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The Czech Validation of the Self-Regulation Questionnaire

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Abstract

The authors report on the validation of the Self-Regulation Questionnaire (SRQ), originally developed by Brown et al. (1999). The SRQ was administered to a sample of 360 university students in the Czech Republic. The factor analysis yielded a four-factor model with factors Impulse Control, Goal Orientation, Self-direction and Decision Making. In this version, SRQ has 27 items with a reliability of .88. The total explained variance was 43%. The findings supported the claim that SRQ does not follow the sequence of steps in self-regulation as described by Miller and Brown (1991).

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*Keywords:*self-regulation; adaptation of SRQ; construct validity: exploratory factor analysis (EFA); internal consistency: Cronbach´s alpha.

1. Introduction

One of the most significant human qualities is the ability to self-regulate one's behavior, attention, will and emotion. Self-regulation has become a relatively well-researched area in the field of psychology, pedagogy, social cognitive theory and adjacent disciplines. The ability to develop, implement, and flexibly maintain planned behaviour in order to achieve one's goals (Brown, Miller & Lawendowski, 1999) is an important potential enabling one to live in today's world. Understanding how self-regulated behaviour develops, functions and how is organized is the main aim of many studies in this area.

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Self-regulation has been a part of research activity across all continents for the last fifty years. The diversity in general theories, models, domain specific applications of the self-regulation theory and research is wide (cf. Boekaerts, Pintrich & Zeidner, 2005).[†] From the social cognitive point of view, that we prefer, self-regulation is seen as an interaction of a triad of personal, behavioural, and environmental processes (Bandura, 1986). In this regard we can claim that self-regulation includes not only behavioural skills (behavioural self-regulation) in managing environmental contingencies (environmental self-regulation) but it also includes a sense of personal agency to enact these skills in relevant contexts. Further, self-regulation includes inner thoughts, feelings and actions that are planned, monitored and cyclically adapted according to acquired feedback and goals.

When referring to the self-regulation processes, it is important to distinguish their phases or stages. There is, however, no consensus on the exact number and the character of such phases. Carver and Scheier (1982) and Kanfer (1970) have proposed a three-phase theory of self-regulation that includes self-monitoring, self-evaluation, and self-reinforcement. Miller and Brown (1991) elaborated on Kanfer´s model and expanded the number of processes involved in self-regulation to seven. They clarified the multiple processes that are involved in successful behavioural change including informational input, self-evaluation, instigation to change, search, planning, implementation, and plan evaluation. Carey, Neal and Collins (2004) provided a single-dimension solution, which was an invariant across gender and semester. Based on a follow-up investigation, Neal and Carey (2005) proposed two self-regulation phases (dimensions). The idea implicit in all conceptualizations is that deficits in any one stage may result in self-regulation difficulties.

That is why we intend to find out if one of the presented concepts of phases in self-regulation (Miller, Brown, 1991) is valid even for university students in the Czech Republic. We believe that only empirical testing can examine: (1) whether there are any phases or stages of self-regulation; (2) what these phases are and how many there are; (3) if these phases are universal for individuals in various circumstances and contexts. Therefore, we continue in deductive-nomological testing of theories because on its basis it is possible to verify or reformulate scientific theories as C. G. Hampel (1965) and K. R. Popper (2002) point out.

The focus on Czech students is relevant to the given issue because, as opposed to previous research (Aubrey, Brown, & Miller, 1994; Carey, Neal & Collins 2004; Neal & Carey 2005), it will deal with students outside the Anglo-Saxon countries. Therefore, this study also contributes to gain a better insight into cultural differences of self-regulation.

In order to be able to implement the presented research, it is necessary to validate a research tool for this concept. In this regard, the main objective of the study is to validate the research tool for the research on self-regulation. This research tool is then used to determine the individual phases of self-regulation among Czech students, the second objective of our paper. We believe that, because of the two objectives, we are able to create a tool for further research in self-regulation in the Czech Republic and also to contribute to the studies of foreign researchers (see Aubrey, Brown, & Miller, 1994; Carey, Neal, & Collins 2004; Neal & Carey 2005).

