



---

**UNIVERSITY OF THESSALY**

*School of Physical Education and Sports*  
Laboratory of sport psychology and quality of life



---

# **SPORTS AND EXERCISE PROGRAMS AGAINST SMOKING**

**Yannis Theodorakis**

**[theodorakis@pe.uth.gr](mailto:theodorakis@pe.uth.gr)**

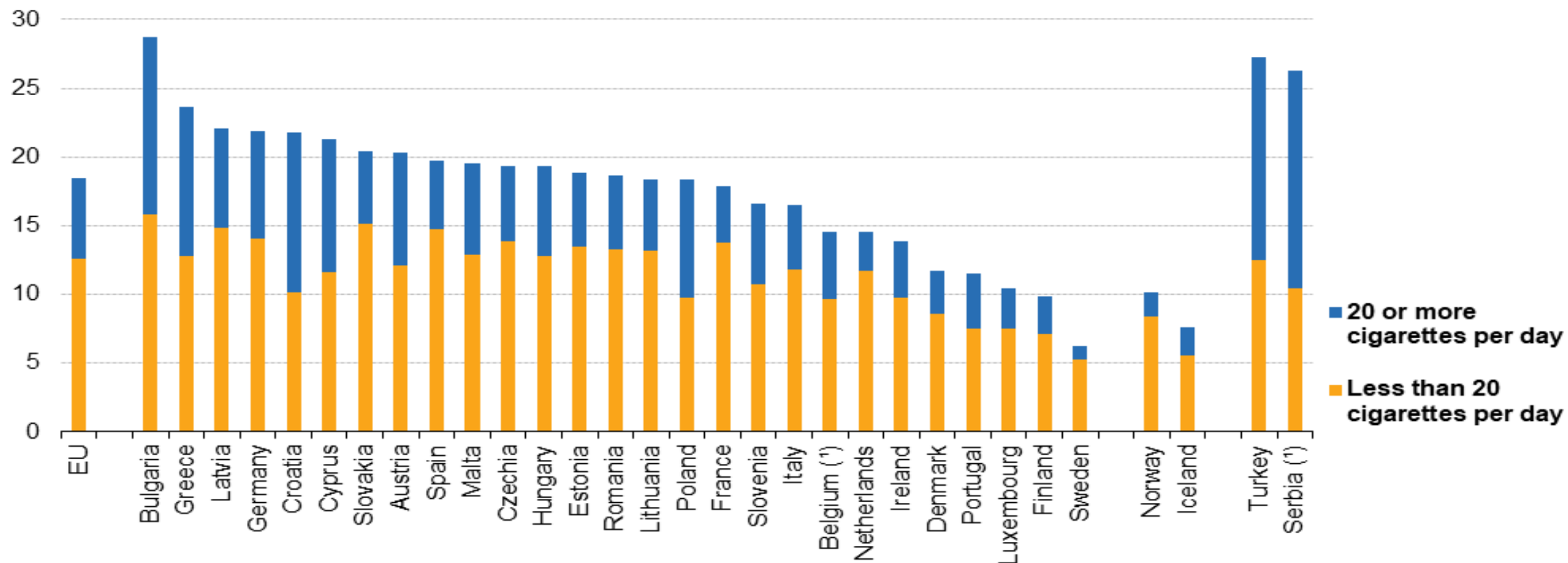
**Trikala, 1-11-2023**

# Topics

- **Addiction definition**
- **Smoking addiction and exercise**
- **How to organize effective intervention programs**

## Share of daily smokers of cigarettes among persons aged 15 and over, by level of consumption, 2019

(%)



Note: ranked on the share of all daily smokers.

(\*) Low reliability.

Source: Eurostat (online data code: hlth\_ehis\_sk3e)

## The effects of exercise on smoking:



# Facts about smoking and diseases

- **There is strong medical evidence that smoking is related to more than two dozen diseases and conditions. It has negative effects on nearly every organ of the body and reduces overall health.**
- **Smoking remains the leading cause of preventable death and has negative health impacts on people of all ages: unborn babies, infants, children, adults etc.**
- **Smokers not only increase their risk of lung disease, including lung cancer, but they also increase their risk of other illnesses, including heart disease, emphysema, stroke, and oral cancer, type 2 diabetes etc.**

# WHO smoking statistics

**Tobacco kills around 6 million people each year and around 8 million by the year 2025. More than 5 million of those deaths are the result of direct tobacco use while more than 600 000 are the result of non-smokers being exposed to second-hand smoke.**

U.S. National Cancer Institute and World Health Organization (2016). *The Economics of Tobacco and Tobacco Control*. National Cancer Institute Tobacco Control Monograph 21. World Health Organization; 2016

# Smoking and diseases

*Research has shown that* **Smoking creates various functional problems and leads to serious diseases.**

**It is responsible for the increased mortality rate of smokers.**

*The percentage of Greek smokers is among the highest in Europe.*

*Greece has the highest proportion of smokers among Western European countries*

# Differences between Exercisers and Non-Exercisers

- the more people exercise the less they smoke
- older individuals exercise less and smoke more than younger individuals,
- non-athletes smoke more than athletes
- former athletes smoke less than people who have never exercised.
- **It seems that exercise is negatively related to the habit of smoking.**
- (Hassandra &Theodorakis, 2005)

# **Sports, Exercise and smoking**

- **Sports and Exercise has been considered as effective tool for smoking prevention and importantly for smoking cessation.**
- **Reviews on the relevant research have identified limitations focusing on the lack of theoretically driven interventions, but also methodological shortcomings.**

# More focused analyses

## Exercise & smoking

- **Smoking is related with stress, depression and bad mood**
- ***Many forms of exercise and physical activity are associated with increased psychological well-being, strength and vitality, and a sense of 'feeling better'.***
- ***an increased capacity to manage stress, depression, anger and fatigue, as well as increased vigour***
- This feeling is attested to be strong after an exercise program, where people **feel pleasant mood changes.**

