

Defining and measuring cognitive resilience in diverse groups

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Initial receipt: 01.03.2015 Final revision received: 01.04.2015 Accepted: 01.05.2015

Abstract: Cognitive resilience is a relatively new concept that defines the capacity to surpass the negative effects of failures and associated stress on performance or cognitive functions. Working in diverse groups has proved to be a challenge, associated with high levels of stress. The first goal of the article is to define cognitive resilience in the setting of diverse groups. The second goal of this article is to present the instrument built in order to measure cognitive resilience. The Cognitive Resilience Questionnaire (CRQ) consists of 11 items, each self-rated on a 5-point Likert scale (1-5), with higher scores reflecting greater cognitive resilience. The questionnaire was administered to a sample of 109 men and women, all exposed to settings that require working in diverse groups. The psychometric properties of the instrument were evaluated. The CRQ has potential utility in organizational and research settings.

Key words: cognitive resilience, definition, questionnaire development, diverse groups.

1. Theoretical grounding

Interest in research on resilience has increased substantially over the last two decades (Windle, Bennett, & Noyes, 2011). Unfortunately, the complexities of what appears to be the simple concept of resilience raise considerable challenges when developing an operational definition of resilience (Windle, 2010). In physics and material sciences, resilience has an accepted definition, being described as the characteristic of a material that allows it to revert to its original shape or condition after being bent, stretched or compressed (Tarter & Vanyukov, 1999). In humanistic sciences, Norm Garmezy was one of the most important pioneers in the conceptualization and study of resilience. From the early 70s, he first started research in the field of developmental psychopathology – the roots of resilience. Secondly, he required a methodologically rigorous approach to data analysis, considering that resilience should not have been seen as an equivalent to positive psychology. Furthermore, Garmezy appreciated the need for resilience research to include personality disposition, a nurturing family

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environment and external societal support system (Rutter, 2012). In this sense, resilience has been used to describe different kinds of phenomena across different disciplines. Based on the discipline origin, Shaikh and Kauppy (2010) divided resilience definitions into two clusters. The first cluster comprised definitions from the field of psychology and described resilience as: 1) a personality trait, 2) a positive outcome, a form of adaptation despite high risk, 3) a factor associated with positive adaptation, 4) a process, 5) sustaining competent functioning, stress resistance, and 6) recovery help from trauma or adversity. The second cluster included definitions from sociology. Furthermore, in her review and analysis on resilience, Windle (2010) presented definitions from different areas, such as developmental psychology, life course context environment, biology and psychiatry and organizations. While resilience received many definitions, disagreement on defining the concept still exists. After analysing a set of definitions of resilience provided by psychological studies, it has become apparent that resilience is a process, personal capacity, ability that help people recover from or adapt to, face adversities, stressful events and difficult life experiences (Windle, Bennett & Noyers, 2011; Walsh, 2002; Luthar, Cicchetti, & Becker, 2000; Staudinger, Marsiske & Baltes; 1995; Wyman et al., 1999).

While family resilience has become more popular over the years, the concept of cognitive resilience has only recently drawn the attention of scientists. The literature on cognitive resilience has focused on individuals that hardly recover from stress, while others are better able to withstand or overcome it. To understand the phenomenon better, Butler and Hope (2007) give the example of two men that lose their jobs. Having the same position, earning the same amount of money and both being satisfied with their jobs, the two men react differently to unemployment. While one man searches for another job, the other one wants his old job back. Why did the two men react differently? The definition of cognitive resilience –the capacity to overcome the negative effects of setbacks and associated stress on cognitive function and on performance – will provide the answer. Cognitive resilience can be understood as a continuum of functionality or behavioural outcome. At one pole of the continuum, cognitive processes are ineffective; at the other pole of the continuum there are few or no negative effects of stress on cognitive performance (Staal, Bolton, Yaroush & Bourne, 2008). Concerning the lack of definition given to cognitive resilience, it is important to mention the related concepts that have been associated with cognitive resilience, such as hardness, stress vulnerability, coping style, and self-efficacy (Bandura, 2001; Florian, Mikulincer & Taubman, 1995; Rhodewalt & Zone, 1989). Furthermore, several factors were shown to contribute to cognitive resilience. The factors include cognitive appraisal, locus of control, and

perception of predictability, perception of control, cognitive flexibility, dispositional optimism, coping styles, motivation, effort and social support systems (Bandura, 2001; Seligman & Csikszentmihalyi, 2000; Lazarus, 1990). This study focuses on three factors – coping and adaptation, cognitive flexibility and cognitive appraisal.

