West University of Timisoara
Centre for Psychological Studies and Research & Department of Psychology

Euroregional Centre for Applied Psychology

Romanian Journal of Applied Psychology

(Former Revista de Psihologie Aplicată)

Year (Volume) 18, no.1, 2016

ROMANIAN JOURNAL OF APPLIED PSYCHOLOGY

(Former Revista de Psihologie Aplicată 1999-2009)

Founded in 1999

ISSN-L: 2392-8441
Print ISSN: 2392-8441
Online ISSN: 2392-845x
Former ISSN: 1454 – 8062

The Romanian Journal of Applied Psychology is published biannually (in June and December), in one volume per year by the Euroregional Centre for Applied Psychology (Timisoara, Romania) in cooperation with West University of Timisoara, Department of Psychology. The journal has a blind peer review policy. The Romanian Journal of Applied Psychology is member of the Committee on Publication Ethics (COPE).

The Romanian Journal of Applied Psychology (RJAP) is an Open Access peer-reviewed publication dedicated to the dissemination of research results and theory in all fields of psychology. Through its Open Access policy, the RJAP is committed to disseminate the published papers as widely as possible, so that the article is made freely available online on publication and the author may post a copy of the final typeset PDF on their personal website or institutional repository. There are no processing or acceptance fees that are requested for publishing in RJAP. The journal is devoted to the advancement of applied psychology. It publishes empirical, theoretical, methodological, and practice oriented articles covering topics relevant to various fields of applied psychology. Whereas particular consideration is given to empirical articles using quantitative methodology, the journal will publish the full range of articles including but not limited to empirical qualitative studies, short research reports, meta-analyses, methodological papers or literature reviews.

All submissions should be written in English, according to the American Psychological Association (APA) last edition standards. All charts and figures should be attached separately in a .ttf or in a .gif format. All manuscripts should have an abstract of maximum 150 words, as well as 5 to 7 keywords. There are no limitations regarding the length of a manuscript, however the authors are encouraged to submit manuscripts with less than 10,000 words. Additional details regarding past contributions are available at the following link: http://www.rjap.psihologietm.ro. Please send one copy of your manuscript via e-mail to: submission@rjap.psihologietm.ro.

Journal indexing: DOAJ, EBSCO Host, Index Copernicus, Academic Journal Database, GESIS.

Cover: Lucian David

Romanian Journal of Applied Psychology, Volume 18, No.1, 2016

Table of contents

Romanian Journal of Applied Psychology
2016, Vol. 18, No. 1, 1-7

Explicit and implicit attitudes toward heights: relationship with acrophobic symptoms and sensitivity to cognitive-behavioral treatment. A preliminary report

Radu Șoflău[1] & Silviu Matu[2]

[1]*Department of Psychology, "Alexandru Ioan Cuza" University of Iaşi, Romania*

[2]*Department of Clinical Psychology and Psychotherapy, Babeş-Bolyai University of Cluj-Napoca*

Received 17.10.2015; Received revised 15.05.2016; Accepted 5.06.2016
Available online 30.06.2016

This study aimed to test whether implicit and explicit attitudes toward heights differ between individuals with low and high fear of heights, and whether the implicit and explicit attitudes toward heights are sensitive to a one session cognitive-behavioral treatment (CBT) in the second group. In addition, we also explored the relationships between implicit and explicit attitudes, as well as the effect of retesting on implicit attitudes. Both explicit and implicit attitudes toward heights were assessed in individuals with low (n = 49) and high levels of fear of heights (n = 83) prior to treatment, and reassessed in the second group after one session of CBT intervention in virtual reality. Results show that there are differences in both implicit (F(1, 96) = 25.155, p < .005, partial η^2 = .208) and explicit attitudes (F(1, 96) = 90.970, p < .001, partial η^2 = .487 for cognitive evaluation; F(1, 96) = 69.542, p < .001, partial η^2 = .420 for dangerousness) between fearful and non-fearful individuals. As expected, implicit ($t(48)$ = 3.712, p = .001) and explicit attitudes ($t(56)$ = 4.071, p < .001 for dangerousness; $t(57)$ = 5.002, p < .001 for cognitive evaluation) favorably changed following treatment, with medium effect sizes. These findings suggest that both explicit and implicit attitudes are cognitive factors related to acrophobic symptoms and might play a role as mechanisms in the cognitive-behavioral treatment of heights related fear.

Keywords: Attitudes, Heights, Anxiety, Cognitive Behavioral Treatment, Virtual Reality.

Address of correspondence: Radu Șoflău, Evidence-based Assessment and Psychological Interventions Doctoral School; The International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health, Babeş-Bolyai University of Cluj-Napoca, Babes-Bolyai University, No. 37, Republicii Street 400015, Cluj-Napoca, Cluj, Romania. E-mail: radu.soflau@ubbcluj.ro

Acknowledgements: This work was possible due to the financial support of the Sectorial Operational Program for Human Resources Development 2007-2013, co-financed by the European Social Fund, under the project number POSDRU/159/1.5/S/132400 with the title „Young successful researchers – professional development in an international and interdisciplinary environment".

Introduction

Anxiety disorders represent a major issue for public health. Recent surveys have confirmed that specific phobias are among the most prevalent psychological disorders, indicating high rates (9.4%-12.8%) in the general population throughout the lifespan (Becker, Rinck, Türke, Kause, Goodwin et al., 2007; Bijl, Ravelli, van Zessen, 1998; Kessler, Chiu, Demler, Merikangas, Walters, 2005; Stinson, Dawson, Chou, Smith, Goldstein et al., 2007). Among anxiety disorders, acrophobia is the type of specific phobia with the highest prevalence in the category of natural environment, with reported estimated lifetime rates ranging from 1.1 to 5.9% (Becker et al., 2007; Stinson et al., 2007; Depla, ten Have, van Balkom, de Graaf, 2008). Given the aforementioned high prevalence and the high social (Buist-Bouwman et al., 2006) and economic costs (Smit et al., 2006) associated with anxiety disorders, identifying factors that might contribute to the onset and maintenance of anxiety is of paramount importance. Moreover, testing the ability of different interventions to impact on these factors is also needed.

Implicit and explicit cognitive processing

Cognitive models of anxiety disorders stressed the importance of cognitive processes on the etiology and maintenance of anxiety disorders (Barlow, 1988; Beck, Emery & Greenberg, 1985; Eysenck, 1992; Foa & Kozak, 1986). However, studies assessing the relations between specific anxiety disorders and information processing (e.g., interpretations, evaluations, attitudes) have mainly focused on self-report measures. Although very valuable in social sciences, self-report measures are not without limitation given that the relevant cognitions might be unavailable to introspection and/or might be distorted by self-presentational biases (Schwarz & Oyserman, 2001; de Jong, Pasman, Kindt, & van den Hout, 2001; Dovidio & Fazio, 1992). More recently, a particular emphasis has been placed in dual-process models on the importance of distinguishing between ruled-based, explicit cognitions and more automatically activated associations (i.e., implicit) (e.g., Gawronski & Bodenhausen, 2006).

Automatic associations are assumed to be simple connections between a category (e.g., heights) and its associated concepts in memory (e.g., dangerousness), that are automatically activated in response to a relevant stimulus (Gawronski & Bodenhausen, 2006). These processes do not involve an evaluative intention, nor many cognitive resources (Cunningham, Raye, & Johnson, 2004) and are independent of truth value assignments (Gawronski & Bodenhausen, 2006). Unlike implicit attitudes, explicit attitudes are seen as evaluative judgments based on propositional reasoning that are dependent on their subjective validity (Gawronski & Bodenhausen, 2006). On other words, while implicitly measured attitudes reflect the activation of associations in memory, explicit attitudes reflect the result of a validation process (Gawronski, LeBel & Peters, 2007). Therefore, although one may rate as false the proposition "heights are dangerous", an association between heights and dangerousness may still be activated in memory.

Considering these conceptual differences, whereas explicit attitudes are usually evaluated with self-report scales, studies on implicit attitudes propose a complementary assessment tool based on response time performance in seemingly unrelated tasks (Ellwart, Rinck & Becker, 2006). Although free of evaluative intention, the association between a certain category and evaluative concepts is used as a proxy for implicit attitudes. Hence, implicit attitudes are typically inferred from the performance on response latency measures. Even though a relative large number of implicit tests have been recently proposed, the Implicit Association Test (IAT) (Greenwald, McGhee & Schwartz, 1998) appears to be one of the most suitable, adequate psychometric properties being reported for this instrument (see De Houwer, 2003; Fazio & Olson, 2003 for a review).

IAT assesses implicit attitudes (Greenwald, McGhee & Schwartz, 1998) by measuring the association between two attribute and two target dimensions. In this computerized task, participants are asked to press one of two response keys to categorize a stimulus appearing in the center of the screen in one of the categories presented in the two opposite top corners of the screen. The assumption of the IAT is that faster responses are obtained in tasks where strongly associated concepts share the same response key (i.e., compatible block; e.g., heights related and negative words require pressing one key, while ground related and positive words the other key) as compared to tasks where the opposite assignment (i.e., incompatible block) is used (e.g., heights related and positive words share the same key, while ground related and negative words share the other response key). The implicit association is computed as the difference in average response time between the compatible and the incompatible blocks.

Implicit and explicit attitudes in fearful and non-fearful individuals

Considering the claim that implicit and explicit attitudes toward a phobic stimulus play a role in the onset and maintenance of anxiety, it would be expected for these variables to clearly distinguish between highly and low/non-fearful individuals. Previous studies (de Jong, van den Hout, Rietbroek & Huijding, 2003; Ellwart, Rinck, & Becker, 2006; Huijdin, de Jong, 2009; Teachman & Woody, 2003) tried to test this hypothesis, but their findings are somewhat mixed. Teachman & Woody (2003) reported stronger fear related implicit evaluative associations toward spiders for spider phobic individuals, as compared to non-phobic individuals, but only for two of the four IATs they used. In opposition, de Jong, van den Hout, Rietbroek & Huijding (2003) found more negative attitudes toward spiders at the explicit level, but not at the implicit level, while Huijdin & de Jong (2009) reported more negative attitudes at both explicit and implicit levels in phobic than in non-phobic individuals. Even though acrophobia is the most prevalent specific phobia in the natural environment category, to our knowledge no study compared implicit and explicit attitudes toward heights between fearful and non-fearful individuals. Only one study (Teachman et al., 2008) used IAT to assess automatic associations with heights, but it focused on the association between heights and fear (i.e., "afraid" versus "unafraid") and not on evaluative associations. Therefore it is unclear whether implicit attitudes toward heights differ between anxious and non-anxious individuals.

Changing implicit and explicit attitudes

Previous studies have shown that both implicit and explicit attitudes can be considered a result of conditioning, given that repeated conditional stimulus (CS) – unconditional stimulus (UC) pairing impacted on subsequent evaluations of CS (for reviews, see De Houwer, Thomas & Baeyens, 2001; De Houwer, Baeyens & Field, 2005; Walther, Nagengast, & Traselli, 2005). Therefore, according to these findings, in order to change negative attitudes toward a phobic stimulus it may be required to break the conditioned response, by creating a new CS – UC connection. These results are in line with the theory of Foa & Kozak (1986) that stresses the importance of implicit information processing, stating that exposure based interventions work through replacing the associations acquired in anxiogenic experiences with new associations. Thus, it would be expected for exposure based interventions that are efficient in reducing anxiety to also impact on information processing (e.g., attitudes). Not surprisingly, foregoing studies have proven that exposure based CBT interventions are effective in improving explicit attitudes toward heights in highly anxious individuals (Coelho, Silva, Santos et al., 2008; Emmelkamp, Krijn, Hulsbosch, De Vries, Schuemie, Van der Mast, 2002; Emmelkamp, Bruynzeel, Drost & Van der Mast, 2001; Krijn , Emmelkamp, Biemond et al., 2004). However, little is known about the impact of exposure based interventions on implicit attitudes. Three studies assessed the impact of exposure interventions for specific phobias on implicit attitudes (Huijdin, de Jong, 2009; Teachman, 2007;

Teachman & Woody, 2003). All the three studies focused on spider phobia, and their findings are mixed. Only Teachman (2007; Teachman & Woody, 2003) reported positive findings, while Huijding & de Jong (2007) showed a similar decrease in implicit attitudes among participants who received treatment and those from the wait list group. This may suggest a possible effect of time and/or retesting. Thus, the treatment sensitivity of implicit attitudes toward phobic stimuli, as well as potential effects of retesting on implicit assessment tools are still to be determined. In this context, taking into account that some studies showed that implicit attitudes are resistant to extinction (Hermans et al. 2002; Diaz et al. 2005), and that implicit information processing can influence one's behavior (e.g., avoidant behaviors), it would be important to assess the impact of exposure based interventions on implicit attitudes toward heights, complementary to explicit attitudes.

Present study

As part of a study assessing the efficacy of four Virtual Reality based (VR) interventions in reducing the level of anxiety in individuals with high levels of heights anxiety, we address both explicit and implicit attitudes toward heights. We aim to test whether individuals with high levels of heights anxiety have more negative implicit and explicit attitudes toward heights than individuals with low levels of heights anxiety, prior to intervention. In addition, we aim to evaluate whether explicit and implicit attitudes toward heights are improved in highly anxious individuals following the intervention. We also explore the relationships between explicit and implicit attitudes toward heights, and whether there is an effect of multiple testing for implicit association test.

