

THE ROLE OF TRAIT ANXIETY IN INDUCTION OF STATE ANXIETY¹

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The reported study had the following goals: to determine psychometric characteristics of a new instrument purporting to measure trait anxiety – AT29, to explore the effectiveness of a mood induction procedure in eliciting state anxiety, and to determine the role of trait anxiety, as measured by AT29, in responding to mood induction. AT29 was administered as a part of a larger test battery to 232 psychology students during a mass testing session. After three weeks, 90 students were randomly selected to participate in the second, experimental phase of the study. These selected participants were randomly assigned to two groups: experimental (mood-induction group) in which participants watched a video clip with a fear-inducing content and control group in which participants watched a neutral video clip of the same duration as the fear-inducing clip. State anxiety was measured in both groups using the STAI-S questionnaire right before and after mood induction. It was demonstrated that there is a significant association between trait anxiety as measured by AT29 and state anxiety obtained at both measurement occasions-before and after mood induction. Following fear induction, the experimental group demonstrated higher state anxiety scores. However, the interaction between group membership and trait anxiety was not significant. Potential explanations regarding the lack of effect of trait anxiety on state anxiety in this mood induction experiment were discussed as well as some recommendations for future research. Additionally, the results suggested that AT29 has very good psychometric characteristics: high internal consistency and test-retest reliability (.96 and .86 respectively), as well as good divergent and convergent validity.

Keywords: *trait anxiety, state anxiety, mood induction*

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INTRODUCTION

State and Trait Anxiety

Some authors believe that anxiety has a long history but short past (Endler & Kocovski, 2001). During this short past, starting from Freud onwards, there have been attempts to explain individual differences in anxious responding. Eysenck (1970) labeled the tendency to respond in an anxious way as Neuroticism, whereas Spielberger (1966) coined the term trait anxiety.

An important conceptual development in exploration of the phenomenon of anxiety can be attributed to the work of Spielberger (ibid.) who has made a distinction between state and trait anxiety. In order to operationalize this distinction, Spielberger, Gorsuch and Lushene developed the State-Trait Anxiety Inventory (STAI; 1970). This is one of the most frequently used instruments employed to measure anxiety. It has been translated into numerous languages and has been the most frequently cited instrument within the anxiety literature for last three decades. STAI has two subscales, one for measurement of trait anxiety (STAI-T) and the other for measurement of state anxiety (STAI-S). By introducing the distinction between trait and state anxiety, Spielberger et al. have emphasized that anxiety can be conceptualized in two ways, as a stable disposition and as a transient emotional state that everyone experiences from time to time. Both trait and state anxieties have been conceptualized as unitary constructs. However, some research has demonstrated that STAI-T has, in fact, a two-dimensional structure (i.e., it appears to measure two related but separate constructs—anxiety and depression) (e.g., Bieling, Antony & Swinson, 1998). A number of researchers have called attention to this extensive overlap between anxiety and depression and have raised concerns regarding STAI's ability to be a "pure" anxiety measure (Endler et al., 1992; Gorenstein et al., 1995; Novovic et al., 2008; Isyanov & Calamari, 2004).

State anxiety has been defined as an unpleasant emotional response while coping with threatening or dangerous situations (Spielberger, 1983), which includes cognitive appraisal of threat as a precursor for its appearance (Lazarus, 1991). In general, states refer to any reliably measured characteristic, but „typically, state variables refer to conscious, verbally reportable qualities such as moods“ (Matthews, Deary & Whiteman, 2003, pp.77).

On the other hand, trait anxiety refers to stable individual differences in a tendency to respond with an increase in state anxiety while anticipating a threatening situation. This tendency is consistent across a broad range of situations and is temporarily stable. Spielberger (1999) characterized trait anxiety as a general disposition to experience transient states of anxiety, suggesting that these two constructs are inter-related. It can be argued that the difference between trait and state anxiety is similar to the difference between potential and kinetic energy.

High trait anxiety individuals can experience more frequent and more intensive anxiety compared to low trait anxiety individuals, however, they are not anxious all the time. On the other hand, similar short-lived states of anxiety can be found in individuals who don't have a high tendency towards anxious responding. In such cases, experience of state anxiety can be a reaction to certain situational demands. Namely, even a low trait anxiety person will experience state anxiety providing a presence of a sufficiently threatening situation. However, trait anxiety tends to moderate the levels of state anxiety, which are provoked by certain situational demands (Eysenck & Eysenck, 1980). The main assumption of the state-trait models is that the effects of traits on behavior are mediated by states, i.e., that states influence more directly internal processing activities and have a more direct effect on behavior than do traits.