# Exercise & smoking.

- Physical activity participation **may increase individuals' confidence** to quit smoking
- might lead to **reductions in withdrawal symptoms** (e.g., stress, depression, irritability, restlessness, poor concentration), nicotine craving
- might help people cope with **abstinence** (εγκράτεια).
- Regular physical activity increases caloric expenditure and may **increase the metabolic rate and reduce the weight gain associated** with smoking cessation
- ( Marcus, et al., 2003; Taylor & Katomeri, 2007; Taylor & Ussher, 2005)

# Interventions

## Psychological theories and hypotheses

- Exercise helps deal with stress and can thus satisfy the motives of those who declare that they smoke **to feel relaxed and calm.**
- People who exercise report fewer symptoms of depression, so exercise can act as a substitute for smokers who use tobacco **in order to cope with depression feelings.**
- **Exercise improves the sense of control,** the sense of self-efficacy, self-image and self-esteem and promotes more positive social relationships.

## The explanation and interpretation of the **psychological and physiologic mechanisms** through exercise

- contributing in this positive outcome **is not yet clarified.**
- The **reduction of depression and stress**
- The activation of the mechanisms of self-esteem, body image, self-confidence, self-control, **pleasure and satisfaction derived from the attendance of exercise programs.** etc.
- The activation of the mechanisms **of endorphin secretion and body temperature fluctuation or via changing of neurotransmitters** (Landers & Arent, 2007).
- **Since beta-endorphin is released during exercise and it appears to be the factor that results in a euphoric feeling after smoking**

# Interventions

## Psychological theories

- The most popular psychological theories examining the relationship between psychological variables and smoking behavior include:
- **Social Cognitive Theory** (Bandura, 1986; Butler, 2002)
- **Theory of Planned Behavior** (Ajzen, 1988),
- **Goal-setting Theory** (Locke & Latham, 1990),
- **Health Belief Model** (Rosenstock, 1974)
- **Thranstheoretical model** (Pochaska & DiClemente, 1983) ,
- **Self determination Theory** (Deci & Ryan, 1985; 2000) .

## **Ten steps to quit smoking**

### **The effects of exercise and psychological counseling in smoking cessation**

**The intervention program was entitled «No more smoking! It's time for exercise».**

Patients participated in a 10-week cognitive-behavioral smoking cessation treatment. The treatment is divided in 10 steps, one step per week, and lasting one hour each.

The focus of the program was

- 1. on psychological intervention strategies,**
- 2. on motivating physical activity participation.**

# The psychological intervention part

was based on relevant quitting smoking programs, and guidelines from the American Cancer Society.

knowledge and information about smoking and health,

analyzing reasons and ways to quit,

changing smoking and unhealthy beliefs,

changing attitudes and unhealthy habits,

analyzing physical and affective symptoms,

coping with cravings,

stress management,

managing mood and affect,

relaxation techniques, and self-monitoring.

# Physical activity promotion and involvement

**During the intervention meetings participants were given written instructions for exercise.**

**They were working by setting personal goals, and completed goal setting forms and log books,**

**to monitor their physical activity participation, by assessing the duration in minutes of physical activity, the intensity and the type of physical activity.**

# Participants instructed to **increase**

- their daily physical activity from 15 to 30 minutes of walking and to increase gradually its duration and intensity about 20 minutes of jogging day to day. The second week participants prompted to increase gradually their physical activity to 40 minutes, by switching jogging and walking.
- The next week participants were taught how to set realistic short-term goals for their daily physical activity intensity and duration.
- Participants also were instructed to use pedometers and encouraged to choose from a broader variety of physical activities (bicycle, sports, e.t.c.).

# The fourth and fifth week participants

- **were also taught how to set long-term goals for their physical activities and how to increase commitment to achieve their goals. The next 5 weeks counsellors monitored the participants' physical activity.**
- During this period also, participants were encouraged to find the better way to incorporate a suitable physical activity when quit-smoking symptoms aroused in their every day schedule. Additionally, they had the opportunity to join a group that every evening was walking and jogging at local recreational parks