Method

Participants

A total of 230 individuals were screened with the Acrophobia Questionnaire. Subsequently, all participants willing to continue were invited to a laboratory session to complete a series of measurements. To be included in the highly anxious group, participants had to score 45 or higher on the anxiety subscale, and 10 or higher on the avoidance subscale of the Acrophobia Questionnaire. One hundred participants (43.47%) met these criteria. Those scoring under the cut-offs (n = 130) were included in the low anxiety comparison group.

From 100 highly anxious subjects, data for 83 participants (mean age = 22.75 years, SD = 5.772, range = 18, 49, 86.74% female) who completed at least the initial evaluation in the current phase of the study was included. In addition to exhibiting high anxiety and avoidance toward heights, participants were required to be over 18 years old and not to suffer from any neurological problems.

From the 130 participants eligible for participation in the low anxiety control group, 49 were assessed in the current preliminary phase of this study. Similar to the highly anxious sample, most of those who already completed the assessment tools were also female (79.59 %), with a mean age of 23.08 years (SD = 5.314, range = 18, 38).

Measures

Acrophobia Questionnaire (AQ; Cohen, 1997) comprises two subscales: one for anxiety (with scores between 0 – 120), and one for avoidance (with scores between 0 – 60). The questionnaire describes 20 heights related situations. Anxiety across these situations is assessed on a seven-point scale (0: not at all anxious, 6: extremely anxious), while avoidance behaviors across these situations related to heights is assessed on a three point scale (0: I would not avoid this situation, 2: I would definitely avoid this situation). Previous studies (Cohen, 1977; Baker, Cohen & Sanders, 1973) reported mean values for acrophobic outpatients ranging from 48 to 60 for the anxiety subscale, and from 4 to 14 for the avoidance subscale. A good internal consistency was found in our sample (Cronbach's alpha, r = .81 for Anxiety Subscale and r = .67 for Avoidance Subscale).

Attitudes Toward Heights Questionnaire (ATHQ; Ableson & Curtis, 1989) includes six semantic differential scales on which subjects rate their general opinion toward high places, using six visual analog scales. The questionnaire provides a measure of two attitude variables: cognitive evaluations (good-bad, awful-nice, pleasant-unpleasant) and dangerousness (safe-dangerous, threatening-unthreatening, harmful-harmless). Acceptable internal consistency was found in our sample ($r\alpha$ = .75 for Cognitive Evaluation and $r\alpha$ = .77 for Dangerousness).

Implicit Association Test (IAT, after Greenwald, McGhee & Schwartz, 1998) is a response-time task in which participants had to classify words and pictures into superordinate categories. The task was designed to assess implicit attitudes by measuring the relative strengths of automatic associations between two contrasted target concepts and two attribute concepts. The IAT designed by the authors of in this study consists of items from four categories: the main target concept (heights), the relative target concept (ground), and two attribute concepts (positive-negative). For the target concepts we used both words and images, while in the evaluative categories we included just the words used in ATHQ, in order to ensure that the same attitudes were measured at the explicit and the implicit levels. Thus, in the "positive" category we included the words "good", "nice", "pleasant", "safe", "unthreatening" and "harmless", while in the "negative" attribute category we included the words "bad", "awful", "unpleasant", "dangerous", "threatening" and harmful.

The IAT designed for this study consists of seven blocks: three training blocks (i.e., B1, B2, B5) and four critical blocks: (B1) target discrimination, (B2) attribute discrimination, (B3) first combined block, (B4) second combined block, (B5) reversed target discrimination, (B6) first reversed combined block, and (B7) second reversed combined block (see Table 1). For each critical block, we presented two sets of category pairs simultaneously. Each pair comprised a target and an attribute category. Stimuli representing one of the four categories were randomly presented in the center of the screen, on each trial, while the two pairs of target and attribute categories appeared simultaneously in the opposite top corners of the screen. Participants were asked to indicate on which side of the screen (corresponding to one pair of categories) each stimulus belongs to by pressing a key to indicate the left (i.e., "Z" key) or the right (i.e., "/" key) side. The assumption of the task is that one classifies easier (i.e., shorter response time) in trials where his automatic associations with the target categories (heights/ground) match the target and attribute pairings, as compared to trials where the target and attribute pairings are mismatched (i.e., longer response time). It is thus expected for people with negative attitudes toward heights to classify faster the presented items when "heights" target

category is paired with the "negative" attribute concept (i.e., B3 and B4) than when "heights" target category is paired with the "positive" attribute concept (i.e., B6 and B7). Higher scores indicate more negative implicit attitudes toward heights (i.e., longer response times for blocks where "heights" are associated with "positive" attribute). Previous studies reported satisfactory internal consistency estimates that generally ranged from .7 to .9 (Greenwald & Nosek, 2001; Schmukle & Egloff, 2004). The test-retest reliability of IAT (r = .56) is somewhat lower than recommended (see Schmukle & Egloff, 2004), but considerably higher than the estimates reported for other implicit measures (Bosson, Swann, & Pennebaker, 2000).

Table 1. Blocks included in IAT

Block	Left corner concepts ("Z" key)	Right corner concepts ("/" key)
B1	heights	ground
B2	positive	negative
B3	heights + negative	ground + positive
B4	heights + negative	ground + positive
B5	ground	heights
B6	ground + negative	heights + positive
B7	ground + negative	heights + positive

Procedure

Therapists involved in this study were graduate students, licensed in clinical psychology and cognitive-behavioral psychotherapy. All of them received intensive training for exposure and cognitive restructuring in anxiety disorders.

Therapists met three times with each highly anxious participant enrolled in the study. In the first session, the pre-intervention assessment was individually conducted and the rationale of the treatment was explained. In the second session, the intervention was carried out, while the third session was allocated for post-intervention evaluation.

The effectiveness study in which the data presented here were collected used a 2x2 design with two levels of treatment virtual environment (Head Mounted Display – HMD and Computer Automatic Virtual Environment – CAVE) and two types of interventions (exposure – BT and exposure + cognitive restructuring – CBT). Participants were randomly assigned to one of the four treatment groups.

VR exposure was provided in a dark laboratory at the International Institute for the Advanced Studies of Psychotherapy and Applied Mental Health. Participants from all intervention groups were exposed to four different locations. In the CAVE environment, participants were gradually exposed to: (1) a balcony, (2) the edge of a wall, (3) the edge of a versant, and (4) the roof of a house placed on a versant. In the HMD environment, participants were gradually exposed to a deck placed at the (1) first floor, (2) second floor, (3) third floor, and (4) fourth floor of a building. During each exposure, participants were instructed to stay focused on the aspect perceived as the most frightening/dangerous. Participants had to rate their anxiety level on a 0-10 scale (subjective units of discomfort – SUDS) every two minutes. Each exposure ended when the anxiety diminished to at least half of the maximum level reported. In both VR environments, the therapist controlled the VR exposure using a joystick. However, participants were free to move within the pre-established exposure scenario.

In the two CBT intervention groups, participants were also asked to monitor their thoughts during exposures. Cognitive restructuring (i.e., logical, empirical and pragmatic) was used in addition to exposure, after each exposure phase.

Implicit and explicit attitudes were assessed one week prior to (i.e., pre) and one week after (i.e., post) the intervention. To assess the effect of multiple assessments on IAT, a subsample of participants (n = 20) were re-tested (i.e., intermediate) right before the intervention, when no change in attitudes could be attributable to intervention.

Data analysis

Although there were multiple interventions, for the aims of this study, we chose to combine data from the four groups, as no group effect was found on implicit or explicit attitudes pre or post-intervention (see Table 2). One way MANOVA was used to test differences between highly anxious and low/non anxious individuals concerning implicit and explicit attitudes, followed by three one way ANOVAs for implicit attitudes, and the two explicit attitudes subscales. Repeated measures t tests were used to assess the impact of intervention on implicit and explicit attitudes, as well as the stability of IAT.

Results

Highly versus low anxious individuals

There was a significant difference in attitudes between highly anxious and low/non anxious individuals ($F(3, 94)$ = 38.824, p < .001, Wilk's Λ = 0.447, partial η^2 = .55) on both implicit ($F(1, 96)$ = 25.155, p < .005, partial η^2 = .208) and explicit attitudes ($F(1, 96)$ = 90.970, p < .001, partial η2 = .487 for cognitive evaluation; $F(1, 96)$ = 69.542, p < .001, partial η^2 = .420 for dangerousness). Results indicate more negative implicit and explicit attitudes toward heights in anxious individuals, as compared to low/non anxious individuals.

Associations between implicit and explicit attitudes

Although both implicit and explicit attitudes are changed following the CBT interventions, there is no significant correlation between the two measurements (see Table 3).

Impact of intervention on implicit and explicit attitudes

Both implicit ($t(48)$ = 3.712, p = .001) and explicit attitudes ($t(56)$= 4.071, p < .001 for dangerousness; $t(57)$ = 5.002, p < .001 for cognitive evaluation) were improved after the intervention. The effect sizes were found to be medium for both implicit (Cohen's d = 0.527) and explicit attitudes (Cohen's d = 0.543 for dangerousness; Cohen's d = 0.661 for cognitive evaluation). To further explore the impact of treatment on attitudes, we conducted a one way MANOVA to compare the attitudes toward heights of anxious individuals after the intervention to those of non-fearful individuals. Results showed that after the intervention fearful individuals maintained more negative attitudes toward heights than non-fearful individuals ($F(3, 76)$ = 12.469, p < .001, Wilk's Λ = 0.670, partial η^2 = .33) concerning explicit attitudes ($F(1, 78)$ = 33.539, p < .001, partial η^2 = .301 for cognitive evaluation; $F(1, 78)$ = 28.795, p < .001, partial η^2 = .270 for dangerousness), but

not implicit attitudes ($F(1, 78) = 1.705$, $p = 019$, partial $\eta^2 = .021$).

Stability of the IAT measurement

Our data provide some support for the stability of the IAT. Results revealed no significant differences between the two measures (i.e., pre and intermediate) taken before any intervention was implemented ($t(19) = 0.876$, $p = .392$), but remained significant between the intermediate and the post-intervention measurements ($t(16) = 2.872$, $p = .011$), as expected if IAT was to be stable. Moreover, there was no significant difference after the intervention between those who had an intermediate measurement and those who had not ($t(52) = 0.641$, $p = .524$).

Table 2. Comparisons between treatments for implicit and explicit attitudes

Variable	χ^2	*df*	*p*	Group	Mean rank
IAT pre	2.677	3	0.444	1	34.94
				2	32.98
				3	43.33
				4	34.94
IAT post	0.068	3	0.995	1	27.14
				2	28.25
				3	27.81
				4	26.75
ATHQ-CE pre	1.349	3	0.717	1	33.38
				2	41.64
				3	37.05
				4	39.43
ATHQ-CE post	1.721	3	0.632	1	31.6
				2	34.46
				3	26.84
				4	31.88
ATHQ-D pre	1.585	3	0.663	1	33.67
				2	40.53
				3	34.74
				4	40.55
ATHQ-D post	3.198	3	0.362	1	28.9
				2	36.71
				3	26.2
				4	32.75

Notes: IAT = Implicit Association Test, ATHQ-CE = Attitudes Toward Heights Questionnaire-Cognitive Evaluation Subscale, ATHQ-D = Attitudes Toward Heights Questionnaire-Dangerousness Subscale, pre = prior to intervention, post = post intervention.

Table 3. Correlation matrix

	IAT pre	IAT post	ATHQ-D pre	ATHQ-D post	ATHQ-CE pre	ATHQ-CE post
IAT pre	-					
IAT post	.13	-				
ATHQ-D pre	.03	.12	-			
ATHQ-D post	- .04	.10	.51**	-		
ATHQ-CE pre	- .18	- .06	.58**	.29*	-	
ATHQ-CE post	.06	- .13	.11	.55**	.46**	-

Notes: IAT = Implicit Association Test, ATHQ-CE = Attitudes Toward Heights Questionnaire-Cognitive Evaluation Subscale, ATHQ-D = Attitudes Toward Heights Questionnaire-Dangerousness Subscale, pre = prior to intervention, post = post intervention.

Discussion

This study mainly aimed to investigate whether there is a difference in implicit and explicit attitudes toward heights between highly anxious and low/non anxious individuals, and to evaluate whether explicit and implicit attitudes toward heights among individuals with high levels of heights anxiety would change after the intervention.

The results of our study indicate that this version of IAT is a useful method to assess implicit attitudes toward heights, considering its ability to distinguish between highly anxious and low/non anxious individuals. We found that both implicit and explicit attitudes toward heights are more negative in fearful than non-fearful individuals. These findings are similar to those reported by Huijdin & de Jong (2009) and Teachman & Woody (2003) for spider phobia, but partially contradict the results of de Jong, van den Hout, Rietbroek & Huijding (2003) who found differences in attitudes toward spiders between fearful and non-fearful individuals only at the explicit level, and not at the implicit level. Therefore, somehow in line with the findings from other phobias, this is, to our knowledge, the first study to show that both explicit and implicit attitudes toward heights distinguish between fearful and non-fearful participants.

We also found that a one session of CBT had a medium effect on both implicit and explicit attitudes. However, exploratory analyses indicate that after the intervention only implicit attitudes were similar to those reported by non-fearful individuals, while explicit attitudes were still more negative in highly anxious than in low/non anxious individuals. These findings raise the question of clinical significance. Even though explicit attitudes improved significantly following the intervention, it is unclear whether this change is clinically relevant. Results of the exploratory analyses are somewhat surprising,

considering that implicit attitudes are assumed to be more resistant to change than the explicit ones. A previous study (Huijdin & de Jong, 2009) provided data in line with the abovementioned assumption, by showing that only explicit, but not implicit attitudes significantly improved after an exposure intervention.