2. Research methodology

Since no reliable and valid instrument existed for measuring self-regulation of behaviour in the Czech educational environment, and instead of constructing a new one, we decided to adopt an already existing instrument. We chose the instrument that fits both the academic and non-academic environments, i.e. it measures the general area of self-regulation of human behaviour rather than self-regulated learning. The instrument chosen for adaptation was The Self-Regulation Questionnaire (SRQ) developed by Brown, Miller and Lawendowski (1999). Its authors define self-regulation as the ability to act according to an internal plan with no external support or reward. More specifically, they perceive self-regulation as an ability to implement planned actions and pursue them for achieving

[†] Theory and research of self-regulation is, for example, developed in the field of alcohol abuse (Carey, Carey, Carnrike & Meisler, 1990; Chassin & De Lucia, 1996; Wills, Sandy & Yaeger, 2002), drug use (Baumeister & Heatherton, 2009), procrastination (Eerde, 2000; Senécal & Vallerand, 1995; Motiea, Heidaria & Sadeghic, 2012), students´ high rates of drop-out and truancy (Veenstra, Lindenberg, Tinga &O rmel, 2010).

personal goals. We label the Czech version of this questionnaire as SRQ-CZ.

2.1. Measurement

The SRQ (Brown, Miller &Lawendowski, 1999) is a 63-item self-report instrument designed to assess the ability for self-regulation in individuals in seven phases. These phases reflect the steps needed for effective behavioural self-regulation. Failure or deficits in any of these steps may lead to undesirable behaviour. These steps are as follow:

- Receiving relevant information (i.e. "I usually keep track of my progress toward my goals").
- Evaluating information and comparing it to norms (i.e. "My behaviour is similar to that of my friends'").
- Triggering change (i.e. "I am willing to consider other ways of doing things").
- Searching for options (i.e. "If I wanted to change, I am confident that I could do it").
- Formulating a plan (i.e. "Once I have a goal, I can usually plan how to reach it").
- Implementing the plan (i.e. "I can stick to a plan that's working well").
- Assessing the plan's effectiveness (i.e. "I feel bad when I don't meet my goals").

The instrument consists of 63 items, twenty-six of which are worded negatively and their scores must be reversed in data processing.[‡]The questionnaire uses a 5-point Likert scale ranging from "strongly disagree" to "strongly agree" the centre point being "uncertain". The questionnaire results are calculated as the total score of all 63 items. The higher the score, the better is the capacity for self-regulation.[§]

The reliability of the original questionnaire was evaluated on a community sample of 83 respondents from diverse U.S. populations (Aubrey, Brown, & Miller, 1994). The test-retest reliability for the SRQ was high (r = .94), and so was its internal consistency (α = .91).The authors confirmed the convergent validity of the questionnaire with clients with high alcohol consumption and the divergent validity with clients with low alcohol consumption. The same was done on two samples of college students. The SRQ scores were inversely correlated to risk-taking, impulsivity, driving after drinking alcohol, marijuana use and tobacco smoking. However, the authors did not perform a factor analysis in order to prove the seven steps of self-regulation on which its items were theoretically based.

Further steps to assess the psychometric qualities of the SRQ were done by Carey, Neal and Collins (2004). Their respondents were 391 students on a bachelor degree programme in the United States. The factor analysis which was performed using the principal factor method yielded only one factor, with factor loadings of .40 and higher. This criterion was met by only 31 items. These items were retained to create a short format of the Self-Regulation Questionnaire (SSRQ). The single factor explained 43 % of the total variance. Cronbach's alpha was .92.

Another attempt at investigating the psychometric properties of the SSRQ was done by Neal and Carey (2005). Participants (n = 237) were recruited from an introductory psychology course, and completed a questionnaire packet which included the SSRQ. The confirmatory analysis using the LISREL proved the single-factor model of self-regulation. In exploratory factor analysis two factors emerged with items loading .40 and higher. The Promax rotation for oblique factors was used .Only 21 items were loaded on one of the two factors. The first factor was named Impulse Control, the second was Goa1Setting behaviour. They accounted for 70% and 17% of variance. Both factors were moderately correlated (r = .63) and the authors (Carey et al., 2004) characterize them as "not quite inconsistent with the single-factor solution". The Cronbach's alpha of dimensions were.84 and .86.

As seen above, none of these studies provided empirical support for the existence of the 7 phases of self-regulation, as established by the theory (Miller, Brown, 1991). These results meant a challenge for further research confirming or denying the 7 phase theory.

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‡ Item 28 which was ranked positive in the original questionnaire was proved to be negative in the Czech sample and was also reversed.

§ The authors (Brown, Miller &Lawendowski, 1999) did not specify how to address situations where the respondent´s score was smaller because some items were left uncompleted.

