ACUTE ANXIOLYTIC AND MOOD BALANCING EFFECTS OF AEROBIC GYMNASTICS: RELATIONSHIP TO AGE, PERSONAL TRAITS AND INITIAL ANXIETY LEVELS

Inga Neissaar[1], Maris Kikas[2], Anu Järvekülg[2], Mehis Viru[2] and Atko Viru[2]
[1]Institute of Sport Pedagogy, University of Tartu, Estonia
[2]Institute of Exercise Biology, University of Tartu, Estonia

Original scientific paper
UDC 613.73:796.41.035

Abstract:

The purpose of the study was to establish the significance of personal traits, age, initial anxiety and affect levels in changes of state and trait anxiety and of any positive and negative affect during a 40-min session of aerobic gymnastics. Participants were 70 healthy women in age range from 17 to 57 years. The testing took place before and after the session with the aid of State and Trait Anxiety Inventory (STAI) and Positive and Negative Affect Scale (PANAS). The examinees filled in the NEO-PI (Big Five Personality Inventory) and the Beck Depression Inventory on the next day. The session of aerobic gymnastics resulted in a reduced state anxiety and diminished negative affect level. The anxiolytic effect appeared to be promoted by high initial levels of state anxiety, pronounced negative affect before the session, and interaction of age with openness and conscientiousness. The diminished negative affect level was related to the initial levels of state anxiety and negative affect level. Interaction of age, and initial levels of state anxiety and negative affect attributed 83% to the variance of the anxiolytic effect and 77% of the decrease in negative affect. In conclusion, the acute effects of aerobic gymnastics are reduced anxiety and a balancing mood. Both effects are promoted by initial high anxiety and mood imbalance.

Key words: *aerobic gymnastics, depressiveness, positive affect, negative affect, state anxiety, trait anxiety.*

AKUTE ANXIOLYTISCHE UND STIMMUNGSHEBENDE WIRKUNG DER AEROBIC-GYMNASTIK: DIE BEZIEHUNG ZUM ALTER, PERSÖNLICHKEIT UND ANFANGSBANGIGKEITSNIVEAU

Zusammenfassung:

Das Ziel dieser Studie war, die Bedeutung der Persönlichkeitseigenschaften, des Alters, des initialen Bangigkeitsniveaus und des Affektniveaus bei den Veränderungen der Bangigkeit und des Bangigkeitszustands, sowie des positiven und negativen Affekts während einer 40-Minuten langen Stunde von Aerobic-Gymnastik festzustellen. 70 gesunden Frauen im Alter von 17 bis 57 Jahren nahmen an der Untersuchung teil. Sie wurden vor und nach der Aerobic-Gymnastik-Stunde mittels State and Trait Anxiety Inventory (STAI) und Positive and Negative Affect Scale (PANAS) geprüft. Am nächsten Tag füllten die Teilnehmerinnen die Fragebögen "NEO-PI (Big Five Personality Inventory)" und "Beck Depression Inventory" aus. Die Ergebnisse der Aerobic-Gymnastik-Stunde waren reduzierter Bangigkeitszustand und verminderter negativer Affekt. Die anxiolytische Wirkung scheint durch einen hohen Anfangsbangigkeitszustandniveau, den ausgeprägten vorherigen negativen Affekt, sowie durch die Wechselwirkung vom Alter und Unbefangenheit und Gewissenhaftigkeit verstärkt zu sein. Vermindertes negatives Affektniveau korrelierte mit dem Anfangsbangigkeitszustandniveau, sowie mit dem Niveau des negativen Affekts. Die Wechselwirkung vom Alter, Anfangs und negativem Affektniveau war für 83% der Varianz der anxiolytischen Wirkung, sowie für 77% der Verminderung des negativen Affekts verantwortlich. Es kann beschlossen werden, dass die akute Wirkungen von Aerobic-Gymnastik reduzierte Bangigkeit und bessere Stimmung seien. Beide Wirkungen werden durch eine hohe Anfangsbangigkeit und Stimmungsstörung verstärkt.