A possible explanation for the difference in results could be related to the assessment tool used for implicit attitudes in the two studies. Unlike us, Huijdin & de Jong (2009) used the Extrinsic Affective Simon Task (EAST). Given that a series of studies reported better psychometric properties for IAT than for EAST (see De Houwer & De Bruycker, 2007) it is possible for IAT to be better suited for testing change in implicit attitudes than EAST. On the other hand, our results might also reflect some differences between the psychometric properties of the explicit and the implicit measurements. Since the IAT appears to be a somewhat less reliable assessment tool than the explicit measurements, the measurement error could have contributed to the observed differences.

Potential clinical implications might follow from these results showing that attitudes seem to be sensitive to treatment. Based on cognitive behavioral theories it can been hypothesized (see Teachman & Woody, 2003) that those who maintained highly negative attitudes toward heights might be at risk for relapse, given that biased information processing may act as a vulnerability. Future studies should address this hypothesis.

Our findings concerning the relationship between implicit and explicit attitudes toward heights are somewhat different from those reported in other specific phobias. Although we found no significant relationship between the two variables, other studies (e.g., Ellwart, Rinck & Becker, 2006) found that implicit and explicit attitudes toward spiders tend to be strongly positively associated. In fact, our negative but insignificant results show more similar patterns to the negative associations reported often in social psychology between implicit and explicit racial attitudes (e.g., Fazio, Jackson, Dutton, & Williams, 1995). This may be explained by self-representational biases.

Given that IAT is a relatively new tool in psychopathology research and some studies suggested possible effects of time/retesting on IAT (Huijding & de Jong, 2007), we explored these possible effects in our sample and provide some data in support for the stability of results after repeated measures. However, future studies should include an additional heights fearful group with no intervention to serve as control in order to assess a possible time effect.

The main limitation of this study is the non-experimental nature of the design. In the absence of a heights fearful waitlist group, the impact of the intervention on explicit and implicit attitudes should be interpreted with caution, given that a time effect could not be excluded based on our design. However, as previously noted, attitudes are considered to be resistant to change, especially over a short period of time (i.e., three weeks between pre and post-evaluation). Thus, although a time effect on these variables is unlikely in this study, it could not be excluded as we did not control for this effect.

To sum up, the present study supports the importance of assessing both implicit and explicit attitudes toward phobic stimuli, providing evidence that both variables distinguish between highly anxious and low/non anxious individuals. Moreover, this is the first study to show that implicit and explicit attitudes toward heights improve after one session of virtual reality based CBT in highly anxious individuals. We also offer some support for the stability of IAT. Overall, our findings suggest that both explicit and implicit attitudes are cognitive factors related to acrophobic symptoms and might play a role as cognitive mechanisms in the cognitive-behavioral treatment of heights related fear.

References

Abelson, J.L., & Curtis, G.C. (1989). Cardiac and neuroendocrine responses to exposure therapy in height phobics: desyncrony within the "physiological response system". *Behaviour Research and Therapy, 27*, 561-567.

Baker, B. L., Cohen, D. C., & Saunders, J. T. (1973). Self-directed desensitization for acrophobia. *Behaviour Research and Therapy, 11*, 79–89.

Barlow, D. H. (1988). *Anxiety and its disorders. The nature and treatment of anxiety and panic.* New York: Guilford Press.

Beck, A. T., & Clark, D. A. (1997). An information processing model of anxiety: Automatic and strategic processes. *Behaviour Research and Therapy, 35*, 49–58.

Beck, A. T., Emery, G., & Greenberg, R. L. (1985). Anxiety disorders and phobias: A cognitive perspective. *New York: Basic Books.*

Beck, A. T., Rush, J. A., Shaw, B. F., & Emery, G. (1979). *Cognitive therapy for depression*. New York: Guilford Press.

Becker E. S., Rinck M., Türke V., Kause P., Goodwin R., Neumer S., Margraf J. (2007) Epidemiology of specific phobia subtypes: findings from the Dresden Mental Health Study. *Eur Psychiatry, 22*, 69–74.

Bijl R.V., Ravelli A., van Zessen G. (1998) Prevalence of psychiatric disorder in the general population: results of The Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Social Psychiatry and Psychiatric Epidemiology, 33*, 587–595.

Bosson, J. K., Swann, W. B., & Pennebaker, J. W. (2000). Stalking the perfect measure of implicit self-esteem: The blind men and the elephant revisited? *Journal of Personality and Social Psychology, 79*, 631–643.

Buist-Bouwman, M. A., De Graaf, R., Vollebergh, W. A. M., Alonso, J., Bruffaerts, R., & Ormel, J. (2006). Functional disability of mental disorders and comparison with physical disorders: A study among the general population of six European countries. *Acta Psychiatrica Scandinavica, 113*, 492–500. doi:10.1111/j.1600-0447.2005.00684.x.

Coelho, C. M., Silva, C. F., Santos, J. A., Tichon, J., Wallis, G. (2008). Contrasting the Effectiveness and Efficiency of Virtual Reality and Real Environments in the Treatment of Acrophobia. *PsychNology Journal, 6*, 203-216.

Cohen, D. C. (1977). Comparison of self-report and overt-behavioral procedures for assessing acrophobia. *Behavior Therapy, 8*, 17–23.

Cunningham, W. A., Raye, C. I., & Johnson, M. K. (2004). Implicit and explicit evaluation: fMRI correlates of valence, emotional intensity, and control in the processing of attitudes. *Journal of Cognitive Neuroscience, 16*, 1717–1729.

De Houwer, J. (2003). A structural analysis of indirect measures of attitudes. In J. Musch & K. C. Klauer (Eds.), *The psychology of evaluation: Affective processes in cognition and emotion*, 219–244. Mahwah, NJ: Erlbaum.

De Houwer, J., Baeyens, F., & Field, A. P. (2005). Associative learning of likes and dislikes: Some current controversies and possible ways forward. *Cognition & Emotion, 19*, 161–174.

De Houwer, J., Thomas, S., & Baeyens, F. (2001). Associative learning of likes and dislikes: A review of 25 years of

research on human evaluative conditioning. *Psychological Bulletin, 127,* 853–869.

Dovidio, J. F., & Fazio, R. H. (1992). New technologies for the direct and indirect assessment of attitudes. In J. Tanur (Ed.), *Questions about questions: Inquiries into the cognitive bases of surveys*, 204–237. New York: Sage.

de Jong, P. J., Pasman, W., Kindt, M., & van den Hout, M. A. (2001). A reaction time paradigm to assess (implicit) complaint-specific dysfunctional beliefs. *Behaviour Research and Therapy, 39,* 101–113.

de Jong, P. J., van den Hout, M. A., Rietbroek, H., & Huijding, J. (2003). Dissociations between implicit and explicit attitudes toward phobic stimuli. *Cognition and Emotion, 17*, 521–545.

Depla M. F., ten Have M. L., van Balkom A. J., de Graaf, R. (2008) Specific fears and phobias in the general population: results from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). *Soc Psychiatry Psychiatr Epidemiol, 43*, 200–208.

Ellwart, T., Rinck, M., & Becker, E. S. (2006). From fear to love: Individual differences in implicit spider associations. *Emotion, 6*, 18–27. doi:10.1037/1528-3542.6.1.18.

Emmelkamp, P. M. G., Bruynzeel, M., Drost, L., & van der Mast, C. A. P. G. (2001). Virtual reality treatment in acrophobia: a comparison with exposure in vivo. *Cyberpsychology and Behavior, 4*, 335–340.

Emmelkamp P. M. G., Krijn M., Hulsbosch A. M., De Vries S., Schuemie M. J., Van der Mast C. A. P. G. (2002). Virtual reality treatment versus exposure in vivo: a comparative evaluation in acrophobia. *Behav Res Ther, 40*, 509–516.

Eysenck, M. W. (1992). *Anxiety: The cognitive perspective*. Mahwah, NJ: Erlbaum.

Fazio, R. H., & Olson, M. A. (2003). Implicit measures in social cognition research: Their meaning and use. *Annual Review of Psychology, 54*, 297–327.

Foa, E. B., & Kozak, M. J. (1986). Emotional processing of fear: Exposure to correcting information. *Psychological Bulletin, 99,* 20–35.

Gawronski, B., & Bodenhausen, G. V. (2006). Associative and propositional processes in evaluation: An integrative review of implicit and explicit attitude change. *Psychological Bulletin, 132,* 692–731. doi: 10.1037/0033-2909.132.5.692.

Gawronski, B., LeBel, E. P., & Peters, K. R. (2007). What do implicit measures tell us? Scrutinizing the validity of three common assumptions. *Perspectives on Psychological Science, 2*, 181– 193.

Greenwald, A. G., McGhee, D. E., & Schwartz, J. L. (1998). Measuring individual differences in implicit cognition: The Implicit Association Test. *Journal of Personality and Social Psychology, 74,* 1464–1480.

Greenwald, A. G., & Nosek, B. A. (2001). Health of the Implicit Association Test at age 3. *Zeitschrift für Experimentelle Psychologie, 48*, 85–93.

Huijding, J. Ć., de Jong, P. J. (2009). Implicit and Explicit Attitudes Toward Spiders: Sensitivity to Treatment and Predictive Value for Generalization of Treatment Effects, *Cognitive Therapy and Research, 33*, 211–220.

Kessler R. C., Chiu W. T., Demler O., Merikangas K. R., Walters E. E. (2005) Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry, 62*, 617–627.

Krijn M., Emmelkamp P. M. G., Biemond R., DeWilde de Ligny C., Schuemie M. J., Van der Mast (2004). Treatment of acrophobia in virtual reality: the role of immersion and presence. *Behav Res Ther, Vol. 42*, 229–239.

Schmukle, S. C., & Egloff, B. (2004). Does the Implicit Association Test for assessing anxiety measure trait and state variance? *European Journal of Personality, 18,* 483–494.

Schwarz, N., & Oyserman, D. (2001). Asking questions about behavior: Cognition, communication, and questionnaire construction. *American Journal of Evaluation, 22,* 127–160.

Smit, F., Cuijpers, P., Oostenbrink, J., Batelaan, N., de Graaf, R., & Beekman, A. (2006). Costs of nine common mental disorders: Implications for curative and preventive psychiatry. *Journal of Mental Health Policy and Economics, 9,* 193–200.

Stinson F. S., Dawson D. A., Patricia Chou S., Smith S., Goldstein R. B., June Ruan W., Grant B. F. (2007) The epidemiology of DSM-IV specific phobia in the USA: results from the National Epidemiologic Survey on alcohol and related conditions. *Psychol Med, 37*, 1047–1059.

Teachman, B. A., Stefanucci, J. K., Clerkin, E. M., Cody, M. W., & Proffitt, D. R. (2008). A new mode of fear expression: perceptual bias in height fear. *Emotion, 8*(2), 296.

Teachman, B. A., & Woody, S. R. (2003). Automatic processing in spider phobia: Implicit fear associations over the course of treatment. *Journal of Abnormal Psychology, 112*, 100–109. doi:10.1037/0021-843X.112.1.100.

Walther, E., Nagengast, B., & Traselli, C. (2005). Evaluative conditioning in social psychology: Facts and speculations. *Cognition & Emotion, 19*, 175–196.

Romanian Journal of Applied Psychology
2016, Vol. 18, No. 1, 8-12

The Quick Inventory of Depressive Symptomatology – the Self Report Romanian version

Elmar Hackl[1] & Bogdan Tudor Tulbure[1]

[1]*Department of Psychology, West University of Timişoara, Romania*

Received 19.09.2015; Received revised 31.05.2016; Accepted 15.06.2016
Available online 30.06.2016

Clinical depression is a debilitating disorder affecting a significant percentage of population. In this context, having reliable screening instruments for depression represents a major advantage. A widely used screening tool is the Quick Inventory of Depressive Symptomatology – Self-Report version (QIDS-SR). The aim of this study was to investigate the psychometric proprieties of the Romanian version of QIDS-SR as a diagnostic measure for depression. The data were collected from Romanian adult participants (N = 148) who expressed interest in an online therapeutic program for depression. Our sample included both normal (N = 48) and clinically depressed (N = 100) participants. Diagnostic assessments were conducted using the Structured Clinical Interview for DSM-IV. The Romanian QIDS-SR demonstrated high convergent validity with Beck Depression Inventory - II (r=.83) and good internal consistency (α=.74). Receiver operating characteristics analysis demonstrated satisfactory diagnostic validity for the QIDS-SR. The optimal ratio between sensitivity and specificity was set at 15 for the QIDS-SR. It was concluded that QIDS-SR represents an adequate, useful and cost-effective screening instrument for clinical depression in Romania.

Keywords: depression measures, QIDS-SR, ROC analysis, optimal cut-off score.

