



The COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale. An Investigation of the REBT Theoretical Model

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Abstract

The present study proposes a contextual specific, short measure of irrational and rational beliefs in order to provide a methodologically rigorous investigation of the REBT theoretical model. The COVID-19 Pandemic- Related Irrational and Rational Beliefs Scale was developed according with the REBT theory including rationally and irrationally worded items for each of the four cognitive processes. The data were collected online via google forms between March and June 2020, the sample comprised 798 individuals. A series of confirmatory factor analysis was conducted to investigate the factor structure of the scale. A total of seven measurement models representing different hypotheses about the structural relationship between the 32 items were estimated. Among the seven competing models, the eight-factor bifactor model comprising eight cognitive processes of irrational and rational beliefs factors and a general factor showed the best trade-of between model fit and complexity among all models. This model is congruent with the current theoretical formulation of REBT. The irrational cognitive processes themselves were highly correlated and the rational cognitive processes were moderately to highly correlate with each other. The concurrent validity was investigated and the results supported the validity of the instrument. Implications for research and clinical practice are discussed.

Keywords COVID-19 · Pandemic · Irrational beliefs · Rational beliefs

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Introduction

In cognitive-behavioral therapy (CBT), the basic assumption of all conceptual models is that cognitions are the main determinant of people's emotional and behavioral problems. They are the mediators of the impact of stressful life events on people's emotional and behavioral responses (Beck, 1976; Ellis, 1994).

Specifically, in rational emotive-behavioral therapy (REBT), the ABCDE model is a general model of human functioning that can be used to understand and explain both human day by day functioning and pathological disturbance. It offers a conceptual framework based on which people emotions and behaviors can be predicted, understood, described and explained (David et al., 2009). According to this model (Ellis, 1994), when people experience an event (A – Activating event) that confirms or blocks their goals, they explicitly or implicitly react with their belief system (B) followed by their emotional and/or behavioral consequences (C). In this times, all people experienced the same activating event, CORONA virus pandemic that blocks their aims (stay healthy, meeting friends, get a new position, have fun, earning money etc.). If their evaluations (B) are rational, then they will have healthy, constructive emotions and behaviors such as concern, sadness, annoyance, remorse, disappointment, regret, respecting the rules, helping others. If they have irrational beliefs instead (B) they will not be able to achieve their goals and they will experience unhealthy, unconstructive emotions and behaviors such as anxiety, depression, anger, guilt, hurt, shame, aggressiveness, breaking the rules, aggressive behaviors, compulsions. As ordinary people, we have had few options regarding this unfortunate event (A—pandemic) that occurs in our lives, but we have a considerable choice as to how we think about this event and how we evaluate it. REBT encourage people to question, to challenge, to dispute their faulty, irrational beliefs (D) and change them with healthy, rational beliefs (E).

Irrational beliefs are “unrealistic, illogical, absolutist and devoutly held even when they are unprovable and unfalsifiable” and rational beliefs are “realistic, logical, non-dogmatic and flexible” (Ellis, 1994, pp. 141). They are implicit, unconscious core philosophies of life, which can be expressed through self-talk sentences and phrases, but also through images, fantasies. Rational beliefs are self-helting, socially helpful cognitions. At the algorithmic-representational level, irrational beliefs are propositional representations and schemas (Ellis et al., 2010). At the computational level, irrational and rational beliefs are “hot” and “warm” cognition, they have an evaluation function, so they are necessary and sufficient to produce emotions (Abelson & Rosenberg, 1958; Ellis et al., 2010; Lazarus & Smith, 1988). Our understanding about pandemic time, what is a pandemic and how it operate represents the level of “cold” cognition, the general and contextual knowing – “Pandemic affects entire countries and continents, this pandemic is caused by a new virus (descriptions), only very few people are immune to it, the number of diseases increases rapidly (inferences)” (Abelson & Rosenberg, 1958; Lazarus & Smith, 1988). The evaluation of significance of this knowing for our well-being is called appraisal, hot cognition. Taking as an example the irrational cognition “This pandemic should not have existed!” and the rational cognition “I wish this pandemic didn’t exist!” it can be assert that both are primary appraisals because refers to extent to which pandemic touches personal

goals (to be healthy) and to the extent to which the transaction person-environment is inconsistent with what the person wants (the person wants a world free of pandemic).