# Goal setting form for exercise

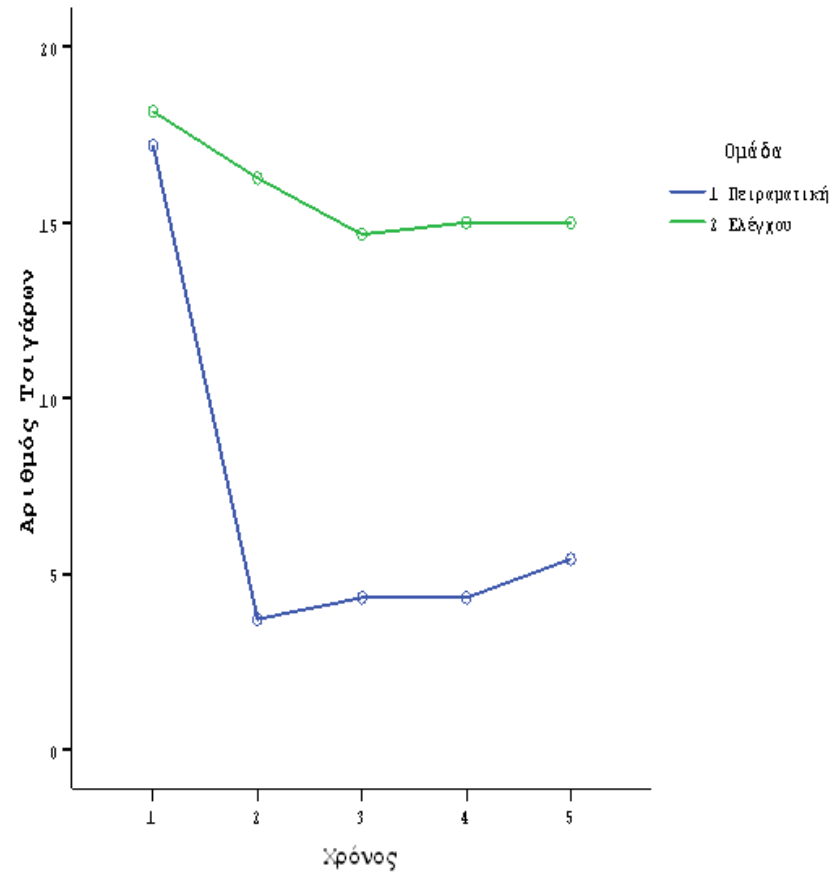
- 
- 

Type of activity	Your long term goal	Goal for the next month	Goal for the next week	Goal for today
walking				
jogging				
Aerobic class				
Other (specify)				

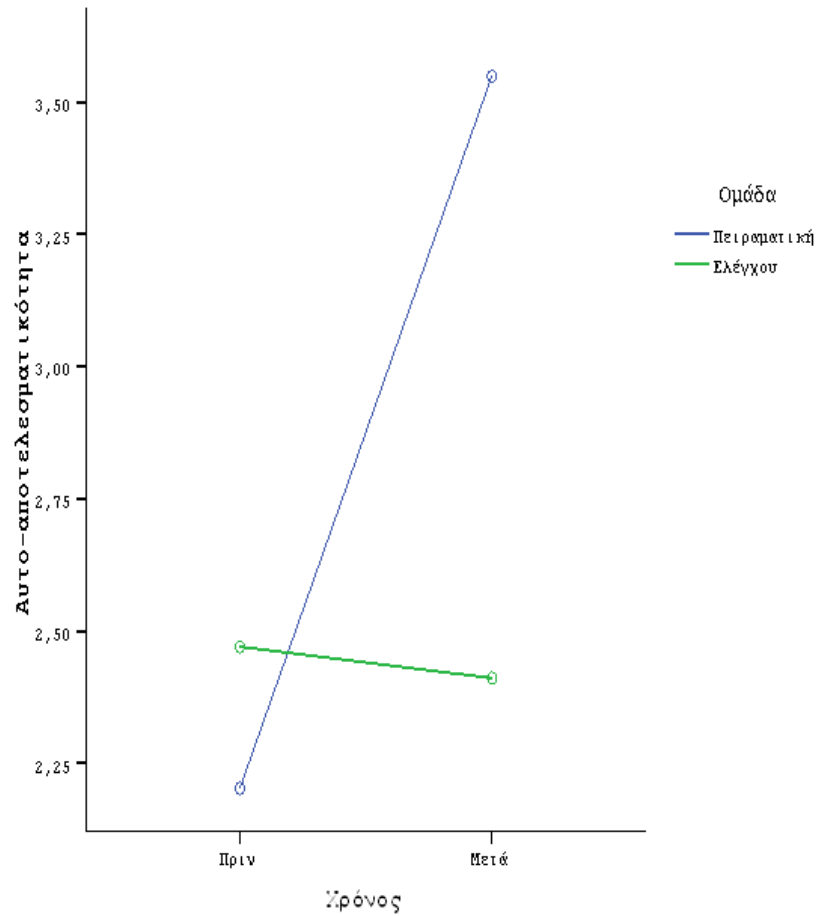
# *Exercise and smoking*

- **Intervention study**
- **Participants (n=50)**
- **36% of them succeeded to quit for **at least 1 year.****
  
- they perceived exercise:
  - as a means that helped them manage their feelings of stress and tension during their effort to quit smoking, and as a way to improve their life by adopting a healthier lifestyle.
  - They reported walking and running as their favorite physical activities whereas several of them found pedometers to act as motivating tools increasing their attachment to exercise. Overall, it could be suggested that people who try to quit smoking should be encouraged to be more physically active.
- (Hassandra et al., EHP, 2012, JSHS 2013)