Schlüsselwörter: *Aerobic-Gymnastic, Depression, positiver Affekt, negativer Affekt, Bangigkeit*

Introduction

Aerobic gymnastics combines traditional gymnastics exercises with contemporary forms of movement and music. This mode of physical activity has won popularity among adolescent and adult female persons. The positive effect of the prolonged non-stop dance or gymnastic activities on health-related fitness has been evidenced in several studies (for review see Williford et al., 1989). However, gymnasts also experience positive mood changes (Legwold, 1982; Rockfeller & Burke, 1979), extended up to the possible alterations in personality (Johnson et al., 1984). The positive mood effects are, obviously, related to the anxiolytic effect of muscular activity (Morgan, 1979; Petruzzello et al., 1991; Breus & O'Connor, 1998) and/or to the exercise-induced euphoria (Partin, 1983; Morgan, 1985). Prolonged non-stop activities also exert a balancing action on the levels of positive and negative affects (Gauvin et al., 1996; McGowan, et al.,1996). Biddle (1992) emphasises that positive psychological or mental outcomes motivate engagement in physical exercises. Dishman et al. (1985) indicate that feelings related to well-being and enjoyment may be more important to maintain activity than concern for health.

However, the positive mood effect of aerobic dance and similar activities has not been confirmed in some studies. Szabo et al. (1998) did not find any positive alterations in exercise-induced feeling states after an aerobic dance session.

Making an attempt to study the significance of opioid peptides in mood changes induced by aerobic gymnastics, we found a pronounced interindividual variability of mood changes in the placebo experiment (Neissaar et al., 1995). The variability might be related to various circumstantial or personal factors. The purpose of the present study was to establish the significance of personal traits, age and initial state on changes of state and trait anxiety and on positive and negative affect levels during a 40-min session of aerobic gymnastics.

Material and methods

Participants

The study was conducted on 70 healthy women in an age range from 16 to 57 years. Participants exercised regularly in groups of aerobic gymnastics two to three times a week during the period from 1 to 4 years. Informed consent was obtained from all participants. Obese women were not included in the sample.

Methods

State-Trait Anxiety Inventory (STAI) and Positive and Negative Affect Scale (PANAS) were used in order to test the acute effects of exercise sessions on anxiety and affect levels (Spielberg et al., 1983, Watson & Clark, 1994). PANAS was used in the Estonian Version (Allik & Realo, 1997). Personality traits were assessed with the aid of the Estonian version (Pulver et al., 1995) of the NEO-PI Inventory (Costa & McCrae, 1985) and Beck Depression Inventory (Beck et al., 1991). The validity of the Estonian version of the Big Five Personality Inventory has been discussed in a special issue (Pulver et al., 1995).

Procedure

The testing with the aid of STAI and PANAS was performed before and within 10 to 20 min after a standard session of aerobic gymnastics (post shower). Duration of the session was 40 minutes. The session consisted of a warm-up phase (jogging and gymnastic exercises with increasing intensity and increasing amplitude of movements, duration 5 min), the main part (various gymnastic exercises and dance movements without any interruptions, duration 30 min), and the relief part (relaxation and stretching exercises, duration 5 min). In the main part the heart rate was maintained at the level of 75-80% of the individual maximum, determined by the formula 220-age in years (Janssen, 1987). The actual level of the intensity of the session load was checked by monitoring the heart rate with the aid of a Sporttester (PE 3000, Polar Electre OY, Ltd, Finland). The heart rate monitoring took place in three randomly selected subjects during each studied gymnastic session.

All the sessions were performed with musical accompaniment. In order to avoid the influence of the time of day on the psychological responses (Trine & Morgan, 1995), all sessions took place between 5 and 7 p.m.

The main part of the session was divided into three subdivisions. In the first subdivision various exercises in standing position were used. The second subdivision consisted of jogging, jumping and dance activities. In the last subdivision of the main part the exercises for abdomen, back, breast and arm muscles were performed including exercises in lying position.

On the next day after testing the exercise session effect the participants were asked to fill in the Big Five Personality Inventory and Beck Depression Inventory (BDI).