Address of correspondence: Bogdan Tudor Tulbure, Department of Psychology, West University of Timişoara, Bd. V. Pârvan No. 4, 300223 Timişoara, Romania, Email: bogdan.tulbure@e-uvt.ro

Introduction

Depression significantly contributes to the global burden of disease affecting 350 million people around the world (WHO, 2013). Besides the great personal struggle, clinical depression is also associated with high financial costs for the sufferer and for the society, due to diminished productivity and expensive treatment (Luppa, Heinrich, Angermeyer, König & Riedel-Heller 2007; Sobocki, Jonsson, Angst & Rehnberg, 2006). It was estimated that the total annual cost of depression was €92 billion in Europe, making it the third most expensive mental disorder (Olesen, Gustavsson, Svensson,Wittchen & Jönsson, 2012).

An epidemiological study demonstrated that lifetime prevalence of major depressive disorder (MDD) in Romania is 3.3%, with higher values for women (4.1%) than man (2.5%, Florescu, Moldovan, Mihăescu-Pintia, Ciutan & Sorel, 2010). These point values converted into absolute numbers corresponds to about 574,000 people. On average, an affected individual spends 5.7 years suffering from a MDD (Florescu, Moldovan, Mihăescu-Pintia, Ciutan & Sorel, 2010). In Europe, the total costs associated with clinical depression were estimated at 113.4 billion Euros in 2010 (Gustavsson et al., 2011).

It was proven that early identification and appropriate treatment reduces the negative impact of depression for most patients (Coulehan, Schulberg, Block, Madonia, Rodriguez, 1997). An alternative way of achieving this goal would be to conduct systematic screenings for at-risk populations (e.g., patients with chronic diseases and/or chronic pain, patients with unexplained symptoms or stressful environments, socially isolated and/or elderly population etc.; Sharp & Lipsky, 2002).

Given the high costs associated with clinical depression, it seems necessary to improve both prevention and intervention methods. In this context, it is very important to have effective and efficient depression measures. These instruments should identify the existence, the severity and the intensity of depressive symptoms. Moreover, they should be useful for diagnostic purposes, and for the evaluation of the treatment outcome.

To expand the possibility of using robust depression measures in other cultures, we translated into Romanian and adapted the Quick Inventory of Depressive Symptomatology – Self Report version (QIDS-SR, Rush et al., 2003). The psychometric proprieties of the Romanian

QIDS-SR were investigated. A comparative analysis between QIDS-SR and the well-known Beck Depression Inventory-II (BDI-II, Beck, Steer, Brown, 1996) was also conducted.

Method

Ethical considerations

This study was reviewed and approved by the Ethics Committee of the West University of Timişoara, Romania. After the terms and conditions for the study were presented, all participants signed an inform consent by surface mail.

Participants

Participants were recruited through an online platform (https://www.iterapi.se/sites/psitod). A total of 220 participants completed all the screening questionnaires. Participants having a high scores on the depression questionnaire (i.e., higher than 14 on BDI-II) were further contacted for a telephone interviewed. After the interview, 100 participants confirmed the diagnosis of either MDD or dysthymia. The data used for the present study included only participants who had a clear diagnostic status (N = 148). Participants' demographic characteristics are presented in Table 1.

Table 1. Demographic characteristics of participants

Variable	N	*% or mean ± SD*
Gender		
Male	43	29.1
Female	105	70.9
Age (years)	148	34.7±11.1
Education level		
PhD	3	2
Master degree	27	18.2
University degree	75	50.7
High school degree	38	25.7
Vocational school	2	1.4
Primary school	3	2
Profession		
Full time worker	86	58.1
Part-time worker	11	7.4
Unemployed	3	2
Student	26	17.6
Staying home	16	10.8
Retired	6	4.1
Marital status		
Never married	47	31.8
Married	50	33.8
Divorced	33	22.3
Widower	10	6.8
In a relationship	8	5.4
Religious affiliation		
Orthodox	117	79.1
Roman Catholic	7	4.7
Other religions	18	12.1
Atheist	6	4.1
Total	N = 148	

Measures

Quick Inventory of Depressive Symptomatology – Self-Report version (QIDS-SR, Rush et al. 1986, 1996) was designed to assess the severity of depressive symptoms during the previous week. The questionnaire is available as a clinician-administered (QIDS-C) and self-report version (QIDS-SR), covering nine symptoms used for the diagnoses of depression. Participants are instructed to rate each item on a 4 point Likert scale ranging from 0 to 3. In this study only the self-report version was used, with an internal consistency of .74. Previous studies demonstrated that QIDS-SR is a sound psychometric measure (Rush et al. 1986, 1996).

Beck Depression Inventory-II (BDI-II) was developed by Beck (1961) to assess the severity of depressive symptoms. The 21 items of the scale assess the most common depressive symptoms encountered during the previous 14 days. Initially Beck recommended a cut-off score of 13, but later, Baumesderfer and Beck (1974) recommended a cut-off score of 21 to distinguish a "pure" depressive population in scientific studies. In our sample a high internal consistency (α = .90) for BDI-II was obtained.

Automatic Thoughts Questionnaire (ATQ - 15 items, Hollon & Kendall, 1980) measures the frequency of occurrence of automatic negative thoughts (negative self-statements) associated with depression. Subjects are instructed to read each item and indicate, on a scale of 1 to 5, how frequently, if at all, that thought occurred to them over the last week.

The Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research version (SCID-I) Module A (First, Spitzer, Gibbon, & Williams, 2002) was used to assess the diagnostic status of all included participant. If additional symptoms were reported during the SCID-I overview, the needed modules were also administered.

Procedure

Participants were recruited in Romania by briefly presenting the study in local and national newspapers during March and September 2014. Interested participants were directed to the study web page (https://www.iterapi.se/sites/psitod) where general information about the study and a brief presentation of the research team were presented. After reading the informed consent, participants signed up for the study and completed a series of online questionnaires and demographics. For privacy purposes, participants were encouraged to create a special email account used only for this study. If the screening process was interrupted (e.g., due to failed internet connection), the already filled information was saved on a server, and participants could continue the screening from where they have left it.

Participants who scored above 14 on BDI-II were contacted for a telephone interview, while the ineligible participants were sent an email with the summary of their results. The telephone interview was conducted using the Overview, Screening and Module A of the Structured Clinical Interview for DSM-IV-TR-Axis I disorders, research version – patient edition (SCID-I/P) (First, Spitzer, Gibbon and Williams, 2002). If additional symptoms were reported during the SCID-I/P interview (e.g., marked embarrassment in social settings), additional modules were administered (e.g., Module F – Anxiety Disorders, Social Phobia)..

Statistical analysis

SPSS 20 (SPSS, Inc., Chicago, IL) and MedCalc 14.8.1 (MedCalc Software bvba, Ostend, Belgium) were used for data analysis. The internal consistency for each measure was assessed with the Chronbach's alpha. The independent t test was used to highlight the differences between MDD/dysthymic and normal participants. Receiver

Operating Characteristics (ROC) was used to evaluate the diagnostic validity of the QIDS-SR and the BDI-II. ROC represents an elegant way of estimating the performance of a screening instrument (in our case two depression measures) at various cut-off points. A graphical plot is created by plotting the true positive rate (sensitivity) against the false positive rate (specificity) along a continuum of possible cut-off points. By estimating the sensitivity as a function of specificity, ROC analysis enables us to better approximate the optimal cut-off scores used in diagnostic decisions.

Results

QIDS-SR convergent validity was confirmed by the high and significant correlations with the BDI-II (r =.83; p < 0,001). Before conducting the ROC analysis, we compared the two groups (i.e., MDD/dysthymic vs. non-clinical participants) to make sure they differ in terms of depressive symptoms. The means and SD's for normal and clinical participants are presented in Table 2, as well as the obtained large effect sizes for all comparisons.

ROC analysis was used to identify the recommended cut-off scores for QIDS-SR and BDI-II. Both questionnaires yielded a significant difference when the area under the curve (AUC) was compared with the area under the diagonal (all z's are significant, see Table 3). Although the BDI-II displays a slightly higher AUC, both measures fall into the moderate category (see Streiner & Cairney, 2007) and no significant differences could be established between the two measures. These results are graphically illustrated in Figure 1.

Table 4 shows the sensitivity and specificity for both measures. The cut-off score for QIDS-SR was set by calculating the maximum Youlden index value (sensitivity+specificity-100). The optimal cut-off score for severe depression was set at 15, which correspond to 76.79% chances to correctly classify cases. The predictive values associated with this cut-off score are relatively high (PPV=92.8%; NPV=54.4%). Moreover, the optimal cut-off score for BDI-II was set at 21, which corresponds to 80.37% correctly classified cases. When the AUC for the two measures were compared no differences emerged (z = 1.64, p >.05). Therefore, the two measures seem equally potent when it comes to discriminating between people with and without MDD/dysthymia.

Table 2. Descriptive and comparative data

Instruments	Clinical Population MDD/dysthymia (N=100)		Non-clinic population (N=48)		t	d
	m	SD	m	SD		
BDI-II	33.81	8.76	18.23	9.50	9.85**	1.70
QIDS	16.80	4.05	10.79	4.12	8.405**	1.47
ATQ	54.92	9.71	39.47	12.06	7.745**	1.41

Notes: ** p < 0.01.

Table 3. Area under the curve (AUC) for QIDS-SR and BDI-II

	BDI-II	*QIDS-SR*	*BDI-II – QIDS-SR Difference*
AUC	.88	.84	.04
95%CI	.81 - .92	.77 - .89	-.006 to .079
z	12.23	10.16	1.65
p	<0.00	<0.00	0.09

Table 4. Sensitivity and specificity for a selection of cut-off scores on the BDI-II and QIDS-SR

	BDI-II			QIDS-SR	
Criterion	Sensitivity	Specificity	Criterion	Sensitivity	Specificity
>13	100.00	35.42	>6	100.00	12.50
>14	99.00	39.58	>7	99.00	22.92
>15	99.00	45.83	>8	98.00	33.33
>16	98.00	47.92	>9	97.00	45.83
>17	98.00	50.00	>10	94.00	47.92
>18	97.00	56.25	>11	90.00	54.17
>19	96.00	62.50	>12	82.00	66.67
>20	94.00	66.67	>13	76.00	75.00
>21*	**92.00**	**68.75**	>14	70.00	79.17
>22	88.00	70.83	**>15***	**64.00**	**89.58**
>23	86.00	70.83	>16	56.00	93.75
>24	83.00	75.00	>17	46.00	93.75
>25	80.00	77.08	>18	36.00	93.75
>27	74.00	81.25	>19	24.00	97.92
>28	70.00	85.42	>20	22.00	97.92
>29	65.00	89.58	>21	13.00	100.00
>30	63.00	89.58	>22	7.00	100.00

Note: Values in bold indicate optimal cut-off point.

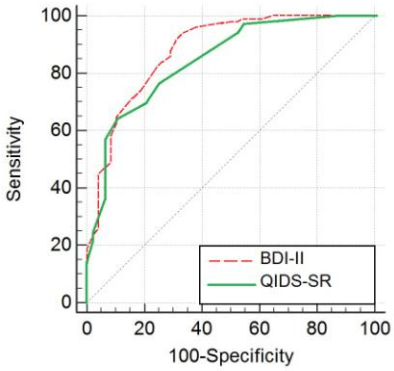

Figure 1. ROC curves for QIDS-SR and BDI-II

Discussion

The aim of this study was to investigate the psychometric proprieties of QIDS-SR when used as a proximal diagnostic instrument for detecting clinical depression in Romanian adults. Overall, the results show that along with BDI-II, QIDS-SR is a valid screening tool for depression. A cut-off score of 15 seems to represent the best discriminant between the normal and the MDD/dysthymic participants in our sample. This cut-off score corresponds to a specificity of 89.58% and a sensitivity of 64%, while ROC analyses revealed that the AUC was 84%. Using a bigger sample (N = 1595) Gili et al., (2014) reported a higher AUC (94%) for QIDS-SR, while the AUC for BDI-II varied between 86 and 96% (Arnau et al., 2001; Kumar, Steer, Teitelman, & Villacis, 2002; Uslu et al., 2008).

The proposed cut-off scores for QIDS-SR vary between 5 and 14 in previous studies (Gili et al., 2014; Lamoureux et al., 2010; Liu et al., 2014; Mergen et al., 2012). Our recommended cut-off score for QIDS-SR is definitely higher than 6 which was originally recommended by Rush et al. (2003). However, the predictive values associated with our recommended cut-off score for QIDS-SR are related with a low percentage of false positives.

Other studies reported a higher internal consistency for QIDS-SR when data was collected from a clinical sample (α = .86, Rush et al., 2003; Trivedi et al., 2004). However, similar convergent validity coefficients were previously reported in the literature (i.e., correlation between QIDS-SR and HRSD was .82; Rush et al, 2004).

When interpreting the results of this study one should take into account its limitations. First and foremost, our results are limited by the specific characteristics of our sample – an all white outpatient population seeking depression treatment online. Moreover, compared to the usual prevalence of clinical depression in general population (3.3%), we had an unusually high MDD/dysthymia prevalence in our sample (67%). Future studies could investigate the psychometric proprieties of the QIDS-SR as a screening measure in a representative sample. Second, all assessments were conducted over the internet or phone in the absence of a face-to-face contact with participants. Therefore, some of the participants' non-verbal messages might have been lost, especially during the SCID-I interview, making the diagnostic procedure more difficult.