Models of Irrational/Rational Beliefs and Their Empirical Support

From his earliest writings, Ellis (1956, 1958) postulated that all humans express desires that may include wishes and preferences or absolute musts and demands. People's wishes and preferences are healthy, productive and the absolute musts and demands are unhealthy and destructive. Ellis has always asserted that explicit or implicit absolutistic, rigid, dogmatic demands (expressed as must, should, need, ought to, have to) are the core irrational beliefs (Ellis, 1994). Three main absolutistic demands are responsible for emotional and pragmatically disturbance; (1) Ego musts ("I must be allowed to do what I want!"), (2) Other people musts ("All people should respect the rules!") and (3) Life conditions musts ("This pandemic should not have existed!", "No restrictions should be imposed on us!"). Three derivatives of absolutistic demands were then conceptualized as unrealistic, overgeneralized inferences and attributions: (1) Awfulizing ("It is awful what happened!"), (2) Global evaluation of human worth ("Only the worthless get sick!") and (3) Frustration intolerance ("I can't stand wearing a mask!") (Ellis, 1994). Preferences are considered the core flexible beliefs of psychological health or functional emotions (Dryden, 2019). They also address the three domains as their irrational alternative are doing: (1) Ego preferences ("I would like, prefer to be allowed to do what I want in this pandemic time."); (2) Other people preferences ("I would like all people to follow the rules of the pandemic."); and (3) Life conditions preferences ("I would have preferred not to experience this pandemic in my life."). Three main rational beliefs derivatives from this core: (1) Realistic negative evaluation ("The pandemic time is bad, but it is not the end of the world"); (2) Unconditional acceptance beliefs ("Not wearing a mask is a mistake in this pandemic period, but the people who do this are human beings with qualities and defects, like all of us."); (3) Frustration tolerance beliefs ("Sometimes, wearing the mask is difficult, but I can tolerate this discomfort.").

The idea that some cognitions are more central to clients' problems than others is also supported by cognitive therapy. The core cognitive process can be distinguished by peripheral ones, schemas are organized hierarchically, some being more central, other more peripheral. The central cognitive process/schema are related and focused on self, they are rules that determine self-worth and influence emotions and behaviors in a range of situations, are more difficult to change and chronologically they develop first. The peripheral ones derive out from the core cognitive process/schema (Guidano & Liotti, 1983; Mahoney, 1982; Meichenbaum & Gilmore, 1984, Robins & Hayes, 1990; Safran et al., 1986). Beck (2020) talks about intermediate beliefs (attitudes, rules, assumptions) that developed under the influence of core beliefs. In cognitive therapy, absolutistic demands, catastrophizing and labeling are conceptualized as cognitive distortions (Freeman et al., 1990). Cognitive distortions are cognitive processes that influence the processing of new information so that it is compatible with schema. Global evaluation of self-worth follows under the category of core schemas about self, absolutistic demands are subsumed under the rules (intermediate

beliefs), and awfulizing are also intermediate beliefs, specifically attitudes (Beck, 2020).

In Ellis's point of view, irrational and rational beliefs vary in content and can coexist at the same time, the individual can have both irrational and rational cognitions towards the same activating event (Ellis, 1994). According with cognitive therapy, common themes can be found in clients' core schemas (Robins & Hayes, 1990). For example, in depression the core beliefs about self can be grouped in three categories: helplessness, unlovability and worthlessness (Beck, 1983, 2020). In anxiety, the core schemas focus on overestimation of future threat and on the increased sense of vulnerability and lack of safety (Clark & Beck, 2010).

There are few empirical studies that support the centrality of demandingness beliefs. Szentagotai et al. (2005) founded that demandingness accompanied all other irrational beliefs, and both demandingness and global evaluation of human worth are organized as schemas, biasing the memory retrieval of both schema congruent and schema incongruent information. DiLorenzo, David and Montgomery (2007) found that demandingness effect on exam related emotional distress is mediated by awfulizing and global evaluation beliefs. Hyland, Shevlin, Adamson and Boduszek (2013) demonstrated that demandingness directly affects some of posttraumatic stress disorder (PTSD) symptoms and other PTSD symptoms are indirectly influenced by it through derivatives beliefs. Hyland, Shevlin, Adamson and Boduszek (2015) showed that each secondary rational belief had a direct effect on PTSD symptoms and two of them (global evaluation and frustration intolerance) mediated the effect of preferences on PTSD symptoms. Buschmann et al. (2017) showed that demandingness predicted frustration intolerance and global evaluation beliefs and these two derivatives mediated demandingness' effect on automatic thoughts.