Data analysis

The materials obtained with the aid of STAI, PANAS and Beck Depression Inventory were analysed manually. The results of the Big Five Personality Inventory were analysed using a special computer program in the Department of Psychology, University of Tartu. Individual changes induced by the exercise session (difference between data recorded before and after session) were calculated for parameters obtained with the aid of STAI and PANAS. The probability of changes was evaluated using the paired *t*-test. The relationships of session-induced changes, as well as of the levels of measured parameters both before and after the session, with age, personal traits and characteristics of the initial state were examined with the aid of Pearson's product moment correlation coefficient and by computing MANOVA. The results of the multivariate test of significance were evaluated by Wilks lambda, F, size effect (ES) and statistical power at probability of 0.05. The results of the univariate F-test were characterized by the significance of F (5,64 degrees of freedom) designating the 0.05 probability level as significant, and by computing ES and statistical power. According to Cohen (1988) statistical power at p=0.05 was considered sufficient if the value was > 0.8. Eta-square (λ-Wilks lambda) was computed for each factor to characterize the contribution of the factor in the variance of experimental results. The amount of variance attributable to the effect of the factor was expressed as a percentage of the total variance.

Data analysis was proceded by using SPSS (Windows Release 6.0).

Results

Anxiety

The session of aerobic gymnastics resulted in a reduced state anxiety (Fig. 1). The analysis of individual changes with the aid of the paired *t*-test indicated that the response was highly significant (t=5.05, p<0.001), despite the opposite change in 9 individuals and lack of change (±1 arbitrary units) in 11 examinees (Table 1). Trait anxiety increased in 14 and decreased in 30 women. Changes of state and trait anxiety were in moderate but significant correlation (r=0.247, p=0.039).

Table 1. Number of individual cases of increased or reduced state and trait anxiety and affect changes during the session of aerobic gymnastics.

	Increase > +1	No change ± 1	Decrease > -1
state anxiety	9	11	50
trait anxiety	14	26	30
Positive affect level	32	13	25
Negative affect level	13	19	38

Age did not correlate with any permality variable, BDI (Table 2) and levels of state and trait anxiety before and after session, but correlated with the reduction of state anxiety during the session (r=0.284, p=0.017). According to MANOVA, age had no major effect on the levels of state or trait anxiety and the magnitude of their change (Wilks lambda = 0.64, F=0.95, p>0.05).

Neuroticism was in negative correlation with extraversion, conscientiousness and agreeableness, but in positive correlation with BDI (Table 2). Positive correlations were also found between extraversion and conscientiousness, extraversion and agreeability and conscientiousness and agreeability, whereas BDI was in negative correlation with extraversion, and conscientiousness (Table 2).

State and trait anxiety levels correlated with neuroticism (r=0.336 ... 0.666, p<0.004), extraversion (r=-0.249 ... -0.463, p<0.037), conscientiousness (r=-0.577, p<0.011) and BDI (r=0.450 ... 0.658, p<0.001), but not with agreeability. Only the postexercise levels of state and trait anxiety correlated with *openness* (r= -0.257, p=0.032 and r=-0.248, p=0.038, respectively). The magnitudes of anxiety changes did not correlate with estimated personal traits.

MANOVA indicated that significant effects have been exerted on anxiety measures by neuroticism (Wilks lambda =0.40, F=2.02, p=0.002, multivariate size effect ES=0.166, power at 0.05=0.98), extraversion (lambda = 0.33, F=2.56, p<0.001, ES = 0.200, power = 1.00), and BDI (lambda = 0.40, F=2.03, p=0.002, ES=0.167 power = 0.99). Univariate test of

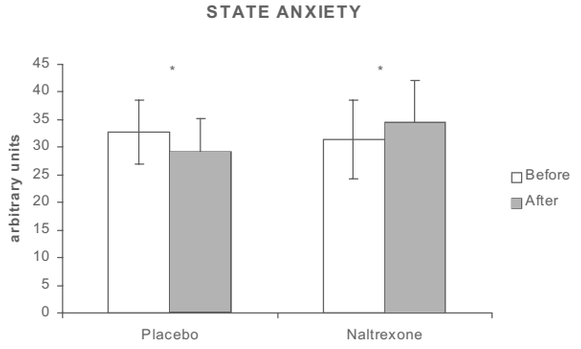

Figure 1. Mean values of state anxiety and trait anxiety before and after a session of aerobic gymnastics (in arbitrary units). Asterisk denotes a statistically significant (p<0.05) change during a session by the paired t-test. The vertical bars indicate the SD over the mean.