Summarizing, although QIDS-SR is not a perfect screening instrument for clinical depression, it represents a good and reliable measure that seems to perform in the same range as other widely used depression instruments (i.e., BDI-II). Using the QIDS-SR in research and clinical practice has a number of advantages: a) it is freely available, b) it is time efficient, requiring minimum amount of training, and c) could be used in an automated, telephone-administered format if needed. Most importantly, an increasing number of studies seem to support the QIDS-SR as an effective measure that could be successfully used to assess the main diagnostic criteria for depression (Gili et al., 2014; Lamoureux et al., 2010; Liu et al., 2014; Mergen, et al., 2012; Rush et al., 2003). There is also some support for the usefulness of the QIDS-SR as a sensitive outcome measure (Rush et al., 2003). Therefore, in spite of its limitations, we recommend the QIDS-SR as a proximal instrument for detecting clinical depression in non-psychotic outpatients.

Acknowledgement

This work was possible with the financial support of the Romanian Ministry of Education–UEFISCDI, Partnerships in priority domains program (PN-II-PT-PCCA-2013), project number: 331/2014.

Note: The Romanian version of the Quick Inventory of Depressive Symptomatology – Self Report (QIDS-SR) is available upon request from the authors.

References

Arnau, R. C., Meagher, M. W., Norris, M. P., & Bramson, R. (2001). Psychometric evaluation of the Beck Depression Inventory-II with primary care medical patients. *Health Psychology*, *20*, 112–119.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). Manual for the beck depression inventory-II.

Beck, A. T., & Beamesderfer, A. (1974). *Assessment of depression: the depression inventory*. S. Karger.

Beck A. T., Ward C.H, Mendelson M., Mock J., Erbaugh J. (1961). *An inventory for measuring depression*, Arch Gen Psychiatry, 4: 53-63.

Coulehan, J. L., Schulberg, H. C., Block, M. R., Madonia, M. J., & Rodriguez, E. (1997). Treating depressed primary care patients improves their physical, mental, and social functioning. *Archives of Internal Medicine*, *157*(10), 1113-1120.

First, M. B., Spitzer, R. L, Gibbon, M., & Williams, J. B. (2002). Structured Clinical Interview for DSM-IV-TR Axis I Disorders, Research Version, Patient Edition. (SCID-I/P) New York: Biometrics Research, New York State Psychiatric Institute,.

Florescu, S., Moldovan, M., Mihăescu-Pintia, C., Ciutan, M., & Sorel, G. E. (2010). The Mental Health Study-Romania 2007. Prevalence, Severity, and Treatment of 12-Month DSM-IV Disorders. *Management and Health*, *13*(4).

Gili, M., Lopez-Navarro, E., Homar, C., Castro, A., Garcia-Toro, M., Llobera, J., & Roca, M. (2014). Psychometric properties of Spanish version of QIDS-SR16 in depressive patients. *Actas espanolas de psiquiatria*, *42*(6), 292-299.

Hollon, S. D., & Kendall, P. C. (1980). Cognitive self-statements in depression: Development of an automatic thoughts questionnaire. *Cognitive therapy and research*, *4*(4), 383-395.

Lamoureux, B. E., Linardatos, E., Fresco, D. M., Bartko, D., Logue, E., & Milo, L. (2010). Using the QIDS-SR 16 to identify major depressive disorder in primary care medical patients. *Behavior Therapy*, *41*(3), 423-431.

Liu, J., Xiang, Y. T., Lei, H., Wang, Q., Wang, G., Ungvari, G. S., & Chiu, H. F. (2014). Guidance on the conversion of the Chinese versions of the Quick Inventory of Depressive Symptomatology-Self-Report (C-QIDS-SR) and the Montgomery–Asberg Scale (C-MADRS) in Chinese patients with major depression.*Journal of affective disorders*, *152*, 530-533.

Luppa, M., Heinrich, S., Angermeyer, M.C., König, H. & Riedel-Heller, S.G. (2007). Cost-of-illness studies of depression: a systematic review. *Journal of Affective Disorders*, *98*(1-2), 29-43.

Kumar, G., Steer, R. A., Teitelman, K. B., & Villacis, L. (2002). Effectiveness of Beck Depression Inventory–II subscales in screening for major depressive disorders in adolescent psychiatric inpatients. Assessment, 9, 164–170.

Marcus, M., Yasamy, M. T., van Ommeren, M., Chisholm, D., & Saxena, S. (2012). Depression: A global public health concern. *Retrieved February*, *7*, 2014.

Mergen, H., Tavlı, T., Öngel, K., Diriöz, M., Alkın, T., Yemez, B., & Kalayci, F. (2012). Validity and Reliability of the QIDS-SR16-Turkish in Comparison with BDI-II-Turkish Among Young Outpatient Sample of Turkish University Students.*Arch Neuropsychiatry*, *49*, 1.

Olesen, J., Gustavsson, A., Svensson, M., Wittchen, H. U., and Jönsson, B. (2012). The economic cost of brain disorders in Europe. *European Journal of Neurology*, *19*(1), 155-162.

Pintea, S., & Moldovan, R. (2009). The receiver-operating characteristic (ROC) analysis: Fundamentals and applications in clinical psychology. *Journal of Cognitive and Behavioral Psychotherapies*, *9*(1), 49-66.

Rush, A. J., Trivedi, M., Carmody, T. J., Biggs, M. M., Shores-Wilson, K., Ibrahim, H., & Crismon, M. L. (2004). One-year clinical outcomes of depressed public sector outpatients: a benchmark for subsequent studies. *Biological Psychiatry*, *56*(1), 46-53.

Rush, A. J., Trivedi, M. H., Ibrahim, H. M., Carmody, T. J., Arnow, B., Klein, D. N., ... & Keller, M. B. (2003). The 16-Item Quick Inventory of Depressive Symptomatology (QIDS), clinician rating (QIDS-C), and self-report (QIDS-SR): a psychometric evaluation in patients with chronic major depression. *Biological psychiatry*, *54*(5), 573-583.

Rush, A. J., Gullion, C. M., Basco, M. R., Jarrett, R. B., & Trivedi, M. H. (1996). The inventory of depressive symptomatology (IDS): psychometric properties. *Psychological medicine*, *26*(03), 477-486.

Rush, A. J., Giles, D. E., Schlesser, M. A., Fulton, C. L., Weissenburger, J., & Burns, C. (1986). The inventory for depressive symptomatology (IDS): preliminary findings. *Psychiatryresearch*, *18*(1), 65-87.

Sharp, L. K., & Lipsky, M. S. (2002). Screening for depression across the lifespan. *American Family Physician*, *66*, 1001-1008.

Sobocki, P., Jonsson, B., Angst, J. & Rehnberg, C. (2006). Cost of depression in Europe. *The Journal of Mental Health Policy & Economics*, *9*, 87–98.

Streiner, D. L., & Cairney, J. (2007). What's under the ROC? An introduction to receiver operating characteristics curves. *Canadian Journal of Psychiatry*, *52*(2), 121.

Trivedi, M. H. (2004). The link between depression and physical symptoms. *Primary care companion to the Journal of clinical psychiatry*, *6* (suppl 1), 12.

Uslu, R. I., Kapci, E. G., Oncu, B., Ugurlu, M., & Turkcapar, H. (2008). Psychometric properties and cut-off scores of the Beck Depression Inventory-II in Turkish Adolescents. *Journal of Clinical Psychology in Medical Settings*, *15*, 225–233.

World Health Organization (2013). Depression. Fact sheet N 369/October 2012.

Romanian Journal of Applied Psychology
2016, Vol. 18, No. 1, 13-17

Perceived urban quality of life in Timișoara's districts

Alexandra Stancu[1], Corina Ilin[2], Alexandra Gruicin[2]

[1]*Sapienza University of Rome, Italy*

[2] *Department of Psychology, West University of Timişoara, Romania*

Received 5.02.2016; Received revised 17.05.2016; Accepted 22.06.2016
Available online 30.06.2016

Media and previous research on quality of life for residents of Timisoara highlighted discontent about the level of pollution, hospitals, job and business opportunities, and the overall quality of life in the city, and contentment regarding schools, utilities and private medical centers (Morais & Camanho, 2011; Agenția pentru Dezvoltare Regionala Vest, 2013). We conducted an analysis of differences between the two districts regarding subjective advantages and disadvantages, the general level of urban quality of life and the level of neighborhood and community quality of life. We applied the questionnaire on urban quality of life adapted by Alexander Keul (2008) after Detroit Area Study developed by Robert Marans (2001), on 90 citizens from Timişoara, from Soarelui and Circumvalatiunii districts. Results showed significant differences between the two neighborhoods for the general level of urban quality of life, and for the perceived quality of the neighborhood. There were no significant differences for the level of perceived quality of the community. In conclusion, the citizens from the district Circumvalațiunii had a higher degree of urban quality of life when compared with the citizens of the district Soarelui. Also, citizens from Circumvalațiunii were more satisfied with the quality of their neighborhood than citizens from Soarelui. The qualitative and quantitative results and further directions are discussed in this article.

Keywords: urban quality of life, neighborhood, community, Timişoara.

Address of correspondence: Mrs. Alexandra Stancu, at Paris Street, No. 1, Centrul de Studii și Cercetare în Psihologie din Timișoara, Timișoara, Romania.
E-mail: alexandra.docea@uniroma1.it

Authors' note: We address our gratitude to Associate Professor Ph.D. Alexander Keul, Salzburg University, Austria, for opening the road for this research and for the support given over time. We would also like to thank Lecturer PhD Lucian Drăguț, from the Geography Department of the West University of Timișoara, Daria Lupșa, Marius Ardelean, Iris Forțiu, and all the other undergraduate and postgraduate students from the Psychology and Geography departments from the West University of Timișoara, who have contributed to the development of this study.

Acknowledgements: This research was partially supported by the West University of Timișoara Foundation and by the City Hall of Timișoara in the project "Timișoara European Capital through the increase of citizens' quality of life, promotion of local cultural values and the active involvement of youth in overcoming problems", developed between 01.01.2014 and 30.07.2014, and coordinated by Associate Professor Ph.D. Corina Ilin.

Introduction

Timișoara, the city named by its residents "little Vienna", has strong occidental influences reflected in the culture, the history of the city, and the attitudes of inhabitants. The citizens often compare the city, in the popular culture, with other West-European cities, rather than Romanian cities, especially when they discuss their expectations for the development of the city.

The concept "quality of life" is controversial for the citizens of Timișoara because some people address it from a darker perspective, making references to the high level of pollution, noise, and insufficient green spaces. Previous studies on quality of life highlight the fact that Timișoara's residents have a poor quality of life, comparing to other European cities (Morais & Camanho, 2011). On the other side, Numbeo, the world's largest database of user contributed data about cities and countries, reported a high quality of life index for Timisoara, with good evaluation for safety, healthcare, and climate, moderate indexes for property prices and pollution, and low indexes for purchasing power, cost of living and traffic commute time (Numbeo, 2016).

Environmental perception has become part of studies interested in investigating the quality of life of citizens, which has been considered a multidimensional construct

and an important indicator of physical and psychological well-being (Utsey, Bolden, Brown, & Chae, 2001). In the newer paradigm of environmental sustainability, environmental perception is considered very important, and the European Environmental Agency has elaborated a set of indicators to measure environmental sustainability, which include "subjective assessment measures" such as citizen satisfaction with the local community (Dumitru, Garcia-Mira, Maricutoiu & Ilin, 2014).

Although the concept of quality of life is encountered in domains such as psychology, sociology, economy, geography, public health, and transportation, its definition as described in the scientific literature is not yet definite. In some theoretical approaches, quality of life was described as consisting of factors such as health, physical environment, natural resources, personal development, and safety, while other economic theories presented it as one of the three pylons of quality (Mitchell, Namdeo, & Kay, 2001). World Health Organization defines quality of life in 1993 (p. 3) as "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns". Other authors described quality of life as the satisfaction of life, or as the degree to which a person enjoys the opportunities they face in life (Kamp, Leidelmeijer, Marsman, & Hollander, 2003).

One of the most complex definitions for quality of life, formulated by Salvaris, Burke, Pidgeon and Kelman (2000), states that quality of life is the general level of well-being and accomplishment that people feel as a consequence of the conditions provided by the social, economic, and natural environment of the community, and the personal, physical and financial background. The concept of quality of life was addressed in both quantitative and qualitative studies, therefore underlining the subjective and objective dimensions of the construct (Marans, 2001).

The dimensions of quality of life differ from one study to another, but certain aspects of this concept remain constant in the scientific literature. For example, a study from New Zealand (Wellington City Council, 2003) emphasized dimensions of the quality of life such as demographic factors, knowledge and abilities, health, the residence, social contact, political and civil rights, economic standard of living, economic development, the natural and built environment. In another study from Canada (International Institute for Sustainable Development, 1997), six dimensions were pointed out: personal well-being, urban economy, the urban environment, community's values and leadership, and pride. A similar approach to the current study was the one developed by the European Commission (2005), through the Urban Audit programme (www.urbanaudit.org), which distinguished among nine dimensions of quality of life: demographic factors, social aspects, economic aspects, civic engagement, training and education, environment, transport and travel, culture and leisure, innovation and technology.

The dimensions of the urban quality of life which we addressed in our study originated in the study of Robert Marans (2001) on the Detroit area. The questionnaire developed by Robert Marans was adapted by Alexander Keul (2008) in Austria, for a study about quality of life in six urban districts from Salzburg. The dimensions of quality of life after Marans (2001) are the years of residence at current address, subjective evaluation of the urban quality of life, the quality of urban transport, the distance to urban transport, satisfaction with the residence, grocery shops and their quality, the use of green spaces, access to leisure spaces, quality of the neighborhood, safety and risk assessment. In the study on quality of life of Detroit area (DAS2001), the dimensions of residential environment described above were included in three categories: personal housing space, the neighborhood of the residence, and the community from the neighborhood. For example, questions about environmental attributes (traffic, noise), social aspects (family, friends, safety), and public services (protection from police, schools, parks, means of transport) were addressed to find out more details about the neighborhood. Regarding the community, questions about shopping, accessibility and transport, and leisure were proposed. For the evaluation of the housing space, aspects such as living costs, space, and property size were investigated.