The idea of resilience can be applied to any functional system, but it has been applied most frequently to individuals, less often to higher social systems, including families, classrooms, working groups or schools. In order to analyse the cognitive resilience of a system, it is required to identify if there is a potential threat to the system, as cognitive resilience is quintessentially inferential (Masten & Obradovic, 2006). This present study aims to investigate resilience in the context of diverse groups. In order to increase their competitive advantage, companies have adopted the diverse working groups as a development strategy. Creating diverse groups has not been very hard to achieve regarding the process of globalization and the workforce diversity (Christian, Porter & Moffitt, 2006; Naquin & Tynan, 2003). Groups can be diverse in several aspects, starting from visible characteristics (age, gender, physical characteristics) to less visible aspects, such as attitude (Milliken & Martin, 1996). Groups can also be diverse in their cognitive abilities and skills, educational background, expertise or attitudes toward social aspects (Pelled, 1996; Larson, 2007).

As mentioned earlier, cognitive resilience can be applied to diverse groups if a potential threat can be identified. In the literature of diversity research, group diversity has been seen as a “double edged sword” (Williams & O’Reilly, 1998) bringing both advantages and disadvantages. A possible threat that diversity can create refers to a high level of stress that individuals working in diverse groups have to face. Stress has become a feared enemy for both employees and employers and is defined as a physiological and psychological state that appears when the resources an individual has are not enough to face the demands of a specific situation (Michie, 2002). Inside diverse groups there are multiple situations that create stress. Most situations that produce high levels of stress refer to low attraction between diverse members working in the same group, negative preconceptions (Tsui, Egan & O’Reilly, 1992), conflicts (Pelled et al., 1999) and low group cohesion (Watson, Kumar & Michaelsen, 1993). All these negative aspects have important negative economic impact on an organization’s performance as well as an individual’s wellbeing and health.

Regarding the multiple negative effects that stress has on people working in diverse groups, a high level of cognitive resilience could be useful for both individuals and organizations. Research demonstrates that cognitive resilience can be enhanced through intervention and that people can learn to be more resilient (Connor & Davidson, 2003; Newman, 2005;

Luthans & al., 2006). Therefore, assessment scales, used to measure cognitive resilience, are important in order to evaluate specific factors that are strong in an individual or those that are weaker and need developing.

Furthermore, in the search for other instruments that measure cognitive resilience, we found few. As for this, we chose a series of instruments that measure resilience and factors that compose cognitive resilience. The Connor-Davidson Resilience Scale (CD-RISC), Ego Resiliency, The Brief Resilience Scale, The Cognitive Flexibility Inventory and the Stress Appraisal Measure, were the instruments reviewed in order to build CRQ (see Table 1).

Table 1 Description of Resilience Measures

Name	Authors	Purpose of the measure
Scale (CD-RISC)	Connor-Davidson Resilience Connor & Davidson (2003)	To assess an individual's stress coping ability. The scale was developed in order to assess five factors (trust, tolerance, acceptance of change and secure relationship control, spiritual influences and the strengthening effects of stress).
Ego Resiliency	Klohn (1996)	To investigate the components of ego resiliency (interpersonal warmth and insight, skilled expressiveness, confident optimism, productive and autonomous activity).
The Brief Resilience Scale	Smith et al. (2008)	To assess the ability to bounce back and recover from stress.
The Cognitive Flexibility Inventory	Dennis & Vader Wall (2009)	Designed to measure three aspects of cognitive flexibility: a) the tendency to perceive difficult situations as controllable; b) the ability to perceive multiple alternative explanations for life occurrences and human behaviour; and c) the ability to generate multiple alternative solutions to difficult situations.
The Stress Appraisal Measure	Peacock & Wong (1990)	Developed to assess dimensions of primary and secondary appraisal (threat, challenge and centrality).

2. Objectives

The first objective of this present study was to define cognitive resilience in the context of diverse groups.

The second objective of this study was to present the development phases of the Cognitive Resilience Questionnaire (CRQ) and to analyze data collected, with the following purposes: to assess the reliability of the CRQ and to assess the three compositions of the CRQ.

3. Method

3.1. Participants

The total sample consisted of 109 participants, 65 female and 44 male, ages 18 to 55 ($M = 25.6$, $SD = 6.5$). The participants are working full time jobs in local companies that use diverse teams in order to increase company performance. Furthermore, all the participants are working in diverse teams as a daily working routine. Participation in the study required the employees to fill in the questionnaire. The CRQ was completed in a paper-pencil format, taking approximately ten minutes. Approval to conduct the study was obtained from each of the company's managers involved in the study.

3.2. Design

There were three phases in the development of the CRQ: (1) production of a preliminary questionnaire, (2) construction of the CRQ and (3) assessment of its psychometric properties.