Based on previous work of Burgess (1990), DiGiuseppe, Leaf, Exner and Robin (1988) proposed a three dimensional model: (1) four processes of irrational thinking (demandingness, awfulizing, global evaluation and frustration intolerance); (2) three content domains (achievement, approval and comfort) and (3) irrational vs. rational dimension. They assessed the model with The Attitudes and Beliefs Scale – 2 (ABS- 2). Bernard (1998) added another content area – fairness and another cognitive process – other condemnation, resulting one rationality factor and six irrationality factors: (1) need for achievement; (2) need for approval; (3) need for comfort; (4) demand for fairness; (5) self-downing and (6) other-downing. He developed The General Attitudes and Beliefs Scale (GABS).

Fülöp (2007) performed confirmatory factor analysis of ABS-2 and the results supported the 24 factors model proposed by DiGiuseppe, Leaf, Exner and Robin (1988). The best model fit was obtained by a second order model in which the 24 factors represented the first-order latent factors that loaded on four second-order latent factor: global evaluation, rationality, comfort and irrationality. All items measuring global evaluation grouped into one factor no matter of their irrational or rational modality or their content. The rational elements that measure the remaining three processes were loaded on a single factor called rationality. The irrational elements with comfort content were grouped on one factor and those with achievement content on another factor.

Hyland, Shevlin, Adamson, and Boduszek (2014) stated that the purpose of REBT is to evaluate the eight processes (four irrational and four rational) rather than the context in which they occur, and in terms of ABS-2, the elements that measure processes are contaminated by the content. Applying a bifactor modeling approach they support the eight factors model (four irrational processes and four rational processes), even though the model fit statistics failed to satisfy acceptable fit criteria across all indices.

DiGiuseppe, Leaf, Gorman and Robin (2018) conducted an exploratory factor analysis and failed to confirm the model proposed in 1988. The first factor was the modality (irrationality vs. rationality), the second was rationality, the third irrationality and the fourth achievement beliefs. They concluded that the dimension of irrationality vs. rationality is more important than the cognitive processes and their content. Using the same sample of data (1132 participants) and Diagonally Weighted Least Squares, DiGiuseppe, Gorman and Raptis (2021) obtained better fit indices than did those reported by previous studies who used Mplus with MLR estimation (Hyland et al., 2014) or LISREL (Fülöp, 2007). Their results support the irrational and rational cognitive processes and irrational-rational dimensions. The content area did not emerge as “nuisance factors”. They argued the development of the measurements irrational and rational beliefs with specific content areas.

There are no many contextual specific measures of irrational/rational beliefs. Osberg, Poland, Aguayo and MacDougall (2008) proposed The Irrational Food Beliefs Scale and their exploratory factor analysis confirmed two factors: food irrational beliefs and food rational beliefs. Turner et al. (2016) developed The Irrational Performance Beliefs Inventory and confirmatory factor analysis supported the four irrational cognitive processes. Hyland, Shevlin, Adamson and Boduszek (2013) constructed Trauma-Related Irrational Belief Scale but they didn’t run a confirmatory factor analysis, instead their results supported that trauma-specific awfulizing, frustration intolerance, and global evaluation of human worth beliefs predicted strong symptoms of PTSD. This measurement is similar with The Exam-Related Beliefs Scale proposed by Montgomery, David, Dilorenzo and Schnur (2007), but the authors didn’t offer data about any confirmatory analysis.

The present study proposed a contextual specific measure of irrational and rational beliefs in order to provide a methodologically rigorous investigation of the REBT theoretical model. The COVID-19 Pandemic- Related Irrational and Rational Beliefs Scale was developed according with the REBT theory including rationally and irrationally worded items for each of the four cognitive processes. The content is consistent across all items referring to pandemic of COVID-19. The main aim of this study was to investigate the construct validity of this specific scale firstly, verifying its structural validity by testing a series of theoretically plausible models, including the eight-factor model and secondly, establishing its concurrent validity through correlational analysis with another measurement.

Methods

Participants

The sample of this study comprised 798 individuals (82.39% female) aged between 16 and 70 ($M=30.75$, $SD=11.28$) from Romania (90.35%), Hungary (8.77%), and other countries (0.88%). Of this sample, 274 participants were single (34.34%), 289 married (36.22%), 225 in a relationship (28.20%), and 10 widower (1.25%). There were no missing values on any of the variables used in the current study. A number of 102 Romanians (80% female) aged between 16 and 60 ($M=24.25$, $SD=10.28$) completed also General Attitudes and Beliefs Scale–Short Form.