In the current study we evaluated Timişoara residents' perception of the neighborhood quality of life, we described the positive and negative aspects of two districts, and offered a few solutions for improving the quality of residents' life, based on our findings.

Timişoara's districts

Timisoara is the capital and largest city of the historical region of Banat, Timiş County, located in western Romania. In 2011, with 319 279 inhabitants and a population density of 2.622 inhabitants / km², it was the third largest city in Romania.

For this study, we evaluated the quality of life in two districts of Timisoara: Soarelui and Circumvalaţiunii (see Figure 1 for exact location). Soarelui's neighborhood is located in the southern part of Timisoara, having an area of approximately 5406947 square meters, and green spaces and having an area of approx. 202358 sqm. It was built around 1985, being among the last working class neighborhoods built by the communist regime in Timisoara. Before 1985, these lands were not used for constructions but were meadows and plots for agriculture. Most residents were employed in factories on the industrial platform Buziaş. In this district there are several kindergartens and a school with primary and secondary classes – the latest school built in Timişoara. Circumvalaţiunii district owes its name to Circumvalaţiunii Road, one of the most important transportation arteries in Timisoara, so named because it circumvents the current Old Town - former fortress and its strongholds. Circumvalaţiunii district has an area of approx. 3890504 square meters and green spaces on an area of approx. 47375 square meters.

We chose these neighborhoods because we consider them opposites in many respects: district Soarelui is newer than the district Circumvalaţiunii, is in a marginal area of the city less connected to the central area, but it is a neighborhood of predominantly green spaces. On the other hand, Circumvalaţiunii district has several advantages regarding public services and connection to the city center. We aim to underline the differences in terms of quality of life in these neighborhoods, taking into account their particularities.

Present study

The objective of this study was to identify the level of quality of life for residents of two districts from Timişoara – Soarelui and Circumvalaţiunii – and to verify the differences between the two neighborhoods as regards to quality of urban life.

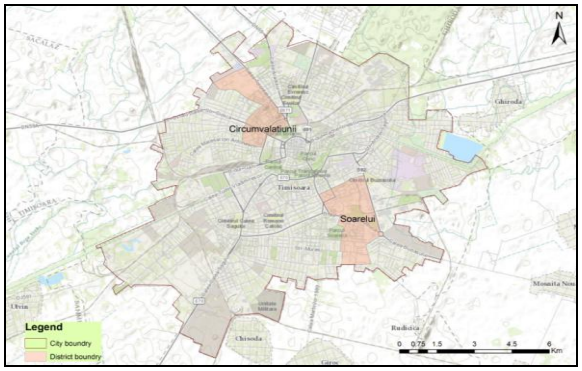

Figure 1. Delimitation of the districts Soarelui and Circumvalaţiunii on the map of Timişoara

Method

Participants and procedure

The data was gathered on field, by Psychology students of the West University from Timişoara, who previously received training on data gathering. Participants completed the questionnaire in paper and pencil format and were randomly selected. The questionnaire lasted around 10 minutes to be completed. No incentives were received by the participants for completing this questionnaire.

Ninety subjects, out of which 49 females (54.4%), completed the questionnaire; 52 were from the Circumvalaţiunii district (57.8%) and 38 from Soarelui district (42.2%). The mean age was 43.73 years (SD = 20.10) and 37.8% of the subjects were born in Timişoara. As respect to education, 1% of the respondents attended primary school, 4.5% attended secondary school, 29% had high school diploma, 18% had postsecondary school diploma, 34.5% had an undergraduate degree, and 13% a postgraduate degree. Regarding the occupation, 32.5% were full-time employees, 21.5% part-time employees, 14.5% were retired, 9% were students, 10% were unemployed or homemakers and 12.5% belonged to other categories (unqualified workers, freelancers, and others). Regarding the monthly income, 10.5% of the respondents reported an income lower than 700 lei/month, 37% had an income between 700 and 1500 lei/month, 30% an income between 1500 and 3000 lei/month, 19% between 3000 and 6000 lei/month, and 3.5% had an income higher than 6000 lei/month.

Measures

We used the Questionnaire for Quality of Urban Life developed by Robert Marans (2001) and adapted by Alexander Keul (2008). The questionnaire consisted of 8 open questions regarding the advantages and disadvantages of districts, followed by 43 items measuring the quality of life in the neighborhood. The 43 items were scored on 5-point Likert scale (0=I don't know; 1=Yes, very much; 2=Rather yes; 3=Rather no; 4=No, not at all). The items were grouped in two subscales: perceived quality of the neighborhood (items referring to safety, education, cultural events, grocery stores, green spaces, transport, noise, environment, the urban/rural features of the neighborhood, and pollution), and perceived quality of neighborhood's community (items referring to social networks, number of inhabitants, social problems, the age of inhabitants, ethnicity, and satisfaction with neighbors). The questionnaire showed good reliability, with α = .83. The scale for the quality of the neighborhood consisting of 27 items showed good reliability with α = .81, and the scale for quality of the neighborhood's community consisting of 16 items had a lower reliability of α = .64.

Finally, we addressed a few demographic questions on gender, age, birthplace, education, occupation, and income.

Results

In this section we will present qualitative results for perceived advantages and disadvantages of the two neighborhoods and quantitative results for the level of perceived urban quality of life. The majority of respondents willingly chose the district they currently live in (N = 46), while for the others it was a coincidence (N = 38) (see Figure 2). As for means of transport, most respondents used the public transport (N = 54). Participants also preferred to walk (N = 46), and to use their personal car (N = 35).

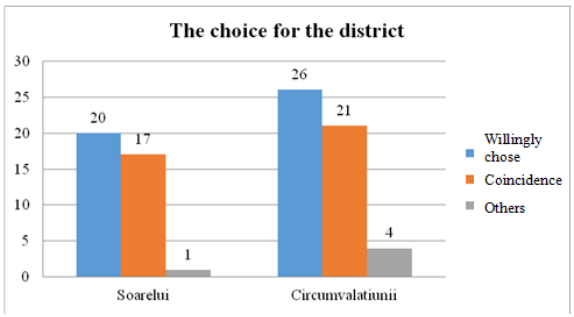

Figure 2. Distribution of respondents based on their choice for the district

We selected the following narrative topics from the open answers, representing the quality of people-environment interaction: distance from the city center, routes of public transportation (bus stations), shops and malls, restorative spaces (green spaces, parks), noise, pollution, and traffic.

As respect to its advantages, Circumvalaţiunii district is closer to the city center, and there are many shops and shopping centers in the area. On the other hand, the disadvantages of this region are air pollution, noise and traffic congestion.

Soarelui district has considerable advantages due to access to public transport (bus stops nearby), more restorative spaces including parks and green spaces (forests), and quiet streets. Its disadvantages are a greater distance from downtown, and the lack of easy access to public services (e.g., post office) and shops. Table 1 presents the frequencies for narrative themes drawn from the answers given by participants to the advantages and disadvantages of their neighborhood.

To identify the possible differences between the two districts, we calculated the independent *t*-test with the SPSS (IBM Corp, 2012). By looking at Table 2, we can see that Circumvalatiunii district's inhabitants perceive the quality of life to be higher than the inhabitants of Soarelui district (t = 2.04, p = .04). Also, there were significant differences between the two districts on the perceived quality of the neighborhood (t = 2.23, p = .029), with a higher score for Circumvalatiunii district. We found no significant differences for the perceived quality of neighborhood's community (t = .19, p = .84)

Table 1. The frequency of narrative themes from the open answers

	Qualitative items	Circumvalaţiunii District	Soarelui District
Advantages	The proximity to the city center	16	4
	Access to public transport	3	10
	Shops and malls	26	8
	Green spaces, parks	2	12
	Quiet	2	10
Disadvantages	Noise	14	2
	Air pollution	5	2
	Traffic	6	0
	Remoteness from city center	0	5
	Lack of public services and shops	0	5

Table 2. T test results for Soarelui and Circumvalatiunii districts

	Mean		*t*	*d*
	Soarelui	Circumvalaţiunii		
Quality of urban life	1.88 (.38)	1.72 (.37)	2.04*	.42
a. Quality of neighborhood	1.97 (.37)	1.75 (.37)	2.66*	.59
b. Quality of community	1.78 (.47)	1.76 (.5)	.19	

Notes: * p < .05; Standard deviations are represented in parenthesis near the mean values.

Table 3. T-test differences between Soarelui and Circumvalatiunii districts on the subscales of the questionnaire

	Mean		*t*	*d*
	Soarelui	Circumvalaţiunii		
Neighborhood quality				
Subjective evaluation of neighborhood	1.68 (.38)	1.52 (.31)	2.11*	.46
Demographic factors	2.14 (1.25)	2.00 (1.09)	.54	
Safety	1.96 (.96)	1.89 (.72)	.37	
Education	2.22 (.82)	1.77 (.91)	2.37*	.52
Leisure	2.11 (.58)	1.81 (.67)	2.20*	.47
Shops	1.81 (.74)	1.18 (.38)	4.77**	1.07
Green spaces	1.71 (.49)	1.94 (.73)	-1.76	
Environmental factors	1.89 (1.11)	1.83 (1.16)	.278	
Public transport	1.74 (.79)	1.38 (.74)	2.15*	.47
Quiet	2.58 (.97)	2.94 (1.25)	-1.48	
Quality of community				
Social network	1.57 (.52)	1.48 (.55)	.82	
Old /young community	2.08 (.66)	2.16 (.65)	-.60	

Notes: * p < .05; ** p < .01; Standard deviations are represented in parenthesis near the mean values.

Discussion

Previous studies on quality of life emphasize that in Timişoara citizens have a lower quality of life compared to other European cities (Morais & Camanho, 2011). In this study, we assessed citizens' perception of quality of life in two districts of Timisoara, Soarelui and Circumvalaţiunii, and described the positive and negative aspects of neighborhoods, and possible solutions to improve the quality of life.

We started from the hypothesis that there are significant differences in terms of quality of urban life between the two neighborhoods, both in terms of general level of quality of life and on the subscales of the questionnaire: the perceived quality of the neighborhood, and the perceived quality of the community.

The results of this study showed that Circumvalaţiunii district residents had a higher quality of urban life and assigned a higher quality to the neighborhood where they live, comparing to the inhabitants of Soarelui district. We did not obtain significant differences between the two districts for how people perceive the quality of neighborhood's community.

Residents of Circumvalaţiunii district were more satisfied comparing to residents of the Soarelui district regarding the access and quality of education, opportunities for leisure, access and diversity of shops, and means of transport linking the district to the city center and the main points of interest from town. Instead, Soarelui residents were more satisfied with the green spaces in the neighborhood, comparing to Circumvalatiunii inhabitants. There were no significant differences between the two districts in terms of perception of safety, pollution or other environmental factors, or the tranquility of the neighborhood. These results were supported by the answers given by respondents for qualitative questions in the questionnaire about the advantages and disadvantages of the neighborhood where they live.

We believe that future initiatives to improve the level of quality of life in Timişoara's neighborhoods should take into account the specific needs of residents, and the specific features of each neighborhood. The results of our analysis confirm that the two districts, Soarelui and

Circumvalaţiunii, are different in terms of residents' perception of the aspects of urban quality of life. We believe that we need a thorough analysis of neighborhood aspects before relating them to the perception of quality of life because some intuitive findings may lead to erroneous conclusions. For example, we might be tempted to intuitively say that Soarelui residents have a higher quality of life because the district features many green spaces and is quieter. But our results indicated that the Soarelui inhabitants, in fact, had a lower quality of life than those in Circumvalaţiunii district. We recommend that future studies to conduct an analysis of the physical factors that predict quality of life in the neighborhood, such as the distance from the residents' apartments to the green spaces in the neighborhood.

We wish to continue the analysis of the quality of urban life of Timisoara's residents and to include in the study all districts of Timisoara, and then compare the quality of life of Timisoara with the city of Salzburg. Thus, recommendations for improving the quality of life can be made both in relation to the specificities of each area and for the entire city of Timisoara.

References

Agenţia pentru Dezvoltare Regionala Vest (2013). *Studiu asupra calitaţii vieţii locuitorilor din Regiunea Vest*. Proiectul Cresterea impactului utilizarii Fondurilor structurale asupra calitatii vietii locuitorilor din Regiunea Vest finanţat in cadrul Programului Operaţional de Asistenţa Tehnica 2007-2013. Online at http://www.adrvest.ro

Dumitru, A., Garcia-Mira, R., Maricutoiu, L., Ilin, C. (2014). Evaluating the Relationship between Place Attachment,Residential Evaluations and Satisfaction in a Medium-sized Romanian City. *Journal of the Korean Housing Association*, (25)4, 31-38.

European Commision (2005). *Results of the Urban Audit think tank meetings*, Luxembourg. Document E4/REG/2005/02.