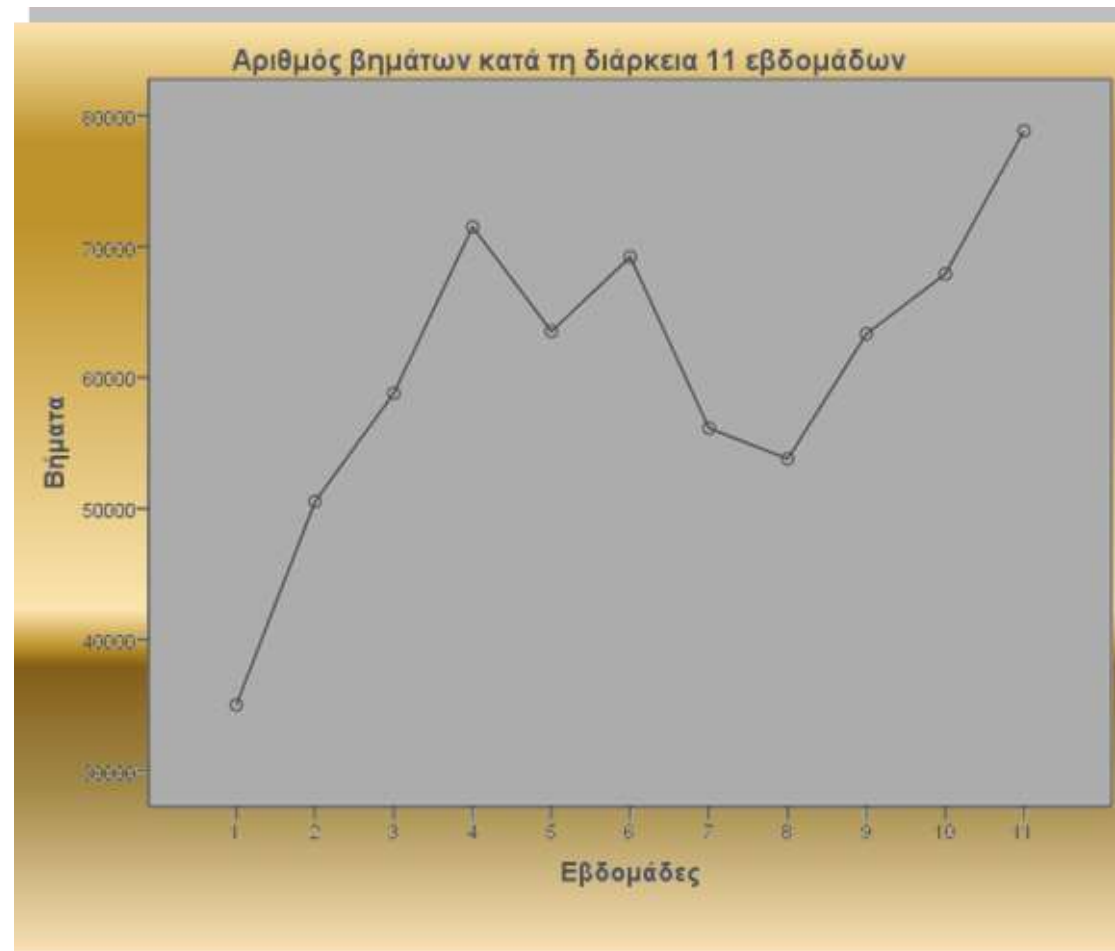
# Number of cigarettes



# Self efficacy to quit smoking



# Walking: Number of steps per week



# Results:

- At the end of the program, **the self-efficacy for quitting smoking** was increased.
- **Participants increased their physical activity** levels from pre-to post-intervention and 5 of them found pedometers as motivating tools to increase their attachment to exercise.
- People who try to quit smoking should be encouraged to be more physically active.
- **Physical activity promotion in combination with psychological support to a smoking cessation program can have positive results on the participants effort to quit.**

# Some more experimental evidence

## The Thalís project

1. Experiment comparing the effects of moderate and high aerobic exercise intensity on smoking delay.
2. Experiment comparing the effects of assigned moderate and self-selected aerobic exercise intensity on smoking urge.
3. An exercise intervention, based on the self-determination theory and self-regulation strategies.
4. A qualitative approach to the topic through the exploration of experiences from smokers participating in relevant exercise sessions.

- The Thalís project:
- This research has been co-financed by the European Union (European Social Fund – ESF) and Greek national funds through the Operational Program "Education and Lifelong Learning" of the National Strategic Reference Framework (NSRF) - Research Funding Program: THALES. Investing in knowledge society through the European Social Fund.



# Thalis project

## Preference for other-selected and self-selected exercise intensity among smokers

- Participants, 10 adults, non-physically active, heavy smokers.
- TASK: 30 min exercise protocol on ergometric bicycle
- Results revealed that smoking urge/ desire to smoke was significantly lower immediately after exercise.
- **Urge to smoke reverted back (increased) to baseline levels 30 minutes** post-exercise periods and surpassed these levels 40 minutes after the completion of the physical task.
- Smokers exhibited an enhanced preference for self-selected forms of physical activity as opposed to other-selected forms of physical activity.
- **Implication:** smoking cessation and motivation for physical activity participation can be increased by allowing smokers select intensity of physical activity programs.