2.2. Sample

The research sample consisted of 360 students at the Faculty of Humanities at Tomas Bata University in Zlín, Czech Republic, who were administered the questionnaire during the autumn 2013 semester. Out of that number, 11.6% of the students were male and 88.1% were female. The age composition of the research sample is illustrated in Table 1.

Table 1.Composition of the research sample by age.

Age of responders	n	%
19-24	261	72.3
25-29	15	4.2
30-39	39	10.8
40-49	45	12.5
ns	1	.3

The composition of the research sample by fields of study is illustrated in Table 2.

Table 2.Composition of the research sample by fields of study.

Field of study	n	%
Social Pedagogy	203	56.2
Health and Social Care	36	10.0
Andragogy	96	26.6
Preschool Teachers' Training	25	6.9
ns	1	0.3

Regarding the distribution by levels of study, 78.4% of the students were enrolled on bachelor degree programmes and 18.5% of the students were studying a master's degree programme. Further, socio-demographic data were collected about the respondents such as the year of study, size of residence, financial situation and economic activity. Questionnaires were distributed by the faculty staff. The respondents were informed of the aim of the research and were provided instruction on filling in the questionnaire. The questionnaires were anonymous and students participated voluntarily.

2.3. I*nstrument preparation*

The questionnaire authors permit free use or adaptation of the questionnaire.** The English version of the questionnaire was first translated into the Czech language and the translation was then checked by an experienced researcher. It is our rule that the translation of an instrument should be adapted to the cultural traditions and language of the country rather than literal, and we claim that back translation (which is the usual practice in research studies) cannot prove the quality of the wording. Therefore, we refrained from the back translation test. Instead, the translation was assessed by a researcher competent in English who analysed the congruence of items with the Czech cultural traditions. The discrepancies in item wording were discussed and solved to reach an agreement.

In the original version of the SRQ a 5-point Likert scale was used despite it being an ordinal scale. Generally, such a scale is less suitable for factor analysis than an interval scale. Therefore, the original scale was transformed to

** This permission can be found on the website of Centre on Alcoholism, Substance Abuse, and Addictions (CASA), University of New Mexico in Albuquerque: http://casaa.unm.edu/inst/SelfRegulation%20Questionnaire%20(SRQ).pdf

create an interval scale by using word labels only at end points of the scale (i.e. 1 = Strongly disagree and 5 = Strongly agree). The numerical points of 2, 3 and 4 were used between the end points.

In previous studies, the questionnaire was scored as a sum of all item scores. We found this method inappropriate because it excluded respondents with missing data. Instead, we calculated the arithmetic mean to express the total raw score of the questionnaire and the scores of the dimensions. Pairwise deletion for handling missing data was used. Respondents with marginal demographic characteristics were excluded from the research sample. These were several respondents over 50 years of age, and several students who studied majors misrepresented in this study.

3. Results

The factor analysis was used to determine the factor structure of the questionnaire and to confirm the 7-dimensional model of the SRQ. First, the Bartlett test of sphericity and the KMO index were calculated to confirm that the data were suitable for factor analysis. Bartlett's test proved significant at .00 level (Chi-square 4, 208.4; df. 703), the KMO index was .89. Both measures proved that the data were appropriate to proceed further with the analysis.

The principal factor analysis was performed on the original 63 items. The extraction yielded a seven factor model with eigenvalues of 1 and higher. A two and four factor solution was considered based on the examination of the scree plot. The four factors accounted for 29% of the total variance but were difficult to interpret. Therefore, in the next step the principal component analysis (PCA) was used as an extraction method. The extraction yielded 19 factors with eigenvalues above 1. Examination of the scree plot suggested two potential factors with 22% of the total variance explained. This result was considered a failure of the factor analysis.

Therefore, a new strategy was adopted. Items from the first extracted factor (amounting to 30) were used for the following PCA. The scree plot indicated 2, 3 or 4 potential factors. The four factor model was adopted in order to achieve the largest total variance explained. Orthogonal Varimax rotation was performed and cross loaded items, as well as items with factor loadings smaller than 0.35, were excluded.

The four factors covered 27 items which explained 43% of the total variance. Cronbach's alpha was .88, and the average total score amounted to 3.7 points with S.D. of .4 (Table3).

Table 3. Factor loadings and psychometric characteristics of SRQ-CZ.