3.3. Procedure

Scale development

Preliminary questionnaire

The Cognitive Resilience Questionnaire was developed as a brief, self-rated assessment to measure resilience in individuals. The content of the preliminary questionnaire was obtained from several sources (e.g. instruments assessing resilience and studies that focused on resilience and cognitive resilience issues). For a full presentation of the instruments used in order to develop the preliminary questionnaire see table 1 above.

A comprehensive literature review found cognitive resilience to be a multidimensional construct. Common findings revealed three interrelated components of cognitive resilience including: coping and adaptation, cognitive flexibility and cognitive appraisal (Kumpfer, 1999; Luthans & Cicchetti, 2006; Rotter, 1989).

Coping and adaptation

Folkman and Moskowitz (2004) define coping – the first factor of cognitive resilience – as “thoughts and behaviours used to manage the

internal and external demands of situations that are appraised as stressful” (p. 754), while adaptation is the process of adapting to a changing environment or stressful circumstances (Maluccio, 2002). In the study of resilience, coping is seen as a variable that reduces the likelihood of experiencing psychological distress (Hooberman & Rosenfled, 2010). Furthermore, coping is important because an individual’s ability to cope with stress affects their psychological, physical and social well-being (Folkman & Lazarus, 1980; Connor & Davidson, 2003).

Cognitive flexibility

The cognitive flexibility construct has received many definitions, but there is no consensus within the literature about how to define it. The ability to switch cognitive sets to adapt to changing environmental stimuli appears to be the most important component for most definitions of cognitive flexibility (Dennis & Vander Wal, 2010). Cognitive resilience and cognitive flexibility have a common point in what is known as executive control. Executive control is described as a form of cognitive processing that uses internal representation to formulate a plan that guides behaviour and the ability to switch gears if something unexpected happens. The capacity to switch gears is known as cognitive complexity (Goldberg & Bougakov, 2005). Furthermore, the ability to think flexibly, to accept challenging or distressing events, to develop alternative explanations and reframe negative situation have been identified as core elements of cognitive resilience (Haglund et al., 2007).

Cognitive appraisal

The last factor to discuss in this study is cognitive appraisal. When facing stressful life events, including relatively minor ones (e.g. arguing with a friend) and major ones (e.g. stressful working condition or loss of a family member), people exhibit different reactions. While some show significantly impaired functioning, others exhibit a high level of resilience. The difference in ways in which individuals react to life stressful events depends on the cognitive appraisal they make (Troy & Mauss, 2011).

The preliminary questionnaire was constructed on the basis of the analyzed sources and included 15 items.

Construction of the CRQ

In order to finalize construction of the CRQ, a copy of the preliminary questionnaire was sent to five experts in resilience. Consultation with the experts was made to assure face validity. After consulting the experts, some items were slightly modified or excluded in order to eliminate ambiguous terms or non-representative items for the expected factors. The CRQ contains 11 items, each of which is rated on a 5-point Likert scale as follows: 1 – Strongly disagree, 2 – Disagree, 3 – Neither disagree nor agree, 4 – Agree, 5 –Strongly Agree. The Likert rating scale was utilized due to its

ability to produce reliable scores and its ease of use for both assessors and respondents (Breckler, Olson & Wiggins, 2006). To avoid the possibility of a response set bias, some items were negatively worded, and these items were reverse scored. The total scores can range from 11 – 55, with higher scores reflecting greater resilience.

Psychometric analysis of the CRQ

The internal consistency of the questionnaire was evaluated using Cronbach’s alpha for the item-total scores.

To assess the factor composition of the CRQ, an exploratory factor analysis was conducted. It was expected that the questionnaire would reveal a three-factor structure.

4. Results

Cronbach’s alpha for the CRQ was .88 (see table 2), which indicates good internal consistency and therefore high reliability. Item-total correlations ranged from .24 to .79, with majority falling between .50 and .71 (see table 2).

Table 2. Reliability analysis – scale (Alpha)

Item-total Statistics				
Item	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Cronbach’s Alpha of Item Deleted
1	34.24	51.69	.794	.867
2	34.17	53.21	.718	.872
3	34.00	50.64	.711	.870
4	33.72	54.06	.678	.875
5	34.13	49.19	.708	.870
6	34.37	47.03	.697	.872
7	35.31	57.72	.244	.898
8	34.68	54.15	.448	.887
9	33.96	52.89	.610	.877
10	34.96	51.74	.696	.871
11	35.37	54.45	.502	.883
Reliability Coefficient				
11 items				
Alpha = .88				

Factor analysis

To assess the factor composition of the CRQ, as well as the construct validity, the 11 items of the questionnaire were subjected to a principal component analysis (PCA), followed by a varimax rotation. Prior to performing the PCA, the suitability of the data for factor analysis was

assessed. Inspection of the correlation matrix revealed coefficients of .30 and above. The Kaiser-Meyer Oklin value was .69, exceeding the recommended value of .60, and the Barlett's Test of Sphericity reached statistical significance, supporting the factorability of the correlation matrix. As a three factor structure was expected, it was decided to retain three factors for further analysis. The Varimax rotation revealed that all items loading into one or more of the three factors. The three factors were interpreted in the following manner: factor 1 represented coping and adaptation, factor 2 represented cognitive flexibility and factor 3 represented cognitive appraisal. The item loadings and factor pattern are presented in Table 3. The eigenvalues of the five factors, the percentage of variance explained by each other and the total variance explained, are also presented in Table 3.