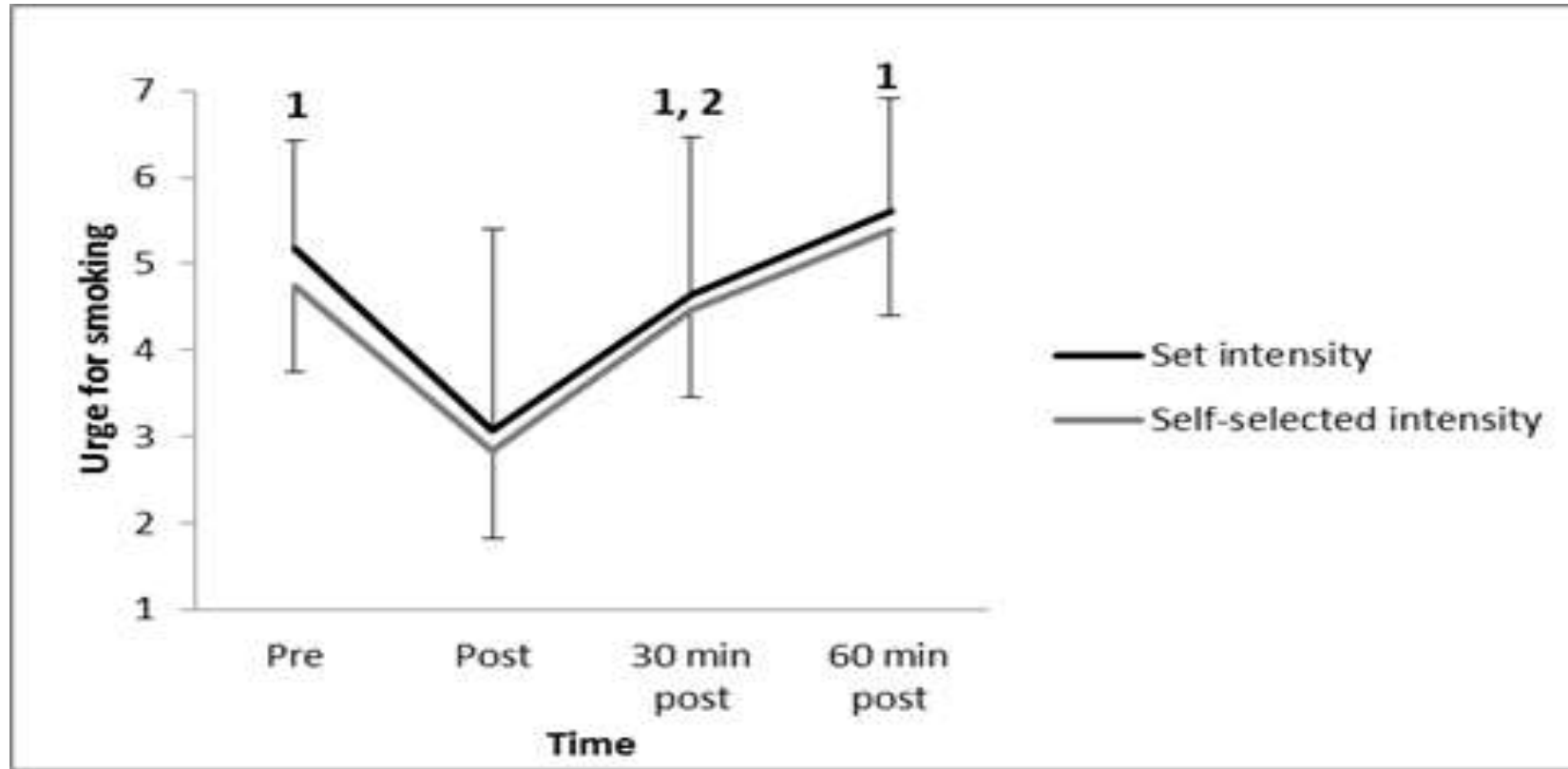
# results

Means and standard deviations for all the examined variables (n = 10)

	Physiological measures (averaged)					
	HR*		RPE**		WL***	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Set intensity	136.38	4.98	12.25	2.30	55.36	14.86
Self-selected intensity	126.18	15.59	11.68	1.30	48.68	11.54

*Note:* \*Heart Rate in beats per minute, \*\*Rate of Perceived Exertion. \*\*\*Work Load in watts

# Smoking urges/desire following set intensity and self-selected intensity exercise



Significantly different compared to Post, 2: Significantly different compared to 60 min post

# Effects of different types of exercise

## **Participants**

Smokers (mean: 26.2 cig/day)

Non exercisers

Mean age 32.70

12 males 12 females

## **Protocol**

Within subjects design

Three 30' conditions (counterbalanced)

control

moderate intensity PA (50-55%)

high intensity PA (65-70%)