Procedure

In the first phase, the scale has been created. At least four items for each cognitive process category were developed. Based on the advice of four experts trained in REBT, four final items were extracted to measure each belief. Because previous studies showed that frustration intolerance is a multidimensional construct, we proposes one item to measure each of the following types of frustration intolerance: intolerance to emotional distress, rules' intolerance, uncertainty's intolerance and ambiguity's intolerance. The subscale of global evaluation of human worth has two items measuring self-downing and two items evaluation others condemnation. In the second phase, the scale was translated into Hungarian, German, English and Russian language, so that participants could fill out the questionnaire in their native language. Native speakers were involved in order to have accurate translates. Back translations into Romanian were also made and the inadequacies were solved. The data were collected online via google forms between March and June 2020. The participants voluntarily completed the questionnaire that was distributed on social networks. They were informed about their participation in the study as being voluntary and anonymous. They could withdraw from the study any time, without any negative consequences. The participants must be at least 16 years old to take part in this study.

Instruments

The COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale is a 32 items scale, 16 of them measure irrational beliefs and the other 16 items rational beliefs. A number of four items measure each category of cognitive processes: (1) Demandingness (“This should not have happened “); (2) Frustration intolerance (“I can no longer stand the feeling of distress created by this pandemic”); (3) Awfulizing (“It would be awful if I or my family got infected”); (4) Global evaluation of human worth (“Everyone who doesn’t follow the rules is an idiot”); (5) Preferences (“It would have been nice if all these hadn’t happened to us, surely there are factors that created this pandemic, we can only accept these times”); (6) Frustration tolerance (“I can deal with the emotional distress generated by coronavirus pandemic”); (7) Realistic negative evaluation (“All the stress and all the pressure in the medical systems are negative things that happen, but they can be overcome”); (8) Uncon-

ditional acceptance (“ Those who do not follow the rules are very wrong, it would be better to help them to understand and to become aware of the consequences of their own mistakes”). All items can be consulted in Annex A. The participants are instructed to read carefully the ideas regarding the coronavirus pandemic and select how often these thoughts crossed their mind in the last week on a continuous scale of seven points where 1 means “not at all” and 7 “very often”. Coefficient α were .59 for Demandingness, .82 for Frustration intolerance, .78 for Awfulizing, .67 for Global evaluation of human worth, .58 for Preferences, .74 for Frustration tolerance, .77 for Realistic negative evaluation, and .74 for Unconditional acceptance.

General Attitudes and Beliefs Scale–Short Form (GABS-SF) is a self-report measure for rational and irrational beliefs based on 26 items. The GABS subscales are: need for achievement, need for approval, need for comfort, demand for fairness, self-downing, other downing, and rational thinking. Adequate psychometric properties have been reported in the literature, the values for coefficient α were higher than 0.80 (Lindner et al., 2007).

Analytic Strategy

In the first step, a series of confirmatory factor analysis (CFA; Brown, 2015) was conducted to investigate the factor structure of the COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale. A total of seven measurement models representing different hypotheses about the structural relationship between the 32 items measuring irrational and rational beliefs were estimated (see Fig. 1): A one-factor

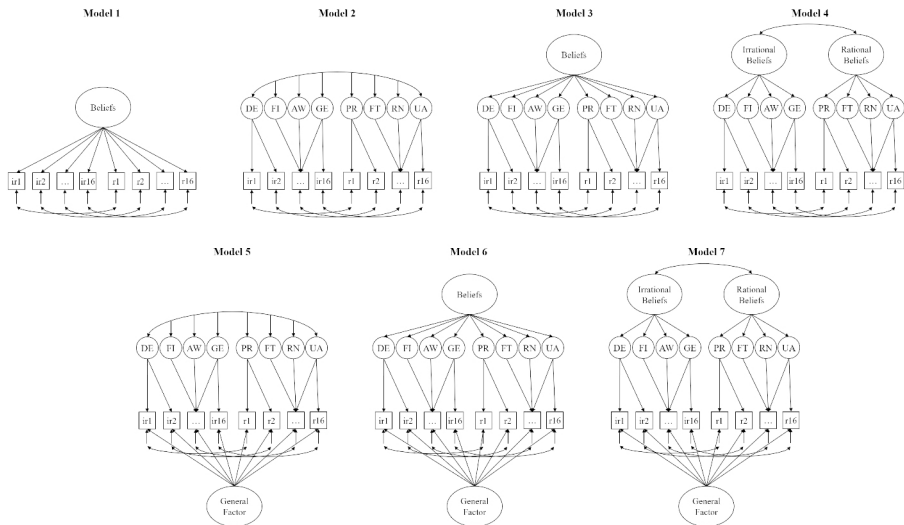


Fig. 1 Measurement Models for the COVID-19 Pandemic - Related Irrational and Rational Beliefs ScaleN