Table 2. Correlations between age, personality variables and BDI

	Age	Neuroti-cism	Extra-version	Openness	Conscien-tiousness	Agreeability	BDI
Age	x	-0.091	-0.231	-0.009	0.058	0.152	0.082
Neuroticism		x	-0.400**	-0.227	-0.547***	-0.462***	0.567***
Extraversion			x	0.251	0.392**	0.310**	-0.291*
Openness				x	0.116	0.212	0.171
Conscientiousness					x	0.465***	-0.471***
Agreeability						x	-0.187
BDI							x

Significant correlations: * $p<0.05$, ** $p<0.01$, *** $p<0.001$

significance showed significant F values of state anxiety in regard to the effect of extraversion (before the session $F=5.18$, $p<0.001$, power=0.98, after the session $F=479$, $p=0.001$, power = 0.97) and BDI (before $F = 3.59$, $p=0.006$, power = 0.90, after $F = 6.38$, $p<0.001$, power=0.99). Significant F values were obtained in regard to the action of neuroticism on state anxiety (before 2.45, $p=0.043$, after $F=2.89$, $p=0.021$), however, the statistical power was sufficiently high in regard to the post-session value (0.81), but not to the pre-session value (0.74). Eta-square (λ-Wilks lambda) revealed that the variance of state anxiety levels before the session was attributable to extraversion by 29% (power 0.98). Variance of state anxiety after the session was attributable to neuroticism by 18% (power=0.81), to extraversion by 27% (power=0.80), to openness by 17% (power=0.80), to conscientiouness by 20% (power= 0.86%), to agreeability by 21% (power=0.92) and to BDI by 33% (power=0.99). The changes in anxiety were not related to the influence of any studied personal traits.

According to the eta-square, interaction of age with extraversion, openness, conscientiousness, agreeability or BDI accounted for considerable amounts of variations (power > 0.8) in various anxiety measures (Table 3). However, in regard to state anxiety change, the influence did not reach the degree corresponding to statistical power > 0.80.

The initial level of state anxiety had a main effect on other measures of anxiety (Wilks lambda = 0.08, $F = 16.8$, $p<0.001$, ES=0.561, power=1.00). Univariate F-tests with (3,66) degrees of freedom showed significant F values ($p<0.001$) for state anxiety after session, trait anxiety, both before and after session, and magnitude of state anxiety change. According to eta-square the initial level of state anxiety accounted for 35% of the variance of trait anxiety (power=0.99), 30% of state anxiety after the session (power = 0.99) and 39% of the state anxiety change. A similar main effect belonged to trait anxiety (lambda=0.08, $F=11.0$ $p<0.001$, ES=0.457, power=1.00). Trait anxiety was attributable for variations of the initial level of state anxiety by 39% (power=0.99) and of post-session levels of state anxiety by 47% (power=1.00), and of trait anxiety by 72% (power=1.00).

Interaction of age with initial levels of state or trait anxiety did not reveal significant effect on post-exercise anxiety levels, but accounted for 37% of variance in a change in state anxiety (power 0.90).

Affect levels

The exercise session did not exert any significant common influence on the positive affect level, but it significantly ($p<0.05$) reduced the negative affect (Fig. 2). Individual variabilities existed in changes of both parameters (Table 1).

Table 3. Variance in anxiety measures attributable to interaction of age and personal traits.

Interaction of age with	State anxiety			Trait anxiety		
	Before the session	After the session	Change	Before the session	After the session	Change
Neuroticism	8%	4%	6%	5%	5%	3%
Extraversion	30%	45%*	21%	43%*	43%*	32%
Openness	36%*	36%*	33%	30%	22%	25%
Conscientiousness	37%	54%*	34%	54%*	53%*	42%*
Agreeableness	25%	33%*	22%	37%*	37%*	17%
BDI	31%	46%*	24%	38%*	29%*	18%

Asterisk indicates power at p 0.05 > 0.80

The correlation analysis did not demonstrate any significant relationships between age and these parameters. Changes of positive affect correlated with extraversion (r=0.275, p=0.021) and agreeability (r=0.256, p=0.032), the change of negative affect with neuroticism (r=0.341, p=0.004) and BDI (r=0.457, p<0.001).