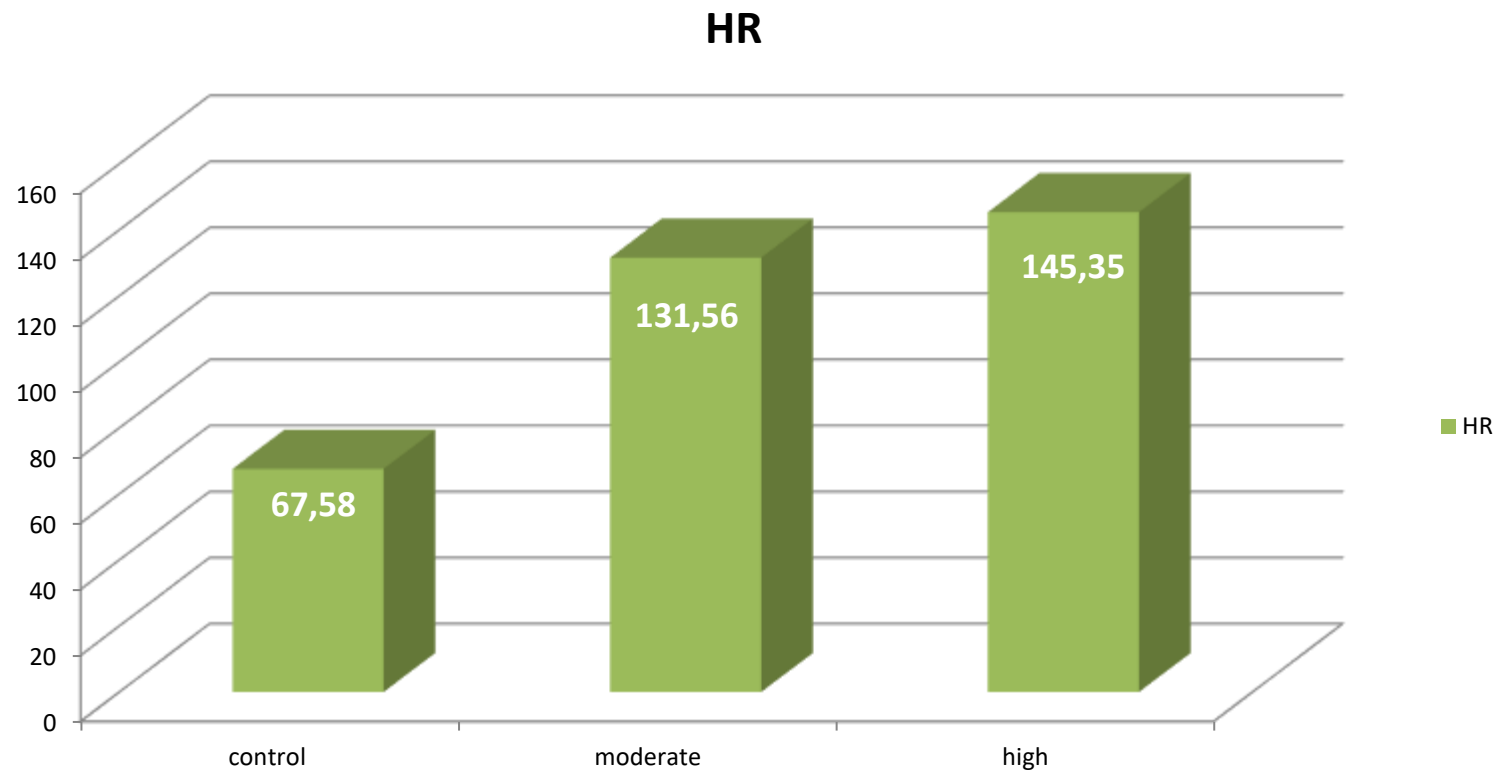
# Exercise protocol



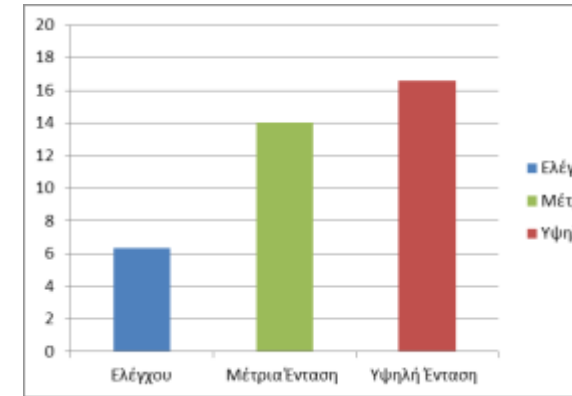
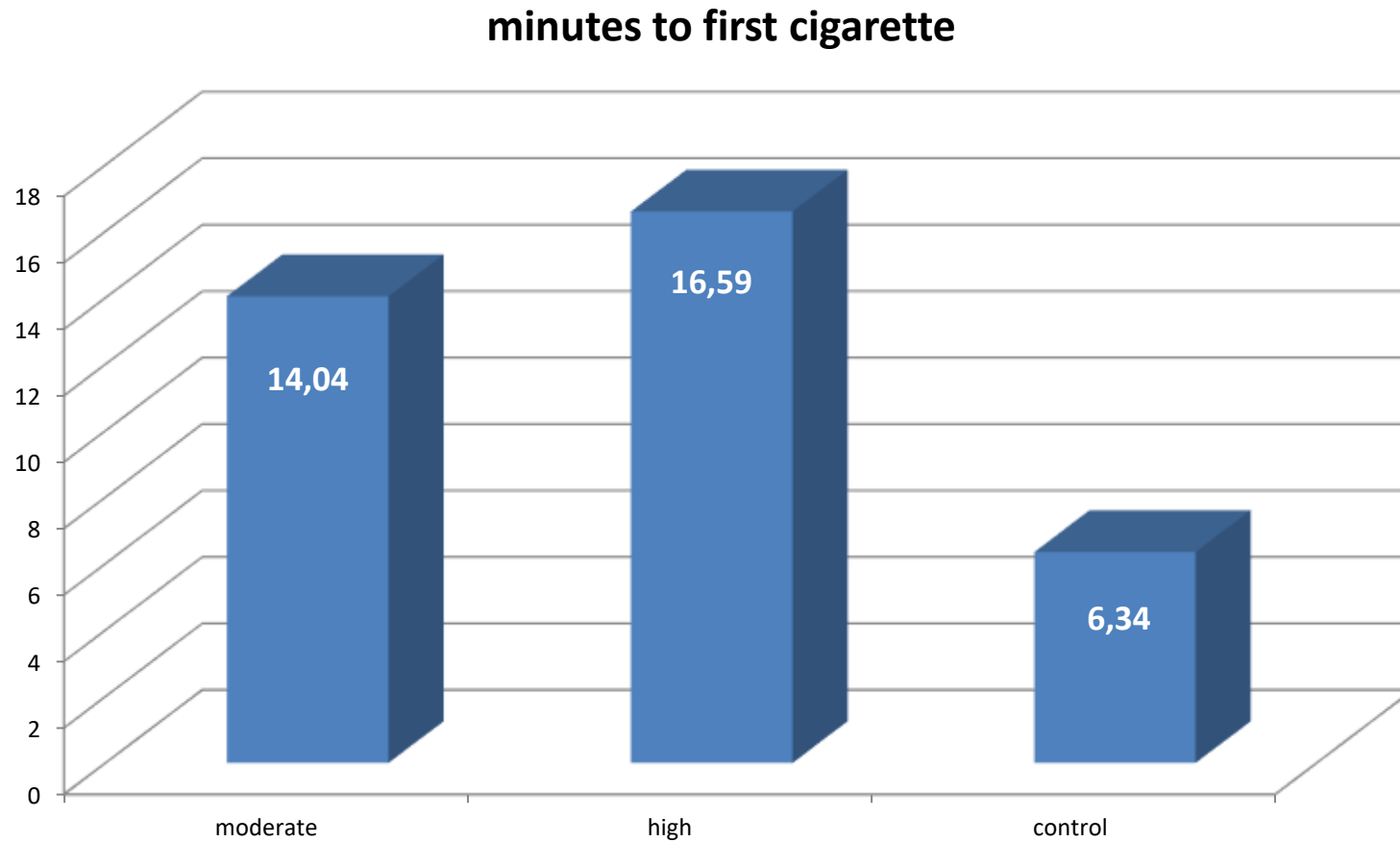
Πειράματα

# HR man. check

Average Heart Rate for the three conditions



# smoking delay: minutes to first cigarette smoking after exercise



# Results

- Smoke delay
- Results showed significant differences between the control and the moderate-intensity condition ( $p < .05$ ), and between the control and the high-intensity condition ( $p < .01$ ), but not between the moderate and high-intensity conditions ( $p = .28$ ).
- In the control condition participants smoke their first cigarette faster than in the two exercise conditions.
- Analysis, showed a preference for the moderate intensity exercise protocol.
- 11 participants reported smoking less on the day of the moderate exercise protocol
- 13 reported smoking less cigarettes on the day of the high intensity exercise protocol
- 8 participants reported initiating moderate exercise/ walking after participating in the experiment
- Participants initiating exercise reported smoking on average 3.75 ( $\pm 3.65$ ) fewer cigarettes during the day they exercise.