Note. ir1=Item 1 of the irrational beliefs scale; r1=Item 1 of the rational beliefs scale; DE=Demandingness; FI=Frustration intolerance; AW=Awfulizing; GE=Global evaluation of human worth; PR=Preferences; FT=Frustration tolerance; RN=Realistic negative evaluation; UA=Unconditional acceptance

model representing a general beliefs factor across all items (Model 1), an eight-factor model representing eight cognitive processes of irrational and rational beliefs (Model 2), a second-order factor model representing one general higher-order beliefs factor across all eight cognitive process factors (Model 3), a second-order factor model representing two general higher-order irrational and rational factor across all eight cognitive process factors (Model 4), an eight-factor bifactor model as a variant of Model 2 including a general factor (Model 5), an one second-order bifactor model as a variant of Model 3 including a general factor (Model 6), and a two-second-order bifactor model as a variant of Model 4 including a general factor (Model 7). Residual covariances among items with similar item meaning or wording were specified in all models (Bandalos, 2021).

In the second step, latent correlations among the irrational and rational factors based on the measurement model selected in the previous step were inspected.

Measurement models were evaluated using the fit indices CFI, TLI, RMSEA, and SRMR based on common cut-off criteria, i.e., CFI/TLI > 0.90 and RMSEA/SRMR < 0.08 for an acceptable model fit (see Kline, 2016). In addition, information criteria (AIC, BIC, and SABIC) were used to select among competing models, where a lower AIC, BIC, and SABIC value indicates a better trade-of between model fit and complexity.

Models were estimated with Mplus 8.6 (Muthén & Muthén, 1998–2017) maximum likelihood estimation method (MLR) with chi-square test statistic and standard errors robust against violation of the normality assumption.

Results

Factor Structure of the COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale

In order to investigate the factor structure of the COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale, a series of CFA was conducted to estimate seven measurement models (see Table 1).

Among the seven competing models, the eight-factor bifactor model comprising eight cognitive processes of irrational and rational beliefs factors and a general factor (Model 5) showed the lowest AIC, BIC, and SABIC indicating the best trade-of between model fit and complexity among all models. Moreover, the model fit according to CFI, TLI, RMSEA, and SRMR was acceptable, $\chi^2(386) = 1113.67$, CFI = 0.922, TLI = 0.900, RMSEA = 0.049, SRMR = 0.048. All items possessed factor loading greater than 0.40. The range of factor loadings varied between 0.45 and 0.55 for Preferences, 0.48–0.72 for Frustration tolerance, 0.42–0.74 for Realistic negative evaluation, 0.45–0.64 for Unconditional acceptance, 0.40–0.54 for Demandingness, 0.66–0.79 for Frustration intolerance, 0.61–0.74 for Awfulizing, and 0.48–0.65 for Global evaluation of human worth.

Table 1 Results of the Confirmatory Factor Analysis: Model Comparison

Model	χ^2	df	CFI	TLI	RMSEA	SRMR	AIC	BIC	SABIC
Model 1: One-Factor Model	4603.37	446	0.554	0.504	0.108	0.138	94452.15	948985.91	94623.90
Model 2: Eight-Factor Model	1876.53	418	0.844	0.814	0.066	0.077	91363.06	92027.92	91576.99
Model 3: One Second-Order Factor Model	2894.16	438	0.737	0.702	0.084	0.136	92490.75	93061.97	92674.55
Model 4: Two Second-Order Factor Model	2161.91	437	0.815	0.790	0.070	0.098	91647.95	92223.85	91833.26
Model 5: Eight-Factor Bifactor Model	1113.67	386	0.922	0.900	0.049	0.048	90529.01	91343.70	90791.15
Model 6: One Second-Order Bifactor Model	1571.78	406	0.875	0.847	0.060	0.057	91014.74	91735.79	91246.75
Model 7: Two Second-Order Bifactor Model	1284.27	405	0.906	0.884	0.052	0.052	90674.55	91400.27	90908.06

Note. $N=798$; Selected model according to AIC, BIC, and SABIC in boldface. CFI=Comparative fit index; TLI=Tucker-Lewis index; RMSEA=Root mean square error of approximation; SRMR=Standardized Root Mean Square Residual; AIC=Akaike information criterion; BIC=Bayesian information criterion; SABIC=Sample-size adjusted Bayesian information criterion

Table 2 Results of the Confirmatory Factor Analysis: Latent Correlations Among the Rational and Irrational Beliefs Factors

Variable	1.	2.	3.	4.	5.	6.	7.	8.
1. Preferences								
2. Frustration tolerance		0.57						
3. Realistic negative evaluation		0.61	0.81					
4. Unconditional acceptance		0.68	0.70	0.81				
5. Demandingness		0.59	0.21	0.33	0.42			
6. Frustration intolerance		0.47	-0.10	0.08	0.22	0.77		
7. Awfulizing		0.52	-0.01	0.17	0.27	0.78	0.92	
8. Global evaluation of human worth		0.45	0.12	0.17	0.26	0.71	0.78	0.77

Note. $N=798$; Statistically significant results at $\alpha=0.05$ are in boldface

Relationship Among Irrational and Rational Beliefs

In order to investigate the relationship among the eight cognitive processes, latent correlations among the irrational and rational belief factors were inspected (see Table 2).