IBM SPSS Statistics for Windows (2012), version 19. IBM Corporation, Armonk, N.Y., USA

International Institute for Sustainable Development (1997). City of Winnipeg quality of life indicators, online at: http://www.iisd.org/pdf/wpg.qoli.pdf

Kamp, I.V., Leidelmeijer, K., Marsman, G., Hollander, A. (2003). Urban environmental quality and human well-being: towards a conceptual framework and demarcation of concepts—a literature study. *Landscape and Urban Planning*, 65, 5–18.

Keul, A. G. (2008). *Bericht ueber das Empirische Seminar Sozialpsychologie* WS 2007/08 [German: Report on the empirical seminar in social psychology, winter term 2007/08]. Salzburg: Psychology Department.

Keul, A., Prinz, T. (2011). The Salzburg Quality of Urban Life Study with GIS Support. În Marans, R., Stimson, R. (Ed.), *Investigating Quality of Urban Life. Theory, Methods and Empirical Research.* New York: Springer.

Marans, R.W. (2003). Understanding environmental through quality of life studies: the 2001 DAS and its use of subjective and objective indicators. *Landscape and Urban Planning*, 65, 73-83.

Mitchell, G., Namdeo, A., Kay, D. (2001). A new disease-burden method for estimating the impact of outdoor air quality on human health. *Science of the Total Environment*, 246, 153–64.

Morais, P., Camanho, A. (2011). Evaluation of performance of European cities with the aim to promote quality of life improvements. *Omega*, 39, 398 – 409.

Numbeo (2016). Quality of Life in Timisoara, Romania. Online at http://www.numbeo.com/

Salvaris, M., Burke, T., Pidgeon, J., & Kelman, S. (2000). *Social benchmarks and indicators for Victoria: Consultants' report*. Melbourne, Australia: Swinburne University of Technology, Melbourne, Institute for Social Research.

Utsey, S.O., Bolden, M.A., Brown, C.F., & Chae, M.H.(2001). Assessing quality of life in a cultural context. In:Suzuki, L.A., Meller, P.M., Ponterotto, J.G. (Eds.). *Handbook of Multicultural Assessment: Clinical, Psychological, and Educational Applications* (second ed.). San Francisco: Jossey-Bass, pp. 191-212

Wellington City Council (2003). *Quality of Life in New Zealand's Eight Largest Cities*, online at: http://www.qualityoflifeproject.govt.nz/pdfs/Quality_of_Life_2003.pdf

World Health Organization (1993). *WHOQOL Study Protocol*. WHO/MNH/PSF/93.9, Geneva.

Romanian Journal of Applied Psychology
2016, Vol. 18, No. 1, 18-23

Relationship of a chaos equation to Piaget's developmental theory and selective attention deficits

Hideaki Yanagisawa[1]

[1]*Konosu Public Health Center, Saitama, Japan*

Received 29.09.2014; Received revised 25.05.2016; Accepted 13.06.2016
Available online 30.06.2016

Piaget's theory provides a typical example of a relationship between human development and chaos theory. Here, Piaget's developmental theory and selective attention deficits are compared with a chaos equation. Continuous covariation is a necessary condition to equilibrium and the chaos phenomenon, and equilibrium is the converged solution in a chaos equation. Each convergence and non-convergence is a fixed and a chaotic state. In many chaos equations, there are two kinds of variables that change or do not change each site beyond the Feigenbaum point. Two types of developmental disorders are assumed. One is low speed in judging convergence or non-convergence. The other is low-speed change after a person's own judgment. In the former, a person cannot sense a difference between a converging point and his present state. Because he/she cannot understand others' emotions, he/she will continue with his/her experience with no convergence . Therefore, he/she cannot request help, and it might be thought that he/she can wait. This type is equivalent to Asperger's syndrome. In the latter, a person senses a difference. Because the person strictly feels the difference between a fixed point and his/her present state, he/she cannot wait for convergence. Therefore, he can request help. His present ate might be anger, and this type is equivalent to ADHD. In the former, a wide chaotic state narrows with experience. Piaget's developmental theory might be that humans have the ability to change each state. Chaos theory shows "Selective attention deficits with autism" as two different patterns in non-convergence or convergence.

Keywords: Piaget, chaos, convergence, autism, equilibrium.

Address of correspondence: Hideaki Yanagisawa, Konosu Public Health Center, 4-5-10, Higashi, Konosu Saitama, Japan, 365-0039. E-mail: science2001007@ybb.ne.jp

Introduction

Some clinical types of developmental disorders have been reported (Kasari & Rotheram-Fuller, 2005), and a mathematical report has been made on Piaget's developmental theory (Ojose, 2008). However, no report has analyzed developmental theory with an equation. In this report, Piaget's developmental theory (Flavell, 1996) and selective attention deficits are compared with a chaos equation.

Explanation of Chaos Theory

Definition

Chaos theory can be defined as "the qualitative study of unstable a periodic behavior in deterministic non-linear dynamical systems" (Kellert, 1993). Chaos theory is a part of complexity theory that concerns itself with nonlinear dynamic systems whose behavior does not follow clearly predictable and repeatable pathways. In linear systems, the relationship between an environmental factor and system behavior is predictable and easily modeled. As the presence of an environmental factor increases, system behavior changes linearly in response to it. In contrast, behavior in chaotic systems might be perceived as unpredictable (McBride, 2005).

In this regard, it is important that such a chaotic state is not confused with the term "random." In mathematical terms, "random" means the "statistics governed by or involving equal chances for each item" (New Oxford American Dictionary).

Relationship of continuous covariation to chaos theory

Yanagisawa's (2015a) article "Association of Evolutionary Topics related to God and Chaos Theory" relates continuous covariation to chaos theory. The basic concepts are outlined below, and a representative chaos equation is given as:

$$Y(n+1) = p[1-Y(n)]Y(n) \quad (1)$$

In this case, Equation (1) has the same meaning as Equations (2) and (3):

$$Z(n) = p[1-Y(n)]Y(n)$$

(2)

$$Y(n+1) = Z(n)$$

(3)

Since calculations in Equations (2) and (3) are alternately repeated, the solutions to Z (n) and Y (n) are in an ordered spiral chaos state. As Y (n) is determined, Y (n + 1) changes according to Equation (1). However, once Y (n + 1) moves to the position of Y (n) in Equation (1), Y (n + 2) also changes. Thus, Y (n) is unable to settle into its original pre-chaos value. This relationship means that once a variable has changed into another, it becomes unable to settle into its original value, or as defined above, it has a "correlated variable relationship" equivalent to covariation. Hence, the relationship between Y (n) and Y (n + 1) in Equation (1) is covariation, and this relationship must continue to sustain the chaotic state. Equation (1) is an example of a recurrence relation as part of covariation. If no correlated variable relationship exists between variables, then a chaotic state cannot be confirmed.

A logistic map of Equation (1) is shown in Figure 1 (Yanagisawa, 2010), with some lines, arrows, and letters added to the original figure (Kohda, 1990, p. 4). The vertical axis is Y (n), and the horizontal axis is "p." The border point between convergence and a chaotic state is called the "Feigenbaum point" in part M of Figure 1 (Feigenbaum, 1978). According to "p" that changes from 3 to 3.56995 (Feigenbaum point), the number of fixed points in Equation (1) changes to 1 (Part P), 2 (Part Q), and 4 (Part R). Fixed points are equivalent to "linear" in the definition of chaos theory. When "p" is less than the Feigenbaum point, the answer converges. When "p" is greater than the Feigenbaum point, the answers change to the localized (Part M) and proliferated (Part S) chaotic states. Points A and B are 0.16 and 2/3 when "p" is 3 in Figure 1. Points D and E are 0.16 and 2/3 when "p" is 4.

For example, the solution to Equation (1) is part P (or point B) when each "p" and Y (0) are 3 and 0.16. Each calculated Y (n) is Y (1) = 0.4032, Y (2) = 0.72188928, Y (3) = 0.6022954422632448, and Y (4) = 0.7186069274765014487708969258188. These are shown in Figure 2. The vertical axis is Y (n), and the horizontal axis is "n."

According to Equation (5), Y (n) will converge to 2/3.

$$p = 3$$

(4)

From Equations (1) and (4),

$$Y = 3[1-Y]Y$$

(5)

$$Y = \frac{2}{3}$$

(6)

This is point B. However, Y (n) can never converge in the chaotic state, like parts M and S. When each "p" and Y (0) are 4 and 0.16, the changes of Y (n) are shown in Figure 3. The vertical axis is Y (n), and the horizontal axis is "n." All Y (n) exist between 0 and 1. However, they never converge, and this is a chaotic state.

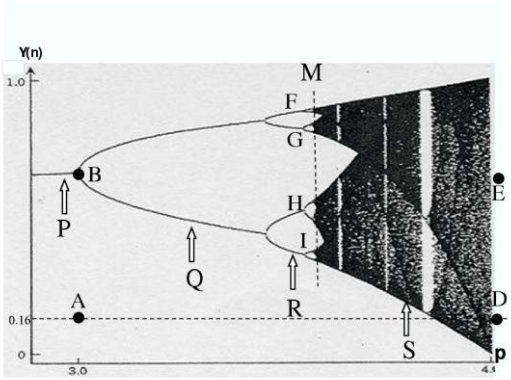

Figure 1. A logistic map of Equation (1): Points A and B are 0.16 and 2/3 when "p" is 3. Points D and E are 0.16 and 2/3 when "p" is 4.

Relation of Piaget's Developmental Theory to Chaos Theory

Next, a relation of the representative chaos equation to Piaget's theory is explained. Jean Piaget focused on accommodation and assimilation to development, in other words, adapting to a new environment. This is equivalent to: "As the presence of an environmental factor increases, the system behavior changes linearly in response to it" in the definition of chaos theory. In Piaget's theory, equilibrium, created with internal and external processes through assimilation and accommodation, is very important. In these processes, a covariant relationship between a human and the environment is required. When the person changes, the environment will also change; conversely, when the environment changes, the person will also change.

As Piaget indicated, a person can know a change in the environment from information, and from that information, can confirm the equilibrium between the environment and himself. In other words, equilibrium is the same as the converging process of answers in chaos equations. In Equation (1), each Y (n + 1) and Y (n) are considered human and information. If a person adds a covariant relation to the environment, the equilibrium might converge by changing the "n" value. This is shown in Figure 2. In this pattern, a person senses difference between the converging point and his present state. Therefore, he can request help from someone. He might be angry, but because he will regain equilibrium over time, we must await his development.

However, equilibrium cannot be attained by changing the "n" value in the chaotic state, such as in Figure 3. In this pattern, the person will have difficulty regaining equilibrium. Because the chaotic state of part S in Figure 1 localizes between 0 and 1, it can be considered equilibrium. However, a person might feel unsteady and have symptoms of anxiety in non-convergence. Persons can consider a chaos phenomenon as a kind of equilibrium after experiencing many chaos phenomena.

Even for an adult to attain their equilibrium is very difficult. Therefore, a person attempts to change his relationship to the environment, and the environment will change from that change. Through information from the environment, he will confirm equilibrium between the environment and himself. This has the same meaning as changing a chaos equation variable, such as the "p" in

Equation (1). In Figure 1, the chaotic state of part S converges to parts F, G, H, and I with the changing "p." In the chaotic state, a person senses the converging point according to his development. If his speed in judging a convergence or non-convergence is too late, his relation to information continues the chaotic state. In this case, he awaits convergence with no guarantee. He cannot sense difference between the converging point and his present state because of not being able to judge convergence or non-convergence. Therefore, he cannot request help from someone. But in this case, we must not wait for a request. If a person cannot judge convergence or non-convergence, he can never attain equilibrium with convergence. If a person cannot change himself after judgment of non-convergence, he cannot promptly attain equilibrium with convergence and feels unsteady in each case.

Which did Piaget consider equilibrium - a fixed state or chaotic state? It might be Piaget's developmental theory that humans attain the ability to judge a non-convergence state and to change from a chaotic state to equilibrium. This means that the human changes the chaos equation's variable, such as the "p" in Equation (1). Piaget's theory provides a typical example of a relationship between human development and chaos theory.

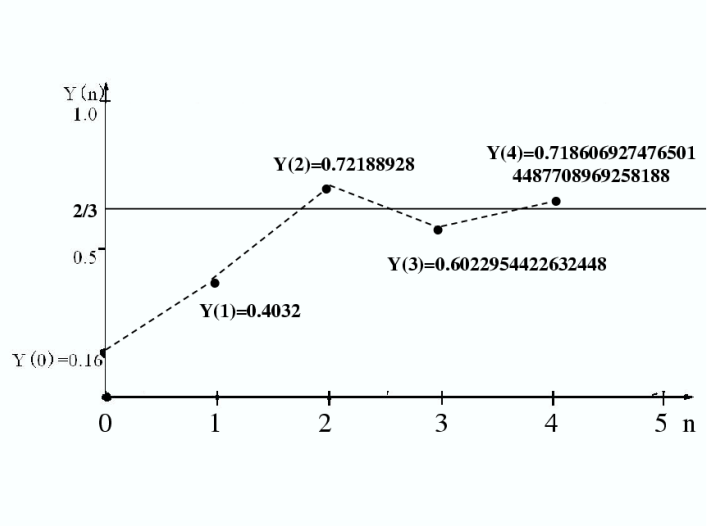

Figure 2. The changes of Y (n) are shown when "p" and Y (0) are 3 and 0.16.