Implementing an intervention program for exercise adherence and smoking cessation

**SELF REGULATION STRATEGIES FOR SMOKING CESSATION**

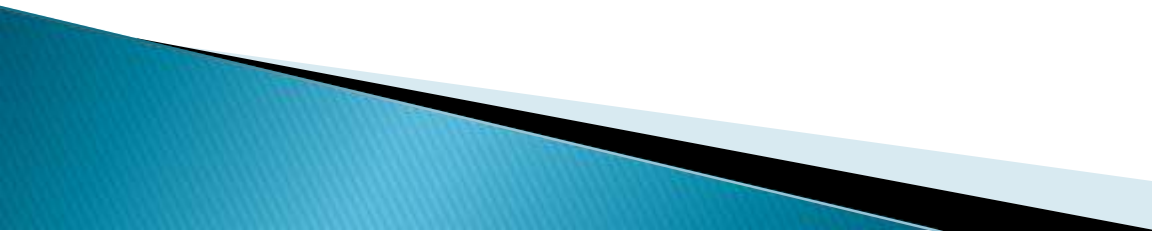
**(D. Tzatzaki thesis)**

- Personal goal setting for exercise
- Personal goal setting for daily number of cigarettes
- Focus on breathing during exercise
- Focus on positive self talk
- Focus on specific Coping strategies to quit smoking (drink water, focus on breathing, attentional focusing on something else),

# The intervention

duration 8 weeks

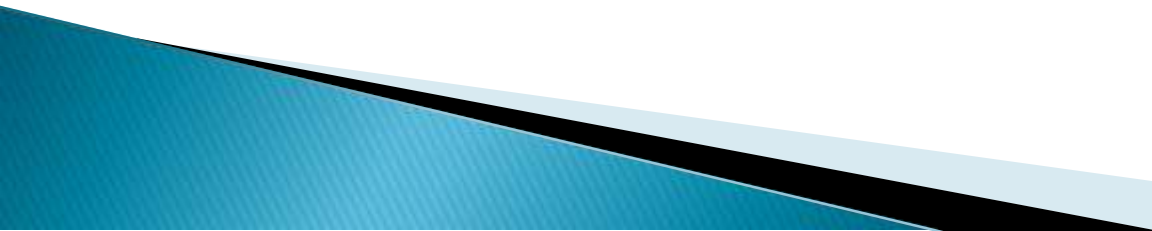
## ▶ Exercise

- Aerobic program
  - In the first 2 weeks, participants were advised to attend 2-3 sessions per week with final goal 5 sessions by week 8.
  - Exercise sessions began at 20-30 minutes per session and gradually progressed to 60-70 minutes.
  - Moderate intensity (55%-60% VO<sub>2</sub>max)
  - The program took place in a recreation park or in the gym (when the weather was not helpful / when participants chose to)
- 

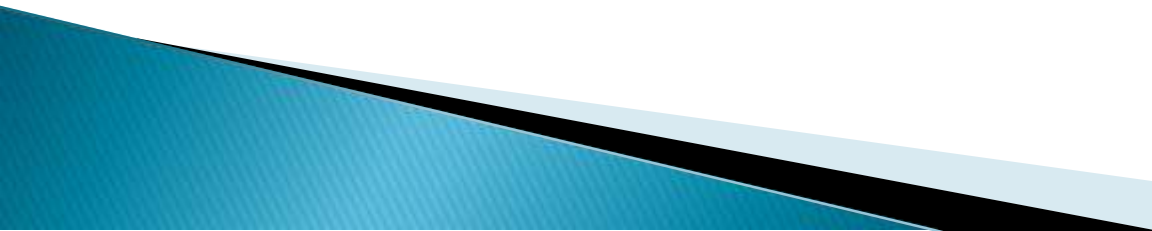
# The intervention

## Self regulation strategies

### Training

- ▶ **to breath properly**
  - ▶ **to set personal goals for exercise and smoking**
  - ▶ **and the use of self-talk**
- 

# Procedure

- ▶ **At baseline,**
    - ❖ **all participants completed questionnaires assessing demographic information, medical history, smoking history, and intention to quit smoking**
    - ❖ **measure of past physical activity behaviour**
    - ❖ **questionnaire packet accessing psychological variables**
    - ❖ **Test of physical condition**
- 

# Procedure

## FORMS TO BE COMPLETED AT THE BEGINNING OF EVERY EXERCISE SESSION

### “Set a goal”

1. Today I will try to walk with moderate intensity for.....minutes
2. How confident are you?  
(not at all confident) 1 2 3 4 5 6 7 8 9 10 (totally confident)