Mood induction

Experimental mood induction studies can provide best evidence suggestive of the trait-state link. Mood induction procedures (MIP) can be defined as strategies whose aim is to provoke in an individual a transitory emotional state in a non-natural situation and in a controlled manner (Coan & Allen, 2007). These procedures are designed to be specific and to produce a specific affect (e.g., dysphoric or anxious state). Also, it is believed that these specific induced states are analogues to naturally experienced states. The initial aim of these experimental procedures was to obtain an insight into emotions and their associations with cognitions, particularly within the research on depression inspired by the cognitive theory. However, over time, induction of various mood states in healthy as well as clinical subjects has become a widely accepted and used technique. Mostly, MIPs have been used to induce depression and happiness, but also there are some MIPs that can be employed to induce anxiety, anger, and "no mood" (i.e., neutral condition) (Martin, 1990).

A number of techniques have been developed to induce experimentally positive and negative mood states: imagination, Velten, film and story, music, feedback, social interaction, hypnosis, gift, facial expression, and combinations of two or more techniques at once (Westermann et al., 1996). MIPs have proven to be efficient in achieving changes in the targeted mood; however, the magnitude and specificity of these changes vary according to the specific MIP use (e.g., Scherrer & Dobson, 2009; Westermann et al., 1996).

Films (or film fragments) have been used by James Gross's group (e.g., Gross & Levenson, 1995; for a more detailed review see Rottenberg, Ray & Gross, 2007). As a mood inductions technique, film can be used in two forms, with and without instructions. When used with instructions, subjects are explicitly asked to imagine and "get involved" with the situation described and the feeling suggested. This form of mood induction is considered a highly effective technique. According to various studies, it produces the required mood in 75% of cases (e.g., Gerrads-

Hesse, Spies & Hesse, 1994; Martin, 1990; Westermann et al., 1996). Additionally, films have certain advantages in that they are a common experience for most people, more realistic than static stimuli, and consistent across participants (King et al., 1993).

In contrast to numerous studies that explored induction of dysphoric mood, experimental studies regarding induction of anxious states have been fairly scarce. One possible reason for such a state of affairs might lie in the very nature anxiety i.e., the difficulty to discriminate clearly anxiety from a related but different state of fear. Also, apprehension and uneasiness, the hallmarks of anxiety, might not lend themselves easily to experimental manipulation. Regarding the experimental techniques used in the existing studies, films or film fragments have been the most frequently used procedures. In addition to films, experimental inductions of anxious mood relied on the following techniques: self-statements, hypnotic suggestions, facial expressions, threat (painful electric shock), and public speaking (Martin, 1990).

Mood induction studies have contributed greatly to our understanding of the trait-state link and can be broadly divided into mediational and moderational studies. Regarding the first group of studies, the nature of mediational processes between traits and states still remains unclear. Trait effects on states might be biologically or cognitively mediated (by cognitive factors such as appraisal and coping). Furthermore, biological and cognitive explanations do not necessarily exclude each other but they might complement each other.

Regarding the second group of studies dealing with moderating effects of traits on affective states, findings seem to be more coherent. The results of experimental mood induction studies tend to be in accord with a general trend found in correlational data, suggesting that personality can moderate affective changes provoked by everyday events, both pleasant and unpleasant (Matthews et al., 2003). These studies have centered predominantly on exploration of two broad personality dimensions, extraversion and neuroticism, on the one hand, and dysphoric state, on the other (e.g., Blackburn, Cameron & Deary, 1990). For example, in a number of experimental studies from the last decade aimed at induction of negative affectivity, it was found that neuroticism tends to act as a moderator. Higher neuroticism scores tend to be related to greater increases in negative affectivity following mood induction compared to persons with lower neuroticism scores (Morrone et al., 2000; Zelenski & Larsen, 1999; Rusting & Larsen, 1999). Although neuroticism and trait anxiety represent similar and highly correlated constructs (Barlow, 2004), the role of trait anxiety in negative mood induction studies has rarely been a focus of researchers.