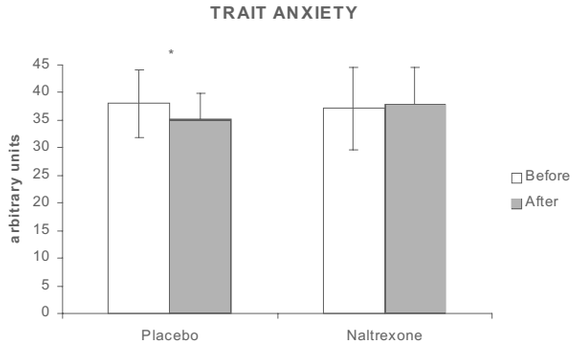

Figure 2. Mean values of positive and negative affect before and after a session of aerobic gymnastics (in arbitrary units). Asterisk denotes a statistically significant (p<0.05) change during a session by the paired t-test. The vertical bars indicate the SD over the mean.

MANOVA allowed us to identify the main effect of extraversion (lambda=0.422, F=19.1, p=0.004, ES=0.159, power=0.98) but not of other personality traits and age on the affect parameters. Extraversion attributed to 24% of the variations at the initial level of positive affect (power=0.94) and 19% in post-exercise level of negative affect (power=0.84). Both the conscientiousness and BDI contributed also to variations in the postexercise level of negative affect (19%, power 0.83, and 25%, power 0.95, respectively).

The initial level of state anxiety but not of trait anxiety exerted a significant effect on the changes both of the positive and the negative affect during the exercise session. 22% of variance of positive affect change (power=0.96) and 15% of variance of negative affect change (power=0.81) were attributable to inter-individual differences at the initial level of state anxiety. The initial level of positive affect accounted for 25% of variance in a change in state anxiety (power=0.94) and 29% (power=0.96) of variance in negative affect (power=0.96). The influence on the variance in positive affect changes was not significant. The initial level of negative affect had a significant effect on variance in negative affect change (40%, power 0.99).

Interactions of initial levels of both affects with age revealed no significant influence on the changes either in the positive or in the negative affect, or in state anxiety. However, the interaction of initial levels of state anxiety and negative affect (lambda 0.27, F=17.9, p=0.003, ES=0.281, power=1.00) exerted pronouncing effects on affect changes (37% of variance may be attributed to the changes in state anxiety, power=0.97, and 43% of variance in changes of negative affect, power=0.99). Most of the variance in changes of these two parameters is attributable to interaction of age, the initial state anxiety and the initial negative affect level (lambda 0.07, F=19.9, p<0.001, SE=0.71, power=1.00). The interaction amounted to 83% of variance in a change in state anxiety (power 0.99) and 77% of variance in negative affect change (power=0.99).

Discussion

The general result of a 40-min aerobic gymnastics session was a reduction in state anxiety. The result is in good accordance with the well-established anxiolytic effect of muscular activity (Morgan; 1979, Petruzzello et al., 1991). The reduction of state anxiety (from 35.4±9.3 to 30.6±2.4, mean±SD) was close to the result of Porcari et al. (1988) obtained in 19 males and 17 females during a 40-min treadmill walking session (state anxiety decreased from 34.8±6.7 to 28.2±5.4). However, the results obtained by us showed that several individuals failed to demonstrate the response or even exhibited an increased state anxiety after the session.

Although pooled material did not show a significant change in trait anxiety, individual analysis revealed a diverse shift also in this anxiety measure. The changes in trait anxiety can be explained by altered self-esteem after the aerobic gymnastics session which made women evaluate their usual anxiety more or less highly than before the session. A significant correlation was found between the changes of trait and state anxiety. Accordingly, the anxiolytic effect of the exercise session might contribute to increased self-esteem. Increased self-esteem caused by muscular activity has been previously established (see Sonstroem, 1984).

The variability in the results indicates that the anxiolytic effect depends not only on the muscular activity itself but also on several other possible factors. A significant correlation between age and the reduction of state anxiety pointed to an increase of response with ageing. However, MANOVA did not confirm the main effect of age on the measures of trait and state anxiety. Significant effects were exerted by some personal traits on anxiety measures. The univariate test of significance indicated that inter-individual variation in state anxiety before the session was considerably related

to extraversion, and to neuroticism, extraversion, openness and conscientiousness after the session. The univariate test of significance did not indicate the effect of any personal traits on any the change in state anxiety. The interaction of age with personal traits, particularly with openness and conscientiousness attributed a considerable amount of variations to a change in state anxiety (33% and 34%, respectively). However statistical power of effects was below 0.80 and it was considered to be necessary for a statistically justified conclusion (Cohen, 1988).