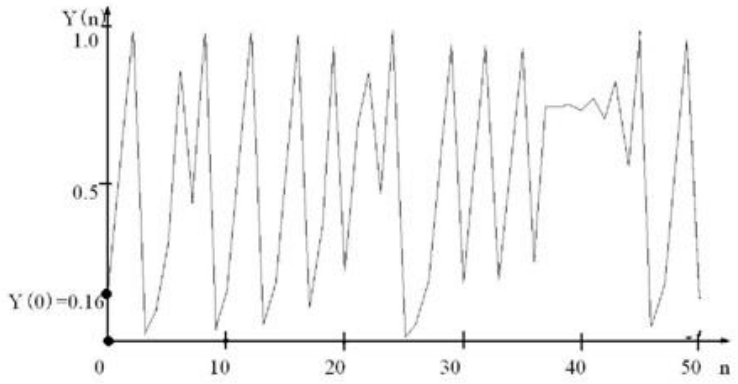

Figure 3. The changes of Y (n) are shown when "p" and Y (0) are 4 and 0.16

Relation of Selective Attention Deficits to Chaos Theory

Next, a relationship of the representative equation to selective attention deficits is explained. Persons with autism show "stimulus overselectivity" (Lovaas, Schreibman, Koegel, & Rehm, 1971). If a person pays very much attention to point D in Figure 1, he can never change from a chaotic state to point B. If a person pays no attention to point E in Figure 1, he can never change from a chaotic state to point B either. If "Selective Attention Deficits in Persons with Autism" (Burack, 1994) is shown in the chaotic part of Figure 1, it will not change over time. However, it will improve over time if it is shown in the convergent part. For example, point A will converge to point B with many calculations in Figure 1. Many calculations are equivalent to human experience over time. Therefore, symptoms can change with age in the convergent pattern.

Difference Between Asperger's Syndrome and Attention Defect Hyperactivity Disorder (ADHD)

There are two different abilities for attaining equilibrium in the fixed and chaotic states. Development is explained as changing the variable, such as the "p" value or the "n" value in Equation (1). Two types of developmental disorders were supposed from the chaos equation. One is a type of changing "p" in which a person cannot judge convergence or non-convergence. In this type, he cannot sense difference between the converging point and his present state. Therefore, he cannot request help. This type might be Asperger's syndrome in Autistic Spectrum Disorder. It is very difficult for a person with Asperger's syndrome to understand others' emotion (Sanders, 2009). Therefore, he cannot attain convergence. Because he has no disorder to changing "n," he will continue infinite calculations with no convergence. But it might be thought that he can wait.

The other is a type of changing "n" so that a person cannot change himself after making a judgment. In this type, he senses difference between the converging point and his present state. This has the same meaning as non-presence of others' emotion. Therefore, he can request help. Because "n" is equivalent to time, this type might be ADHD because a person with ADHD can understand others' emotion. Therefore, he can predict convergence in relation to another person. Because he strictly feels difference between a fixed point and his present state, he cannot wait for convergence (Sanders, 2009). And chaos theory shows "Selective attention deficits with autism" as two different patterns in non-convergence or convergence, and symptoms will later be able to change with age.

Humans can consider chaos phenomena as a kind of equilibrium after experiencing many chaos phenomena. In the former, a wide chaotic state can narrow with experience. However, understanding low-speed change is difficult in the present society that educates only the fixed state. In each type, a person might sense different equilibrium. If Piaget thought of change to some equilibrium from non-equilibrium as development, both types are developmental disorders in his theory. If Piaget thought of change to a fixed state from a chaotic state, the former is a developmental disorder. Because a person has low speed in later attaining some equilibrium in the latter, he cannot attain it. Piaget's developmental theory might be that humans have the ability to change from the chaotic state to some equilibrium, in other words, both types can do so.

Discussion

There is a report relating the chaos model to Piaget's developmental theory (Yeongmahn, 1993). However, no report explains it using one variable of a chaos equation. In this report, a relation of covariation to equilibrium was made clear. Continuous covariation is a necessary condition of chaos equations (Yanagisawa, 1996, p. 115). In Equation (1), a fixed point such as part P has the same meaning as convergence and is equilibrium. The chaotic states such as part S have the same meaning as non-convergence. A difference between a fixed state and a chaotic state is given by changing the "p" in Equation (1). For attaining equilibrium, a human changes his variable in the environment. Thus, development is explained as changing the variable, such as "p" or "n," in Equation (1). Of course, this means that a law of development is explained as the character of some variables in the chaos equation. In many chaos equations, there is a variable such as "p" changing the state beyond a Feigenbaum point, and "n" related to continuous covariation does not change the state beyond the Feigenbaum point. Each "p" and "n" in Equation (1) is equivalent to a person's thought and time. However, the thought of changing "p" can be attained only with repeated rearrangement of personal experience.

Therefore, two factors necessary for development were clarified. One is the ability of judgment for convergence or non-convergence. This is equivalent to changing the "p" in Equation (1). In part S of Figure 1, the person's relation to information continues the chaotic state until judgment, implying a long period of time. Therefore, it is difficult for symptoms of Asperger's syndrome to change with age, but there is a possibility of change over a very long time. The other is the ability to change on one's own after judgment, equivalent to changing the "n" in Equation (1) in part P. Many calculations such as "n" are equal to experiences or time, that is, a short time. Therefore, symptoms of ADHD can change with age.

Piaget's developmental theory might be that humans attain the ability to change from a chaotic state to some equilibrium, and both abilities are necessary in development. If a person's ability in one or both is low, he is recognized as having a developmental disorder. Ability has the same meaning as speeds in judging and changing. A person with a developmental disorder cannot deal with much information from the environment due to low speed. In this state, the person feels unsteady and has anxiety symptoms. In ADHD, for instance, he can sense difference between a converging point and his present state when he cannot change himself after judgment. Therefore, he might request help from somebody.

In Asperger's syndrome, for instance, a person cannot sense difference between a converging point and his present state when he cannot judge convergence or non-convergence. Therefore, he cannot request help. This difference is important for understanding developmental disorders, and, therefore, therapy for each type is different. Because a person with ADHD has low speed in attaining equilibrium, he becomes irritated. However, he can slowly attain equilibrium, and a central nervous system stimulator or excitement depression therapy might be effective. On the other hand, understanding of equilibrium is nil or very low speed in a person with Asperger's syndrome. Therefore, he must first understand some equilibrium and must have continuous experience with simple chaos phenomena. Variables must be reduced for a simple chaos phenomenon, meaning that another person relating to his needs to be in a fixed state, and if possible, there should only be one person. "Make it hard to interact successfully one-on-one and in groups" and "You may choose to stay or to marry" were reported in "Five Benefits of Therapy for Adults with Asperger's Syndrome" (Roberson K, 2013). Five benefits are equivalent to the conditions with continuous covariation to change to a fixed state from a chaotic state. The ability to attend selectively to meaningful sources of information while ignoring irrelevant ones is essential to competent and adaptive functioning (Lane & Pearson, 1982). Persons with autism not only pay attention to the unimportant, but also pay no attention to important information. They are shown as responses to points D and E in Figure 1. If a person pays very much attention to point D in Figure 1, he can never change from a chaotic state to point B. If a person pays no attention to point E in Figure 1, he can never change from a

chaotic state to point B either. If "Selective Attention Deficits in Persons with Autism" (Burack, 1994) is shown in the chaotic part of Figure 1, it will not change with many calculations. However, it will improve with many calculations if shown in the convergent part.

Because many calculations are equivalent to human experience, symptoms of Asperger's syndrome can change with very long-term experiences. And those of ADHD can change with more short-term experiences. Therefore, a theoretical mechanism of autism might be explained as the low ability of judgment or convergence as well. In this way, Piaget's theory provides a typical example of a relationship between human development and chaos theory.

There are many methods to organize thoughts. The relation of the chaos equation to the KJ method (Yanagisawa, 2010), Counseling (Yanagisawa, 2004; 2015b), Peer Support (Yanagisawa, 2015c), the SEIQoL-DW (Schedule for the Evaluation of Individual Quality of Life-Direct Weighting) method (Yanagisawa, 2014) and God's Law of Nightingale (2016) has been reported with a three-dimensional logistic map. They can be explained by the same method changing "p" of Equation (1) beyond Feigenbaum point (Yanagisawa, 2012). Because covariation is made with over time, all natural phenomena with time are chaotic. Therefore, living creatures in natural phenomena experience chaos phenomena (Yanagisawa, 2011). All phenomena relating to living creatures could be explained by chaos theory.

Conclusions

Piaget's theory of cognitive development can be explained by chaos theory, and equilibrium has the same meaning as converging in chaos equations. Here, two types of developmental disorder were supposed by a chaos equation. One is poor ability to judge convergence or non-convergence. The other is poor ability to change one's self after judgment. In the former, a person cannot sense difference between a converging point and his present state because of his inability to judge. Therefore, he cannot request help. This type is equivalent to Asperger's syndrome. In the latter, he senses difference between a converging point and his present state. Therefore, he can request help. This type is equivalent to ADHD. Piaget's developmental theory might be that humans have the ability to change from a chaotic state to some equilibrium and provides a typical example of a relationship between human development and chaos theory.

A theoretical mechanism of "Selective Attention Deficits in Persons with Autism" is shown as two different patterns in non-convergence or convergence by chaos theory. Symptoms of Asperger's syndrome might change with very long-term experiences, and those of ADHD might change with more short-term experiences.

References

Burack, A. J. (1994). Selective Attention Deficits in Persons With Autism: Preliminary Evidence of an Inefficient Attentional Lens. *Journal of Abnormal Psychology, 103* (3), 535-543.

Feigenbaum M. J. (1978) Quantitative universality for a class of nonlinear transformations. *Journal of Statistical Physics, 19* (1), 25-52.

Flavell, J. (1996). Piaget's legacy. *Psychological Science, 7* (4), 200-203.

Kasari, C. & Rotheram-Fuller, E. (2005). Current trends in psychological research on children with high-functioning autism and Asperger disorder. *Current Opinion in Psychiatry, 18* (5), 497-501.

Kellert, H. S. (1993). *In the Wake of Chaos: Unpredictable Order in Dynamical System.* Chicago: Chicago University Press.

Kohda, T. (1990). *Chaos - Bases and Applications of Chaos Theory.* In K. Aihara (ed.) Tokyo: Saiensu-sha Co.

Lane, D.M. & Pearson, D.A. (1982). The development of selective attention. *Merrill-Palmer Quarterly, 28*, 317-337.

Lovaas, O.I., Schreibman, L., Koegel, R.L. & Rehm, R. (1971). Selective responding by autistic children to multiple sensory input. *Journal of Abnormal Psychology, 77*, 211-222.

McBride, N. (2005). Chaos theory as a model for interpreting information systems in organizations. *Information Systems Journal, 15*, 233-254.

Ojose, A.B. (2008). Applying Piaget's Theory of Cognitive Development to Mathematics Instruction. *Mathematics Educator, 18* (1), 26-36.

Roberson, K. (2013). Five Benefits of Therapy for Adults with Asperger's Syndrome.
http://www.kennethrobersonphd.com/five-benefits-of-therapy-for-adults-with-aspergers/

Sanders, J. L. (2009). "Qualitative or Quantitative Differences Between Asperger's Disorder and Autism? Historical Considerations". *Journal of Autism and Developmental Disorders, 39* (11): 1560-1567

Yanagisawa, H. (1996). *Contradiction and Development of Modern Science – Beyond Chaos Theory.* Tokyo: Kirishobo Co.

Yanagisawa, H. (2004). Relation of Counseling to cryptogram - Analysis of corrected chaos theory to co-relation. *Japanese Journal of Nursing Science, 26* (8), 45-49.

Yanagisawa, H. (2010). Comparison of Public Health Nurse's action to chaos equation (community diagnosis = using the KJ method to community). *Japanese Journal of Community Health Care, 42* (11), 56-63.

Yanagisawa, H. (2011). Relation of Evolutionary Theory to Second Law of Thermodynamics (Part 1) - Relation of Chaos Theory to Gene's Learning Function. *European Journal of Science Research, 53* (1), 80-83.

Yanagisawa, H. (2012). Relation of the chaos equation to God Perceived by Pascal, Nietzsche and Nightingale. *Scientific GOD Journal, 3* (2), 207-212.

Yanagisawa, H. (2014). Relation of chaos equation to the schedule for the evaluation of individual quality of life-direct weighting method. *Mediterranean Journal of Clinical Psychology, 2* (2), 1-10.

Yanagisawa, H. (2015a). Association of Evolutionary Topics related to God and Chaos Theory. General Science Journal, January 28, http://www.gsjournal.net/Science-Journals/Research%20PapersUnification%20Theories/Download/5889.

Yanagisawa, H. (2015b). Discovering Equations in Relation to the Counseling Process. *Mediterranean Journal of Clinical Psychology, 3* (1), 1-20.

Yanagisawa, H. (2015c). Relation between Chaos Theory and Peer Support in Mental
Illnesses: Wisdom in the "Serenity Prayer" Embodies the Peer Support Effect and Ability to Sense Behavioral Changes through Continuous Covariation. *Mediterranean Journal of Clinical Psychology, 3* (3), 1-14.

Yanagisawa, H. (2016). Relationship between Chaos Theory and God's Laws in Florence Nightingale's Philosophy. *Asian Journal of Nursing Education and Research, 6* (1), 81-84.

Yeongmahn, Y. (1993). What can we learn from chaos theory? An alternative approach to instructional systems design. *Educational Technology Research and Development, 41* (3), 17-32.