Original item	Item wording	Factor 1	Factor 2	Factor 3	Factor 4
1	I usually keep track of my progress toward my goals.	.45			
5	I have trouble making up my mind about things.	.57			
6	I get easily distracted from my plans.	.68			
10	It's hard for me to see anything helpful about changing my ways.	.38			
19	When it comes to deciding about a change, I feel overwhelmed by the choices.	.69			
20	I have trouble following through with things once I've made up my mind to do something.	.66			
26	I can come up with lots of ways to change, but it's hard for me to decide which one to use.	.65			
62	I give up quickly.	.51			
27	I can stick to a plan that's working well.		.48		
30	I have personal standards, and try to live up to them.		.77		
31	I am set in my ways.		.77		
48	I have rules that I stick by no matter what.		.81		
58	I know how I want to be.		.47		
8	I don't notice the effects of my actions until it's too late.			.59	

21	I don't seem to learn from my mistakes.		.60		
28	I usually only have to make a mistake one time in order to learn from it.		.50		
33	I have a hard time setting goals for myself.		.52		
50	Often I don't notice what I'm doing until someone calls it to my attention.		.56		
54	I usually think before I act.		.57		
57	I learn from my mistakes.		.64		
32	As soon as I see a problem or challenge, I start looking for possible solutions.			.61	
35	When I'm trying to change something, I pay a lot of attention to how I'm doing.			.44	
38	As soon as I see things aren't going right I want to do something about it.			.48	
39	There is usually more than one way to accomplish something.			.64	
46	I can usually find several different possibilities when I want to change something.			.68	
52	Usually I see the need to change before others do.			.42	
53	I'm good at finding different ways to get what I want.			.69	

	Impulse control	Goal orientatio	Self-direction	Decision making	In total
Number of items	8	5	7	7	27
Explained variance in %	23	8	7	5.3	43.3
Cronbach's alpha	.78	.75	.70	.74	.88
Average score	3.6	4.1	3.5	3.6	3.7
S.D.	.6	.6	.6	.6	.4

Note: Respondents received the Czech version of items.

In this model, self-regulation consists of the following factors:

- Impulse control (i.e. "I have trouble making up my mind about things").
- Goal orientation (i.e. "I have personal standards, and try to live up to them").
- Self-direction (i.e. "I usually only have to make a mistake one time in order to learn from it").
- Decision-making (i.e. "As soon as I see things aren't going right I want to do something about it").

The comparison of psychometric data of the original SRQ in three U.S. studies and those from the SRQ-CZ is provided in Table 4. The number of extracted dimensions ranges from 1 to 4 and the number of items is from 21 to 63. As none of these studies confirmed the seven rationally created phases in the self-regulation processes (dimensions in factor analysis) in the Miller and Brown (1991) model, we can conclude that the SRQ is based on a model which is not empirically grounded in research data.

Table 4. Composition of psychometric data of SRQ and SRQ-CZ.

Questionnaire	Sample size	Number of dimensions	Number of items	Explained variance	Cronbach's alpha
SRQ-CZ	360	4	27	43%	.88
Brown et al. (1999)	83	ns	63	ns	.91
Carey et al. (2004)	377	1	31	43%	.92
Neal et al. (2005)	236	2	21	87%	.84; 86

In the SRQ-CZ the correlations between dimensions and the total score ranged from .64 to .81 indicating a relatively good homogeneity of the instrument. The correlations between dimension range from .31 to .81 (Table 5).

All dimensions correlated positively and were statistically significant at the level of 1%. This confirms our previous procedure in which the most appropriate items for the questionnaire were chosen for factor analysis; i.e. those that were initially extracted on the first factor.

Table 5. Intercorrelation between dimensions of SRQ-CZ.

	Goal orientation	Self-direction	Decision making	Overall
Impulse Control	.33	.41	.52	.81
Goal orientation		.31	.43	.64
Self-direction			.32	.70
Decision-making				.77

The overall Cronbach's alpha reliability of the SRQ-CZ was .88 indicating good internal homogeneity. The reliabilities of the dimensions vary from .70 to .78, which is again a relatively good outcome (Table 3).

3.1 Descriptive statistics

The basic results of the research are expressed as the mean total score of the questionnaire. Students with higher scores have a higher level of self-regulation and vice versa. The overall score and scores for each dimension are above the midpoint of the scale (Fig. 1). This indicates that students possess a relatively good ability to self-regulate their behaviour. A more extended interpretation of these findings could be achieved when compared with other samples. Unfortunately, comparison with the U.S. results is not possible because, as we explained above, these studies expressed the scores in a different way.