This research had several related goals. The first goal was to test psychometric characteristics of a new measure purporting to measure trait anxiety – AT29 (Tovilović & Novović, 2009). We wanted to determine whether this instrument assesses only one-dimension of trait anxiety (i.e., whether it is a “pure” anxiety measure), which would be an advantage over STAI-T. The second goal was to determine effectiveness of the experimental manipulation aimed at inducing state

anxiety given that this experimental procedure has rarely been used in our culture. Finally, we were interested in exploring a possible moderating role of trait anxiety in inducing state anxiety. Similar to neuroticism with which is highly correlated, we wondered if trait anxiety as measured with AT29 acts as a moderator of experimentally induced state anxiety. In other words, we hypothesized that high trait anxiety individuals would experience greater increases in state anxiety during mood induction compared to low trait anxiety individuals.

METHOD

Sample

The sample consisted of 90 students from the Department of Psychology, University of Novi Sad, Serbia. Participants were randomly selected from a larger pool of participants ($N = 232$) who responded to a larger test battery with a purpose of testing psychometric characteristics of the tests. The average age of participants in the experimental group (EG) was 21.16 ($SD = 1.38$) whereas the average age of participants in the control group (CG) was 22.44 ($SD = 3.10$). In both groups, the majority of participants were females. Although males were less represented in the total sample, their distribution between the two groups was comparable (15.6 % in EG and 12.5 in CG).

Instruments

Anxiety-Trait 29 (AT29; Tovilović & Novović, 2009³) is a newly developed instrument purporting to measure trait anxiety. The final version of the instrument was created from a larger item pool using a series of psychometric procedures. A substantial number of items from the initial item pool were selected from the existing inventories, which were considered best anxiety indicators based on their psychometric properties and a rational analysis of their content. The final version of the instrument has 29 items. The respondent is asked to rate the extent to which he/she agrees with each item on a 4-point Likert scale.

State-Trait Anxiety Inventory (STAI-S; Spielberger et al., 1970) is a self-report inventory comprised of two subscales of 20 items assessing state and trait anxiety. In the current study, we were interested in assessment of state anxiety. The participants were asked to report how they felt “right now”, on a 4-point scale from

³ Contact the first author to request an English version of AT29.

“not at all” to “very much so.” Cronbach’s alpha in the current study was .90 ($M = 35.5$, $SD = 9.07$).

Serbian Inventory of Affect based on the Positive and Negative Affect Schedule-X (SIAB-PANAS; Novović & Mihić, 2008) is a Serbian translation and adaptation of the Positive and Negative Affect Schedule-X (PANAS-X; Watson & Clark, 1994). In addition to Positive Affectivity (PA) and Negative Affectivity (NA), SIAB-PANAS measures the following specific emotions: Fear, Sadness, Guilt, Hostility, Shyness, Fatigues, Surprise, Joviality, Self-Assurance, Attentiveness and Serenity. The main reason for administration of this measure, as well as the ones described below, was to provide data regarding divergent and convergent validity of AT29. In this regard, we were interested in three scales: NA, Fear, and Hostility. For the current sample, Cronbach’s alphas were: .84 for NA, .80 for Fear, and .68 for Hostility.

Beck Depression Inventory, Version II (BDI-II; Beck, Steer, & Brown, 1996) is one of the most frequently used instruments developed to assess the intensity of depressed mood. It contains 21 items pertaining to measure depressive symptoms of various intensity. For the current sample, Cronbach’s alpha was .87.

Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992) is an instrument used to assess aggressiveness. The BPAQ comprises 29 items with a 5-point response Likert type format (from 1-“extremely uncharacteristic of me” to 5-“extremely characteristic of me”). The items are divided into 4 subscales: physical aggression, verbal aggression, anger, and hostility. In the present study, the total score was employed. For the current sample, Cronbach’s alpha was .83.

Procedure

The participants filled out a test battery that was used to explore the psychometric characteristics of the AT29 questionnaire. They were also informed that they would be contacted in three weeks to complete the experimental part of the study. Both parts of the study took place during regular classes. The participants obtained a certain number of credits for their participation. They were asked to mark the questionnaires with their student ID’s which were used for their subsequent identification. The participants were randomly allocated to two treatment groups (45 participants per group). Also, the groups were randomly assigned to treatment conditions. The two groups did not differ regarding their level of trait anxiety ($t(88) = .47$, ns).

Prior to the experiment, the participants completed STAI-S and AT29. STAI-S was completed for the second time right after the experiment. The experimental manipulation consisted of mood induction using a video clip with an additional instruction. The induction procedure was conducted in a group format in a classroom setting. Before the participants watched the clip, they were given the following instructions: “*You will watch a short video clip. Try not to think of*

anything else but of the video clip content and to experience emotions elicited by the clip to the greatest possible extent.”