The factor preferences was moderately correlated with all other irrational and rational beliefs. The factor demandingness was moderately correlated with global evaluation of human worth and weakly correlated with all other rational beliefs. The association was high with the other irrational beliefs: frustration intolerance and awfulizing. Frustration tolerance was highly correlated with realistic negative evalu-

ation, moderately with unconditional acceptance and weakly with demandingness. No other significant associations were found between frustration tolerance and other irrational beliefs. Realistic negative evaluation was highly correlated with unconditional acceptance and weakly with the irrational beliefs. The largest association was found between frustration intolerance and awfulizing. Global evaluation of human worth was highly correlated with both frustration intolerance and awfulizing.

The correlations between eight factors and the subscales of GABS-SV are presented in Table 3.

The correlations between the four rational cognitive processes and GABS-SV rational thinking subscale are weak. Rational thinking significantly correlated with frustration tolerance and realistic negative evaluation. Demandingness was significantly correlated with need for achievement, need for approval and demand for fairness. All these relationships were weak. Frustration intolerance moderately correlated with need for achievement and weakly associated with need for approval, need for comfort, demand for fairness and other-downing. Awfulizing weakly correlated with all these subscales. Global evaluation of human worth was weakly related with self-downing, need for achievement, need for approval, need for comfort and demand for fairness.

Discussion

This article presented data on a new short measurement of irrational and rational beliefs related with COVID-19 pandemic. The idea to propose such scale was based on previous studies that pleaded for more content-specific scales' development to measure irrational and rational beliefs (DiGiuseppe et al., 2021; DiGiuseppe et al.,

Table 3 Correlations Among the Rational and Irrational Beliefs Factors and GABS-SV subscales

Variable	Self-downing	Achievement	Approval	Comfort	Fairness	Other-downing	Rational beliefs
1. Preferences							0.08
2. Frustration tolerance							0.26
3. Realistic negative evaluation							0.22
4. Unconditional acceptance							-0.10
5. Demandingness	0.13	0.32	0.40	0.12	0.32	0.18	
6. Frustration intolerance	0.18	0.57	0.32	0.45	0.46	0.41	
7. Awfulizing	0.18	0.48	0.34	0.39	0.39	0.37	
8. Global evaluation of human worth	0.31	0.37	0.38	0.24	0.24	0.13	

Note. $N=102$; Statistically significant results at $\alpha=0.05$ are in boldface

2018; Hyland et al., 2014). Such measurements may have more relevance in assessing specific irrational associated with different functional or clinical emotional problems and evaluating specific rational beliefs as protective factors against such emotional difficulties. The content specific scales may also solve the “nuisance factors” problem of irrational/rational beliefs measurements’ validity.

As far as we know, four such scales have been proposed to evaluate irrational and rational beliefs in specific contexts: The Irrational Food Beliefs Scale (Osberg et al., 2008), The Irrational Performance Beliefs Inventory (Turner et al., 2016), Trauma-Related Irrational Belief Scale (Hyland et al., 2013), and The Exam-Related Beliefs Scale (Montgomery et al., 2007). The Irrational Food Beliefs Scale fails to evaluate the updated theory of REBT focused on four cognitive processes (demandingness, awfulizing, frustration intolerance and global evaluation of human worth), assess constructs from other cognitive-behavioral therapy models (inferences), and does not measure the rational beliefs. The other three scales are based on the updated REBT theory. However, The Exam-Related Beliefs Scale proposed only one item to measure each of irrational and rational beliefs. Trauma-Related Irrational Belief Scale does not assess the rationality component of cognitive processes, but only the four irrational beliefs through two items per each. The Irrational Performance Beliefs Inventory uses seven items to assess each of the four cognitive processes, but it doesn’t measure their rational counterparts. It has been translated and validated in other languages as German (Chrysidis et al., 2020), Thai (Chotpitayasunondh & Turner, 2019), Turkish (Urfa & Aşçı, 2018), and Persian (Nejati et al., 2022). The factorial structure was confirmed for Turkish, Thai and Persian language versions.