The main effect on the changes in state anxiety has been found in regard to the influence of the initial anxiety. State anxiety levels before a session contributed to 39% of its change during the session (power=0.99). Thus, the higher the initial state anxiety, the higher the anxiolytic effect of an exercise session (Fig. 3).

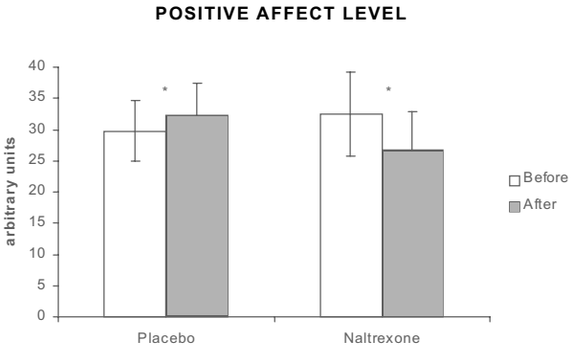

Figure 3. Relationship between the decrease of state anxiety during a session of aerobic gymnastics and the initial level of state anxiety.

Intensive exercises may result in an euphoric state called "runners high" (Partin, 1983; Morgan, 1985). LaFontaine et al., (1992), reviewed the studies of aerobic exercise effect on mood, and emphasised a great beneficial effect. Accordingly, it was possible to expect the changes in levels of positive and negative affects under the influence of the session of aerobic gymnastics. Previous studies indicated that similar exercise sessions resulted in an increase in positive affect (Gauvin et al., 1996; Mcgowan et al., 1996) and in a decrease in negative feelings (Mcgowan et al., 1996). Actually, the aerobic gymnastic session reduced the negative affect, but it did not exert a common influence on the positive affect level. The reduced negative affect in association with an unchanged positive affect also indicates that the session of aerobic gymnastics exerted a balancing mood effect.

The changes in positive or in negative affect were not related either to personal traits or age, although the variance at the post-exercise level of negative affect was attributable to the influence of extraversion, conscientiousness and BDI in the amounts of 19%, 19% and 25%, respectively. The initial level of state anxiety contributed significantly to the variance in the changes of positive (22%) and negative (15%) affects. At the same time the initial levels of negative affect contributed significantly to the variance of changes in negative affect (40%). Accordingly, the higher the negative affect before the session, the greater the reduction of the negative affect during the session (Fig. 4). Consequently, imbalance between positive and negative affects before the session favoured the balancing mood effect of aerobic gymnastics.

Most of the variance in the changes of both state anxiety and negative affect was attributable to interaction of age, initial state anxiety and initial negative affect level.

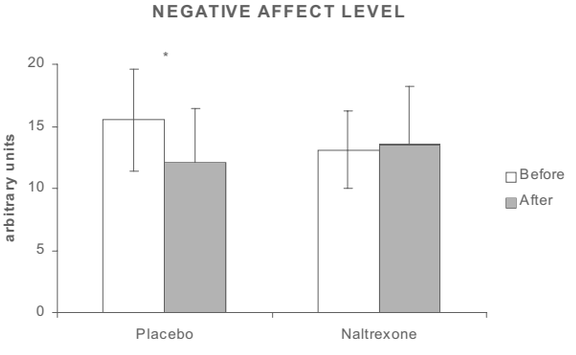

Figure 4. Relationship between the decrease of negative affect and the initial level of negative affect.

Conclusion

The acute effects of aerobic gymnastics encompass a reduced state anxiety and a balancing effect on mood. Both effects are promoted by high initial anxiety level and mood imbalance. The interaction of the initial state with age is attributable for the most variance in anxiolytic (83%) and mood balancing effect (77%). The personal traits and depression influence the state and trait anxiety and the affect levels before and after the exercise session but do not produce any changes during the session.

Reference

Allik, J. and Realo, A. (1997). Emotional experience and its relation to the Five-Factor Model in Estonians. *Journal of Personality* 65, 625-647.

Beck, A.T., Ward, C.H., Mendelson, M., Mock, J. & Erbaugh, J. (1961). An inventory for measuring depression. *Archives for General Psychiatry* 4, 561-571.

Biddle, S.J.H. (1992). Exercise psychology. *Sport Science Review* 1(2),79-92.