The experimental group watched a 10-minute long video clip from the movie “Jaws 1”, which is frequently used in the studies regarding fear induction. In the scene, the actors demonstrate clear signs of fear due to a contact with an approaching threat. Using this fear induction clip, our purpose was to induce the unpleasant states of tension and apprehension, which tend to be common features of anxiety. The control group watched a 10-minute long neutral material (a series of Earth images made from a satellite). A manipulation check consisted of the participants’ responses to the item “On a scale from 1 to 5, estimate the intensity of emotion elected by the video clip”. Their responses ranged from “not at all” to “a lot”. At the end of the study, a debriefing was carried out. The participants received information regarding the purpose of the procedure. All participants seemed satisfied with the explanations.

RESULTS

Psychometric characteristics of AT29

The results of psychometric analyses of AT29 are shown in Table 1. The results suggest that AT29 has a high internal consistency and test-retest reliability. The average inter-item correlation was .47, whereas the item-total correlations ranged from .53 - .77.

Table 1. Descriptive Statistics, Reliabilities of AT29 and Item Representativeness

	M	SD	Cronbah α	Test-retest r	KMO	Inter-item r
AT29	56.93	20.85	.96	.86	.95	.47

Note: N=232 for all statistics except test-retest reliability which was N=123

In order to determine the factor structure of AT29, Principal Components Analysis was conducted. Scree test suggested a one-factor solution with the first factor explaining 49% of the variance. Factor loadings ranged from .51 to .71.

In order to determine the convergent validity of AT29, its associations with the measures of anxiety (STAI-T and STAI-S), negative affectivity, and fear (SIAB-PANAS Fear subscale) were assessed. The measures of depression (BDI-II), aggression (BPAG), and hostility (SIAB-PANAS) served as a basis for determination of the divergent validity of AT29. The correlations are shown in Table 2. It is important to note that AT29 correlated more strongly with STAI-T than STAI-S, and that the difference between these two correlations was statistically significant ($p < .001$), which supports both the convergent and construct validity of AT29.

Table 2. AT29: Convergent and Divergent Validity

	AT29
STAI-T	.77
STAI-S	.50
BDI-II	.56
BPAQ	.31
SIAB-PANAS NA	.47
SIAB-PANAS Fear	.43
SIAB-PANAS Hostility	.40

Note: N=123 due to listwise deletion

In order to determine the divergent validity, the correlations between AT29, a measure purporting to measure a similar construct (anxiety), and measures intended to tap different but somewhat related constructs (depression, aggression, and hostility) were explored. Namely, it was determined that AT29 was more strongly related to STAI-T than to BDI-II ($p < .01$), BPAG ($p < .001$), and SIAB-PANAS Hostility subscale ($p < .01$).

Manipulation check

A great majority of the participants in both groups responded that the induction procedure was effective in a moderate degree (i.e., the most frequent rating was 3 on a 5-point scale). The average rating of the intensity of elicited emotions in the control group was $M = 3.11$, whereas in the experimental group was $M = 2.91$. These differences were not statistically significant ($t(87) = 1.07$, ns).

Effects of Mood Induction and Trait Anxiety on State Anxiety

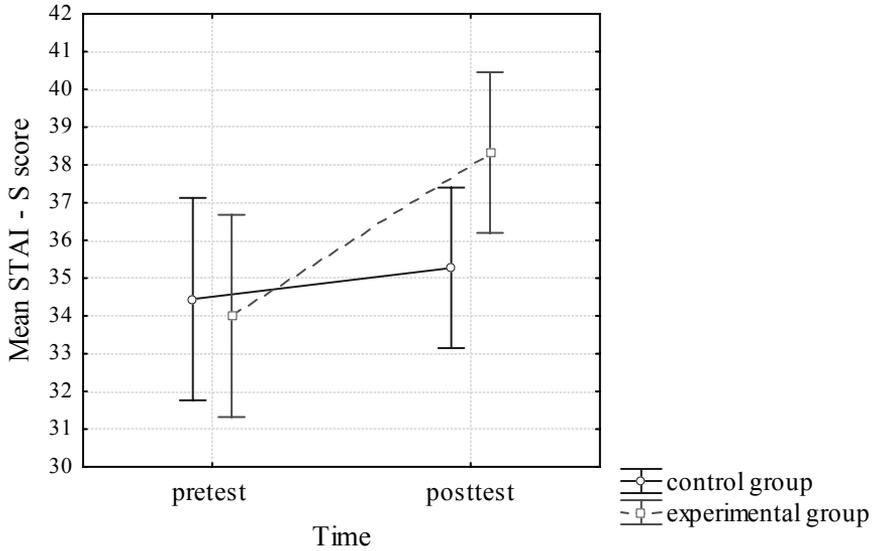
Data were analyzed using a two-way analysis of covariance (General Linear Model) in Statistica 8, with group membership (experimental vs. control) as a between-subject factor, time (pretest vs. posttest) as a within-subject factor, and state anxiety as a dependent variable. Trait anxiety measured with AT29 served as a covariate.