From the generalized measures category of rational and irrational beliefs, Attitudes and Belief Scale 2, both long and short form are the most studied (DiGiuseppe et al., 2018; DiGiuseppe et al., 2021; Fülöp, 2007; Hyland et al., 2014). The data supported an eight-factor model, where each factor represented one of the four cognitive processes in their irrational and rational form and one general factor. This model is in concordance with REBT theory that there are four irrational cognitive processes, each of them having a rational correspondent.

The COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale follows previous studies’ recommendations regarding irrational and rational beliefs scales’ development (David et al., 2019; Hyland et al., 2014; Terjesen et al., 2009). Being a situationally specific measure, the context of COVID-19 is explicitly identifiable in each item. Each of the cognitive process is evaluated with four items, measured along a continuous scale of seven points. Both irrationality and rationality component of the four cognitive processes are assessed.

A number of seven models were estimated. The results did suggest that the eight-factor bifactor model comprising eight cognitive processes of irrational and rational beliefs factors and a general factor showed the best trade-of between model fit and complexity among all models. According to CFI, TLI, RMSEA, and SRMR the model fit was acceptable. This model is congruent with the current theoretical formulation of REBT and it was supported by the CFA analysis on the general scale of irrational and rational beliefs ABS-2 structure (DiGiuseppe et al., 2021; Hyland et al., 2017; Hyland et al., 2014). So the new instrument assesses functional and dysfunctional beliefs in the specific context of the COVID-19 pandemic, and it makes sense

to report eight sub-scores of cognitive processes. The model's eight grouping factors (four irrational and four rational beliefs) are hypothesized to be uncorrelated with the general factor, supposed to measure the content, the specific context in which the eight cognitive processes are being expressed.

The irrational cognitive processes themselves were highly correlated, the only moderate association was between demandingness and global evaluation of human worth. Strong correlations between irrational factors were reported in the case of other instruments as well (Trip et al., 2019; Trip & Bora, 2012; Turner et al., 2016). The largest correlation was between frustration intolerance and awfulizing at 0.92. A strong correlation between these two factors was obtained also by DiGiuseppe et al. (2021), Hayland, Shevlin, Adamson and Buduszek (2013) in the analysis of abbreviated ABS 2 form. The rational cognitive processes were moderately to highly correlate with each other. The largest correlations were between realistic negative evaluation and frustration tolerance, respective unconditional acceptance at 0.81. The fact that irrational beliefs were positively correlated to one another and the same pattern was obtained for the rational alternatives could suggest the presence of two second-order latent factors irrationality and rationality. However, model 7 that checked this hypothesis didn't meet the cut-off criteria for the model fit. The correlation between demandingness and preferences factors was positive and moderate, similar to DiGiuseppe et al. (2021). People generally do not distinguish between absolutist demands and desires, they learn to do this only in therapy. In the case of the COVID-19 pandemic, people's wishes can remain wishes, but also quickly can become absolutist demands without them being aware of the emotional and behavioral consequences of this change. The factor preferences was mostly moderately associated with all other rational and irrational factors. Demandingness was strongly correlated with all irrational factors and weakly with the other three rational factors. We can speculate that maybe the preference beliefs are our general factor of resilience, the core rational belief, but this must be proven in future studies. Previous studies have focused more on proving what Ellis argued, that absolutist demands are the core irrational belief and the main cause of the human emotional disturbance. They have totally ignored the idea that maybe preferences are the core rational belief and the main determinant of our well-being.

The lowest values of α Cronbach coefficients were recorded for demandingness, and preferences (0.59, 0.58). The value of global evaluation of human worth subscale (0.67) was also slightly below 0.70. The size of α Cronbach is influenced by the number of items. Checking the items' loadings on each of these factors revealed acceptable values of the standardized coefficients, even though their values are not so high.

To strengthen the evidence for construct validity of the scale, correlations were calculated between the eight cognitive processes and the GABS-SV subscales. Global evaluation of worth subscale seems to measure more self-downing than other – downing, significant correlation being observed with GABS-SV subscale of self-devaluation. Frustration intolerance and awfulizing correlated with all irrational GABS-SV subscales, except self-downing. Demandingness was associated with demand for fairness, need for achievement and need for approval. Frustration tolerance and realistic negative evaluation were correlated with GABS-SV rationality thinking subscale. Correlations with a general measure of irrational and rational

beliefs support that The COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale measures the eight cognitive processes – four irrational beliefs and four rational beliefs.

As in the case of any study, there are some limitations that need to be indicated. In our sample, males were underrepresented. Previous studies have typically reported that male sex are associated with non-response to online surveys (Lallukka et al., 2020). In the same time, online data collection runs the risk of not being able to track participants' responses and preventing false answers.

