, UCL Passive/Depressive Coping and UCL Reassuring Thoughts scales

[2] Due to a null absolute frequency on the highest response category of item 1, measurement invariance using WLSM estimation method required collapsing the two higher categories for this item.

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Conflict of Interest
The authors do not have any personal, scientific, professional, legal, financial or other interests or relationships to declare.

Ethical Approval
This study was approved by the Medical Ethical Committee of the University Hospital Brussels and Vrije Universiteit Brussel (VUB) (B.U.N. 143201837212).

Data Availability
Data is not available as it is part of an ongoing project.

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