The results indicated the following significant effects: the main effect for the continuous predictor-trait anxiety ($F(1,87) = 8.06$, $p < .001$), and the interaction effect between time and group membership ($F(1,87) = 4.87$, $p < .05$). Univariate results indicated that trait anxiety had a significant effect on both state anxiety measures – pretest ($F(1,87) = 6.96$, $p < .01$) and posttest ($F(1,87) = 14.14$, $p < .001$).

The significant time and group membership interaction can be seen in Figure 1. As can be discerned, following fear induction, the participants in the experimental

group experienced a significant increase in state anxiety in contrast to the control group.

Figure 1. Interaction Effect between Group and Time on State Anxiety



Note: Vertical bars denote .95 confidence intervals.

The results of Scheffe’s test with planned comparisons (Table 3) also support this interpretation. Participants in the experimental condition experienced a significant increase in state anxiety in contrast to participants in the control group.

Table 3. Scheffe’s Test of Planned Post-Hoc Comparisons

Group	Pre-test: M (SD)	Post-test: M (SD)	p
Experimental group	34.05(1.36)	38.44 (1.11)	.00
Control group	34.40(1.36)	35.17(1.11)	.93

The final analysis concerns the hypothesis that trait anxiety acts as a moderator during mood induction so that greater increases in state anxiety can be expected in high trait anxiety individuals compared to low trait anxiety individuals. However, the results of a moderated regression analysis revealed no interaction between trait anxiety and group membership ($b=.01$, ns).

DISCUSSION

In this research we wanted to determine whether anxiety conceptualized as a relatively stable disposition contributes to experimentally induced state anxiety? Or, whether changes in a transient state anxiety, which were experimentally induced, can be attributed to trait anxiety? In order to address this question, a mood induction experiment was conducted. The participants in the experimental group were exposed to fear induction by means of a video clip, whereas the participants in the control group observed a neutral video clip of the same duration (“no mood induction” condition). A new measure of trait anxiety was administered as a part of a larger test battery on a larger sample. After three weeks, during the experimental part of the study, STAI-S (a Serbian translation) was administered before and after induction.

Trait anxiety was assessed using a new questionnaire – AT29 (Tovilović & Novović, 2009). Thus, one aim of this research was to validate this new measure. The results obtained on a complete sample suggested that AT29 has very good psychometric characteristics, in particular high internal consistency and test-retest reliability. For the sake of comparison, Spielberger et al. (1999) showed that for STAI-T typical stability coefficients tend to be around .80. More importantly, AT29, different from STAI-T, appears to have a clear one-dimensional structure, which is a desirable characteristic for a measure intended to be a “pure” anxiety measure (Bieling et al., 1998). Additionally, the questionnaire demonstrated the levels of internal consistency, divergent, and convergent validity which are comparable to similar trait measures, suggesting that it fulfills the psychometric criteria for test construction as outlined by Zuckerman (1976; as per Mathews et al., 2003).

Among those psychometric criteria, Zuckerman has emphasized that state measures have to be sensitive to transient conditions, which are expected to influence the relevant construct. This further implies that a valid state anxiety questionnaire (in contrast to trait measures) has to be sensitive to a particular experimental manipulation. In accordance with this criterion, STAI-S demonstrated sensitivity to fear induction in our study. Namely, in comparison to the control group which received “no mood induction”, the participants in the experimental group had significantly higher scores on STAI-S following fear induction. This result speaks in favor of the effectiveness of the mood induction procedure employed in this research, and, consequently, of the validity of the Serbian version of STAI-S.