In conclusion, the current study advances the science and practice in REBT by developing an evidence-based assessment of the irrational and rational cognitive processes that people may express in the context of the COVID-19 pandemic. The COVID-19 Pandemic—Related Irrational and Rational Beliefs Scale is a situationally – specific measure of the cognitive processes. These types of measures are closer to the clinical practice of REBT, in which the therapist identifies client's irrational beliefs activated by a specific event and attempts to replace them with their alternative rational beliefs. Its clinical utility is also evident in prevention. By identifying the dominant irrational and rational cognitions of the population during this period of the pandemic, public messages can be formulated in such a way as to support the adaptive behaviors of the population and reduce their emotional distress. Thus, they can contain elements from the dispute of irrational cognitions, include rational variants and make the connection between this adaptive way of thinking and adaptive emotions and behaviors. It was translated into four languages and these translations can be used by other researchers in order to investigate their psychometric properties. The structure of this scale supports the conceptual model of REBT based on eight cognitive processes – four irrational beliefs and four rational beliefs. This will allow researchers to develop new specific irrational / rational beliefs scales and to test hypothesis concerning whether different cognitive processes are related with different emotional problems and emotional well-being as well as with different dysfunctional and functional behaviors specific to this pandemic time.

Appendix A

Irrational Beliefs.

1. This should not have happened.
2. Everyone must/should respect the rules.
3. Our country should close its borders even for its own citizens.
4. The authorities should be more competent.
5. I can no longer stand the feeling of distress created by this pandemic.
6. All these rules are unendurable.
7. The uncertainty regarding a possible infection of myself or my family is unbearable.
8. Everything regarding this virus is ambiguous, and this is hard to accept.
9. It would be awful if I or my family got infected.
10. It is terrible what is happening in the medical system right now.

11. The number of infected people is increasing daily in my country and in Europe and this is spreading horror/terror.
12. It is terrible to be isolated, to stay indoors of your house, or to be quarantined.
13. If I or my family becomes ill it means that I am weak, since I was not able to protect my family.
14. Everyone who doesn't follow the rules is an idiot.
15. The authorities are incompetent.
16. They consider us fools.

Rational Beliefs.

1. It would have been nice if all these hadn't happened to us, surely there are factors that created this pandemic, we can only accept these times.
2. For saving human lives, it would be desirable and useful that everyone should follow the rules imposed, but I understand that some people cannot do it for various reasons (they are not informed, they are dominated by emotions, they think wrongly, etc.).
3. I would have liked our country to close its borders even for its own citizens, but I understand that this is not possible.
4. I would prefer that the authorities were more competent, but now I cannot change that.
5. I can deal with the emotional distress generated by coronavirus pandemic.
6. I can tolerate all the newly imposed rules and I understand the importance of respecting them to stop the virus from spreading and saving human lives.
7. I can't be 100% certain that I or my family won't get infected with the virus, but I can face the thought that there is this risk.
8. At present, there is an ambiguity regarding the emergence of the virus, its evolution and methods of healing, but I can accept all of this, humanity is trying to make progress towards overcoming the pandemic.
9. It would be really bad if I or my family got infected, but if it happens I have hope for a full recovery.
10. All the stress and all the pressure in the medical systems are negative things that happen, but they can be overcome.
11. It is absolutely normal to worry about the fact that the number of infected people is increasing, but I can continue to live my life in the most enjoyable way, of course, under the given conditions.
12. It is not very pleasant that we must isolate ourselves, stay in the house, or in quarantine, but this is very important for the faster end of the pandemic.
13. If I or my family got sick, it only means that we failed in following the safety procedures, but this does not make me a weak human being.
14. Those who do not follow the rules are very wrong, it would be better to help them understand and to become aware of the consequences of their own mistakes.
15. The state authorities endeavor to stop the pandemic, even if sometimes they do not take the measures that I expect or consider appropriate.
16. By the fact that rules are imposed, it is desired to stop the contamination and it does not mean that we are being fooled.

Data Availability The data that support the findings of this study are available from the corresponding author, [ST], upon reasonable request.

Declarations

Conflict of Interest The authors have declared no conflict of interest.

Ethical approval This study was carried out in accordance with the recommendations of Code of Ethics of University of Oradea. The protocol was approved by the Ethics Committee for Research, Faculty of Socio-Humanistic Sciences, University of Oradea. According to the Helsinki Declaration, in order to consent to their involvement in the study, participants were informed that their contribution is voluntary and anonymous. They could withdraw from the study at any time, without any negative consequences. The participants had to be at least 16 years old to take part in this study.

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