Breus, M.J. & O'Connor, P.J. (1998). Exercise-induced anxiolysis a test of the "time out" hypothesis in high by anxious females. *Medicine and Science in Sports and Exercise* 30,1107-1112.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* 3rd edn, Hillsdale NJ: Erlbaum.

Costa, P.T. & McCrae, R.R. (1985). *The NEO Personality Inventory Manual.* Psychological Assessment Resources, Odessa Fl.

Dishman, R.K., Sallis, J.F. & Oranstein, D.R. (1985). The determinants of physical activity and exercise. *Public Health Reports* 100,158-171.

Gauvin, L., Rejeski, W.L. & Narris, J.L. (1996). A naturalistic study of the impact of acute physical activity on feelings and their affect in women. *Health Psychology* 15, 391-397.

Janssen, P.G.J.M. (1987). *Training, Lactate, Pulserate.* Oulu: Polar Electro OY.

Johnson, S., Berg, K. and Latin, R. (1984). The effect of training frequency of aerobic dance on oxygen uptake, body composition and personality. *Journal of Sports Medicine and Physical Fitness* 24, 290-298.

Legwold, G. (1982). Does aerobic dance offer more fun than fitness? *Physician and Sportmedicine* 10(9),147-151.

McGowan, R.W., Talton, B.J. & Thompson, M. (1996). Changes in scores on the profile of mood states following a single bout of physical activity - heart rate and changes in affect. *Perceptual and Motor Skills* 83, 859-966.

Morgan, W.P. (1985). Affective *beneficience* of vigorous physical activity. *Medicine and Science in Sports and Exercise* 17,94-100.

Morgan, W.P. (1979). Anxiety reduction following acute physical activity. *Psychiatric Annals* 9, 36-45.

Neissaar, I., Smirnova, T. and Viru, A. (1995). Naloxone effect on emotivity in female gymnasts. *Pharmacology and. Toxicology*, 76 (Suppl.3), 4-57.

Partin, C. (1983). Runners 'High' *Journal of American Medical Association* 249, 21.

Petruzzello, S.J., Landers, D.M., Hatfield, B., Kubitz, K.A. and Salazar, W.A. (1991). Meta-analysis on the anxiety-reducing effects of acute and chronic exercise: Outcomes and mechanisms. *Sports Medicine* 11, 143-182.

Porcari, J.P., Ward, A., Morgan, W., Mance, M., Ebbeling, C., Kline, G., O'Honley, S. and Rippe, J. (1988). Effect of walking on anxiety state and blood pressure. *Medicine and Science in Sports and Exercise*. 1988;20 (Suppl),S85 (abstract)

Pulver, A., Allik, J., Pulkinen, L. and Hämäläinen, M. (1995). A Big Five personality inventory in two non-Indo-European languages. *European Journal of Personality* 9, 109-124.

Rockefeller, K.A. and Burke, E.J. (1979). Psycho-physiological analysis of an aerobic dance programme for women. *British Journal of Sports Medicine* 7,109-124.

Sonstroem, R.J. (1984). *Exercise and self-esteem. Exercise and Sport Sciences Reviews* 12, 123-155.

Spielberger, C.D., Gorsech, R.L., Lushene, R., Vagg, P.R. and Jacobs, G.A. (1983) *State-Trait Anxiety Inventory (Form V).* Palo Alto: Consulting Psychologists.

Trine, M.R. and Morgan, W.P. (1995). Influence of time of day on psychological response to exercise. *Sporst Medicine* 20, 328-337.

Watson, D. and Clark, L.A. (1994). *The PANAS-X Manual for the Positive and Negative Affect Schedule. (Expanded Form.*) The University of Iowa.

Williford, H.N., Scharff-Olson, M. and Blessing, D.L. (1989). The physiological effects of aerobic dance. A review. *Sports Medicine* 8, 335-345.