In our study, trait anxiety was significantly related to state anxiety at both measurement occasions, pre- and post- fear induction. This result is in accordance with Spielberger’s definition of trait anxiety as a general disposition to experience transient anxiety states (1999). However, the interaction between trait anxiety and mood induction was not significant suggesting that the observed changes in state anxiety cannot be attributed to the tendency for anxious responding but to the effects of mood induction. What are the possible explanations for the lack of the moderating

effect of trait anxiety in this study? First, it is important to note that the experiment was conducted on a student sample, which can be considered representative of a normal population. Thus, one can expect that trait anxiety, as a dimensional construct, had a normal distribution of scores in this sample. It is possible that the moderate levels of the tendency toward anxious responding have no effects on state anxiety in low-stressful situations. In other words, our experimentally induced stress level could have been of an insufficient stressfulness to produce a state of threat and activate trait anxiety to exert its effects. For example, some previous research regarding the trait-state anxiety link has emphasized the importance of contextual factors such as the nature of stressors. Namely, Eysenck (1982) has suggested that trait anxiety is primarily associated with the ego-threatening situations. Hodges (1968, as per Mattwes et al., 2003) has demonstrated a long ago that trait anxiety correlates positively with state anxiety only in the situations representing threats to one's self-esteem (failure to accomplish a task) but not in physically threatening situations (electric shock). Thus, the lack of the moderating effects of trait anxiety in our mood induction study can be attributed to the nature of stressors as well as subjective appraisal of threat. One implication of our study is that future research on this topic should include stressor of various intensity and nature.

The second possible explanation for our results is that the moderating effects of trait anxiety can be discernable only at the extreme levels of trait (i.e., a possibility that the relation between trait and state anxiety is not linear). This hypothesis can only be tested on a clinical sample (e.g., participants with a history of anxiety disorders). This type of research would allow for conclusion relevant for clinical practice and treatment of anxiety disorder patients.

Overall, the current study has demonstrated validity of a new trait anxiety measure (AT29) and a Serbian translation of state anxiety measure (STAI-S). Additionally, it can stimulate further experimental research in this field. Testing the aforementioned hypotheses can be one research direction. Also, future mood induction studies would probably benefit from inclusion of the constructs such as anxiety sensitivity (Reiss et al., 1986) and/or cognitive vulnerability (Rachman, 2004). This way, one would broaden the scope of research in this field by exploring the relations between state anxiety and theoretically relevant constructs other than trait anxiety. Also, more complex experimental designs might include additional behavioral measures (e.g., memory impairment, measures of attention) strengthening the external validity of conclusions that can be drawn from the experiments inspired by the trait-state model of anxious responding. Lastly, future research in this field should focus more closely on possible mediating mechanisms. Ideally, it would be worth exploring the ways traits exert their influence on states and behaviors by delineating particular mechanisms of their influence.

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REZIME

ULOGA CRTE ANKSIOZNOSTI U INDUKCIJI STANJA ANKSIOZNOSTI

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Istraživanju je imalo tri cilja: proveru psihometrijskih karakteristika novokonstruisanog instrumenta za merenje crte anksioznosti – AT29, ispitivanje uspešnosti eksperimentalne indukcije anksioznog stanja i ispitivanje doprinosa crte anksioznosti merene pomoću AT29 reagovanju na afektivnu indukciju. AT29 je primenjen u sklopu šire baterije testova na ukupnom uzorku od 232 studenta psihologije. Tri nedelje nakon tog ispitivanja, iz inicijalnog uzorka slučajno je odabrano 90 ispitanika za eksperimentalni deo istraživanja. Ispitanici su slučajnim odabirom podeljeni u dve grupe. Eksperimentalnoj grupi je prikazan filmski insert putem koga je indukovano osećanje straha, a kontrolna grupa je posmatrala neutralni video-materijal u istom trajanju. Stanje anksioznosti kod obe grupe je mereno pomoću STAI-S neposredno pre i posle afektivne indukcije. Rezultati eksperimentalnog dela istraživanja pokazuju da postoji značajna povezanost crte anksioznosti merene pomoću AT29 i stanja anksioznosti u oba merenja - pre i nakon indukcije. Nakon indukcije straha, eksperimentalna grupa je imala značajno povišenje stanja anksioznosti, no interakcija crte anksioznosti i grupne pripadnosti se nije pokazala značajnom. Diskutovani su mogući razlozi za odsustvo efekta crte anksioznosti na indukciju stanja anksioznosti i iznete smernice i preporuke za dalja istraživanja. Osim ovih nalaza, ustanovljeno je da novokonstruisani AT29 ima veoma dobre psihometrijske karakteristike – visoku internu konzistentnost ($\alpha=.96$), test-retest pouzdanost (.86), kao i divergentnu i konvergentnu validnost.

Ključne reči: crta anksioznosti, stanje anksioznosti, indukcija afekta

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