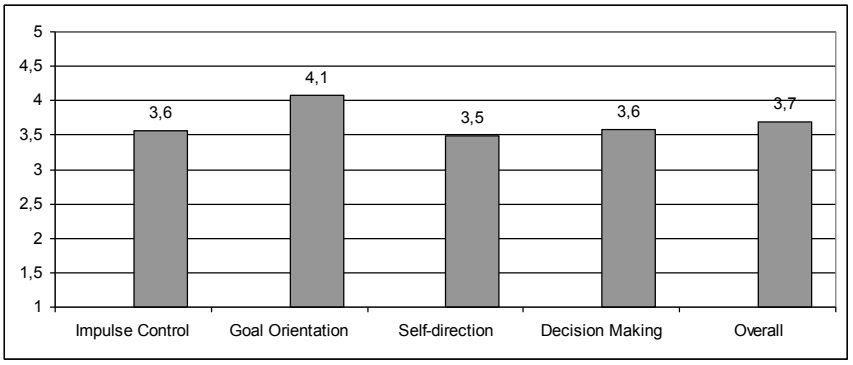

Fig. 1. Arithmetic means of SRQ-CZ scores (n = 360).

The somewhat lower scores on dimensions 1 and 3 were expected because they measure items described as unfavourable behaviour in self-regulatory situations (e.g., "I get easily distracted from my plans"). On the other hand, the high score on dimension 2, which measured goal orientation (e.g., "I have personal standards, and try to live up to them"), confirms that good self-regulation is based on setting individual goals of action and on attempts at achieving these goals. Regarding gender, women and men had equal overall scores (3.7 points). There was a gradual increase of scores in dimensions 2 and 4 with age, and a decrease of scores in dimensions 1 and 3. In other words, dimensions that measured positive qualities in self-regulation increase with age while those that determine unfavourable self-regulation qualities decrease.

4. Discussion

The presented research describes the first attempt at adapting the SRQ questionnaire to the Czech educational environment. Although the adaptation shows satisfactory results, it is necessary to conduct further analysis to verify questionnaire properties, e.g. assess the divergent and convergent validity of the SRQ-CZ.

The SRQ suggests some structural problems. A seven-step theoretical model of self-regulation poses unanswered questions. These seven steps represent solutions for specific tasks in each phase while using self-regulatory activities. The question is whether the person actually proceeds systematically with one step at a time, and whether he/she uses all activities in each phase.

Another problem is a related to the general character of the SRQ. It captures generic rather than specific tasks. We believe, however, that while filling in the questionnaire respondents always relate their answers to a specific action in a life situation. For example, the results of a respondent who filled in the questionnaire related to self-regulation in sports may yield a different picture of self-regulation than that of a respondent who related self-regulation to study activities. This questions the construct validity of the questionnaire.

The findings revealed that impulse control, goal orientation, self-direction and the ability to make decisions are strong predictors of self-regulation among Czech university students. Impulse control rests on the ability to resist temptation, urges or impulses that may disrupt the target behaviour. In this case students with high self-regulation adhered to their activities, were not distracted by external stimuli and easily controlled impulsivity, attention and moods. Students are narrowly focused on set goals and preferences, that they implicitly specify for themselves in order to achieve the results aimed at. They are also usually able to learn from their mistakes and think a lot about what they are doing. Before making decisions, they consider what is likely to happen if they do one thing or another, and they can find more ways to solve problems and know how to learn from them.

Further, the findings do not confirm whether the seven-phase theory of self-regulation (Miller & Brown, 1991) has any empirical relevance. This is probably neither due to a lower number of individual phases of self-regulation nor to the phases being ordered in a different way, but because there are dimensions or spheres of self-regulation rather than phases. The dimensions do not require any time consecution and therefore it can be said that partial processes of self-regulation happen in different moments and are not organized chronologically. What's more, it is important to note that the whole concept of dimensions of self-regulation should be considered as an analytical and not a factual segmentation. This means that the processes of impulse control, goal orientation, self-direction and the ability to make decisions cannot be considered wholly autonomous. They always depend and are reciprocally affected by other processes. Nevertheless, we believe that an analytical differentiation is necessary because without it, it is not possible to see in which situations and to what extent a particular dimension of self-regulation gains superiority.

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