NEPOSREDAN UTJECAJ VJEŽBANJA AEROBIKE NA SMANJENJE ANKSIOZNOSTI I URAVNOTEŽENJE RASPOLOŽENJA: RELACIJE SA ŽIVOTNOM DOBI, CRTAMA LIČNOSTI I POČETNIM RASPOLOŽENJEM

Sažetak

Svrha je ovoga istraživanja bila utvrditi kolika je važnost crta ličnosti, životne dobi, inicijalnog stupnja anksioznosti i raznih afektivnih stanja za promjene anksioznosti i anksioznih stanja, kao i za pozitivne i negativne učinke 40-minutnog vježbanja aerobike. Uzorak ispitanica činilo je 70 zdravih žena u dobi od 17 do 57 godina. Za mjerenja, koja su provedena neposredno prije i poslije sata aerobike, korišteni su upitnici State and Trait Anxiety Inventory (STA) i Positive and Negative Affect Scale (PANAS). Ispitanice su idući dan popunile još dva upitnika – Big Five Personality Inventory (NEO-PI) i Beck Depression Inventory (BDI).

Ustanovljeno je sniženje anksioznoga stanja nakon četrdesetominutnog vježbanja aerobike. Dob nije korelirala ni sa jednom varijablom crta ličnosti, kao ni sa razinom anksioznosti i anksioznoga stanja prije i nakon treninga, ali je uspostavila korelaciju s redukcijom anksioznoga stanja tijekom vježbanja. Prema rezultatima multivarijatne analize varijance (MANOVA), dob ne utječe znatnije na razine anksioznosti i anksioznih stanja niti na veličinu njihove promjene. Razine anksioznosti i anksioznih stanja korelirale su s neuroticizmom, ekstravertiranošću, savjesnošću i BDI-om, ali ne i sa stupnjem ugodnosti osobe. Eta-kvadrat je pokazao da se razina anksioznoga stanja prije vježbanja može pripisati ekstraverziji (29%). Varijanca anksioznoga stanja nakon vježbanja mogla se pripisati neuroticizmu (18%), ekstraverziji (27%), otvorenosti prema iskustvu (17%), savjesnosti (20%), stupnju ugodnosti osobe (21%) i BDI-u (33%). Veličina promjene anksioznosti nije korelirala s utvrđenim crtama ličnosti. Samo je inicijalna razina anksioznoznog stanja značajno utjecala na ostale mjere anksioznosti. Udio inicijalne anksioznosti u varijanci anksioznoga stanja nakon vježbanja bio je 30%, a u promjeni anksioznoga stanja 39%. Interakcijom između dobi i inicijalnih razina anksioznoga stanja može se objasniti 37% varijance promjene anksioznoga stanja.

Trening nije značajnije utjecao na razinu pozitivnih emocija, ali je znatno smanjio negativne emocije. Na temelju rezultata MANOVA-e, utvrđen je glavni utjecaj ekstraverzije. Ostale crte ličnosti i dob nisu imale utjecaja na parametre emocija. Ekstraverzija objašnjava 24% varijance inicijalnih pozitivnih emocija i 19% varijance negativnih emocija nakon vježbanja. Pokazalo se da je inicijalna razina anksioznoga stanja, ali ne i anksioznosti, najznačajnije utjecala na promjene i pozitivnih i negativnih emocija tijekom vježbanja – 22% varijance promjene pozitivnih emocija i 15% varijance promjene negativnih emocija objašnjeno je individualnim razlikama u inicijalnom stupnju anksioznog stanja. Iinicijalna razina pozitivnih emocija sudjelovala je u promjeni anksioznoga stanja sa 25%, a inicijalna razina negativnih emocija sa 29%.

Zaključimo, na anksiolitički učinak aerobike utjecale su, prije svega, visoka inicijalna razina anksioznoga stanja, inicijalno jasno izražene negativne emocije te interakcija između životne dobi, s jedne strane, i otvorenosti prema iskustvu i savjesnosti, s druge. Sniženje razine negativnih emocija povezano je s inicijalnim razinama anksioznoga stanja i negativnih emocija. Interakcija životne dobi s inicijalnim razinama anksioznoga stanja i negativnih emocija objašnjava 83% varijance anksiolitičkog efekta aerobike i 77% sniženja negativnih emocija.

Ključne riječi: *aerobika, depresija, pozitivne emocije, negativne emocije, anksioznost, anksiozno stanje*

Received: January 10, 2000
Accepted: October 5, 2001

Correspondence to:
Inga Neissaar,
Institute of Sports Pedagogy,
University of Tartu, 18 Ylikooli,
Tartu 51014, ESTONIA
Phone: 372-25 570 075
Fax: 372-7-375 367
E-mail: aluik@ut.ee