Table 3. Factorial saturation for rotated factors

Factors	Item	Factorial saturations	
Coping & Adaptation	Q3 Atunci când trebuie să iau o decizie, cântăresc toate opțiunile.	.811	
	Q7 Mă aștept ca lucrurile să meargă așa cum mi-am propus.	.798	
	Q5 Când am foarte multe sarcini de îndeplinit, cer ajutorul persoanelor apropiate.	.586	
	Q10 Cred în zicala « Ce nu te omoară, te face mai puternic. »	.586	
	Q11 Când am o discuție în contradictoriu, prefer să las de la mine.	.764	
Cognitive Flexibility	Q4 Intr-o discuție accept și punctele celorlalți de vedere.	.678	
	Q9 Intr-o discuție nu accept punctele celorlalți de vedere.	.640	
	Q6 Când am discuții în contradictoriu, nu îmi place să cedez.	.671	
Cognitive Evaluation	Q8 Atunci când sunt constrânsă de timp, devin neliniștită.	.841	
	Q9 Chiar dacă întâmpin obstacole, reușesc să obțin ceea ce vreau.	.668	
	Q1 Atunci când sunt constrânsă de timp, rămân calmă.	.637	
Eigenvalue	F1 3.71	F2 1.55	F3 1.40
% of Variance	F1 33.76	F2 14.16	F3 12.78

Extraction Method: Principal Component Analysis

Rotation Model: Varimax with Kaiser Normalization

5. Discussion

Reliability

The CRQ demonstrated good internal consistency. The item-total correlations were moderate to high, further indicating adequate reliability.

Factor analysis

Analysis of the factor composition of the CRQ revealed a three-factor structure, which supports the theoretical grounding of cognitive resilience as a multidimensional construct (Richardson, 2002). The questionnaire was comprised of three internal factors: factor 1 related to coping and adaptation, factor 2 to cognitive flexibility and factor 3 to cognitive appraisal. This corresponds with the literature, which suggests that these three factors can be regarded as the underlying factors of cognitive resilience (Bandura, 2001; Florian, Mikulincer & Taubman, 1995; Rhodewalt & Zone, 1989). Therefore, the three factors reflect the theoretical definitions of cognitive resilience.

Application for the CRQ

The questionnaire could have potential utility in organizational practice and research. The CRQ could be used to measure and quantify the level of cognitive resilience an individual has when encountering difficult or stressful situations. Furthermore, the CRQ identifies specific factors that are strong in an individual or those that are weaker and need developing. As for this, prevention and intervention programs can be designed in order to enhance specific factors that further enhance cognitive resilience.

Additionally, the questionnaire could be of use to researchers that are interested in studying cognitive resilience in organizational settings.

Limitations of the study

The total sample of the study was low and had a greater representation of females. Both aspects will limit the generalizability of the results. Another limitation of the study consists in the degree and number of stressors that people in this sample faced. This aspect has not been investigated; therefore it is difficult to determine if all individuals, viewed as resilient, had experienced comparable levels of adversity.

Future direction

In order to have an instrument with sound psychometrical properties, future research will focus on assessing the convergent and concurrent validity. As far as stress is concerned, it will remain a present aspect in organizational settings, is imperative for further research to investigate the factors that contribute to cognitive resilience; this is the process involved in the development of cognitive resilience and test strategies to improve it. Such efforts may not only enhance productivity, but potentially reduce absenteeism and low satisfaction in employees.

Final conclusion

Positive psychology recognizes the value of assessing and developing individuals' strengths in order to increase stress adaptation. Cognitive resilience is one of those strengths, and research suggests that is modifiable (Ryan & Caltabiano, 2009). The assessment and development of cognitive resilience is important, as individuals face many stressors, changes and challenges. The CRQ is a measurement meant to assess cognitive resilience and is comprised of three factors. Prevention and intervention programs in organizational settings could focus on developing these three factors.

Acknowledgement: This paper is supported by the Sectoral Operational Programme Human Resources Development (SOP HRD), financed from the European Social Fund and by the Romanian Government under the contract number POSDRU/159/1.5/S/133675.

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