### “Use of self-talk”

1. While I'm walking I'm thinking: p.e. calmly, I feel good
2. I choose to repeat the word..... every .....steps

# Procedure

## FORM TO BE COMPLETED, First day every week

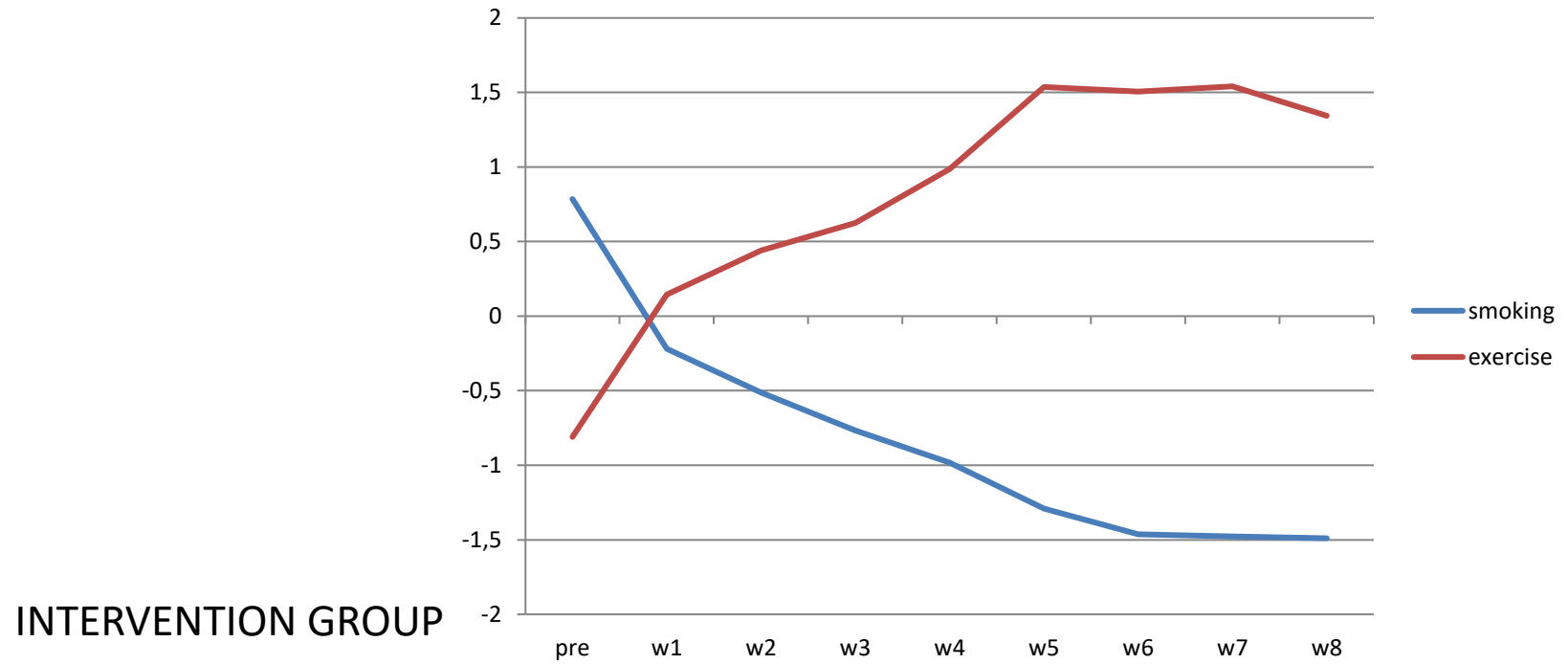
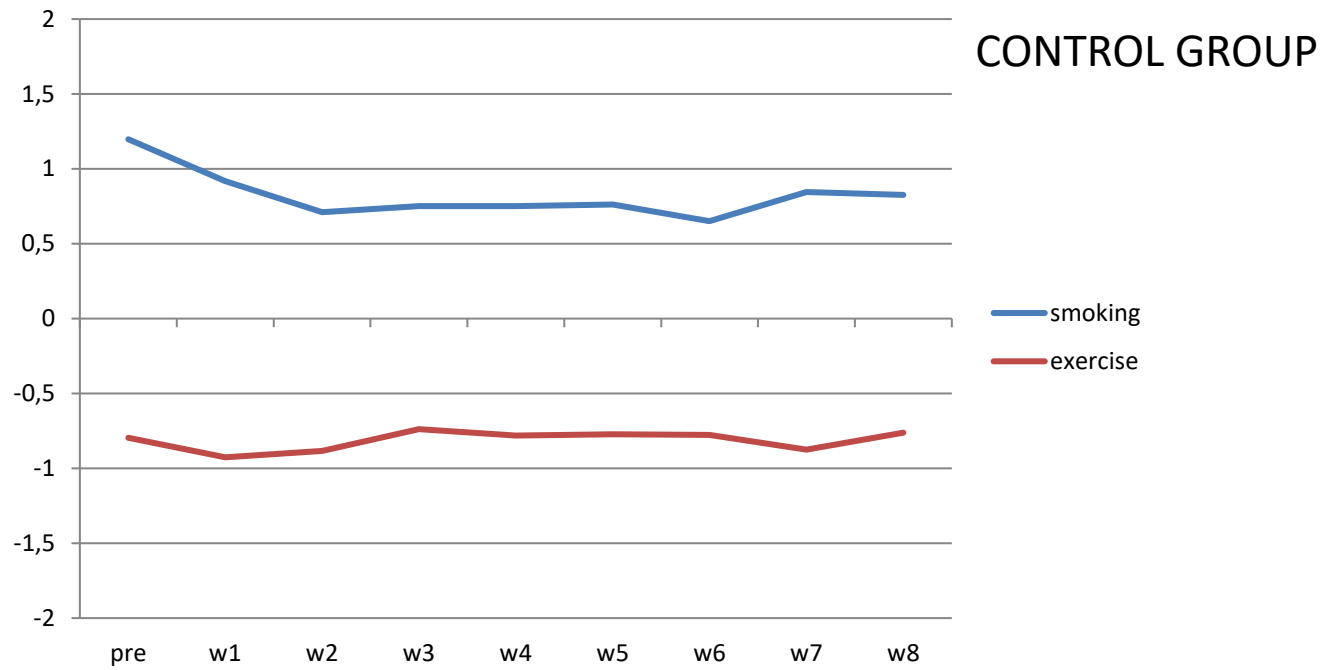
### “goal setting for smoking reduction”

1. This week the number of cigarettes that I'll smoke will be less than.....
2. How confident are you ?  
(not at all confident) 1 2 3 4 5 6 7 8 9 10 (totally confident)

### “goal setting for exercise”

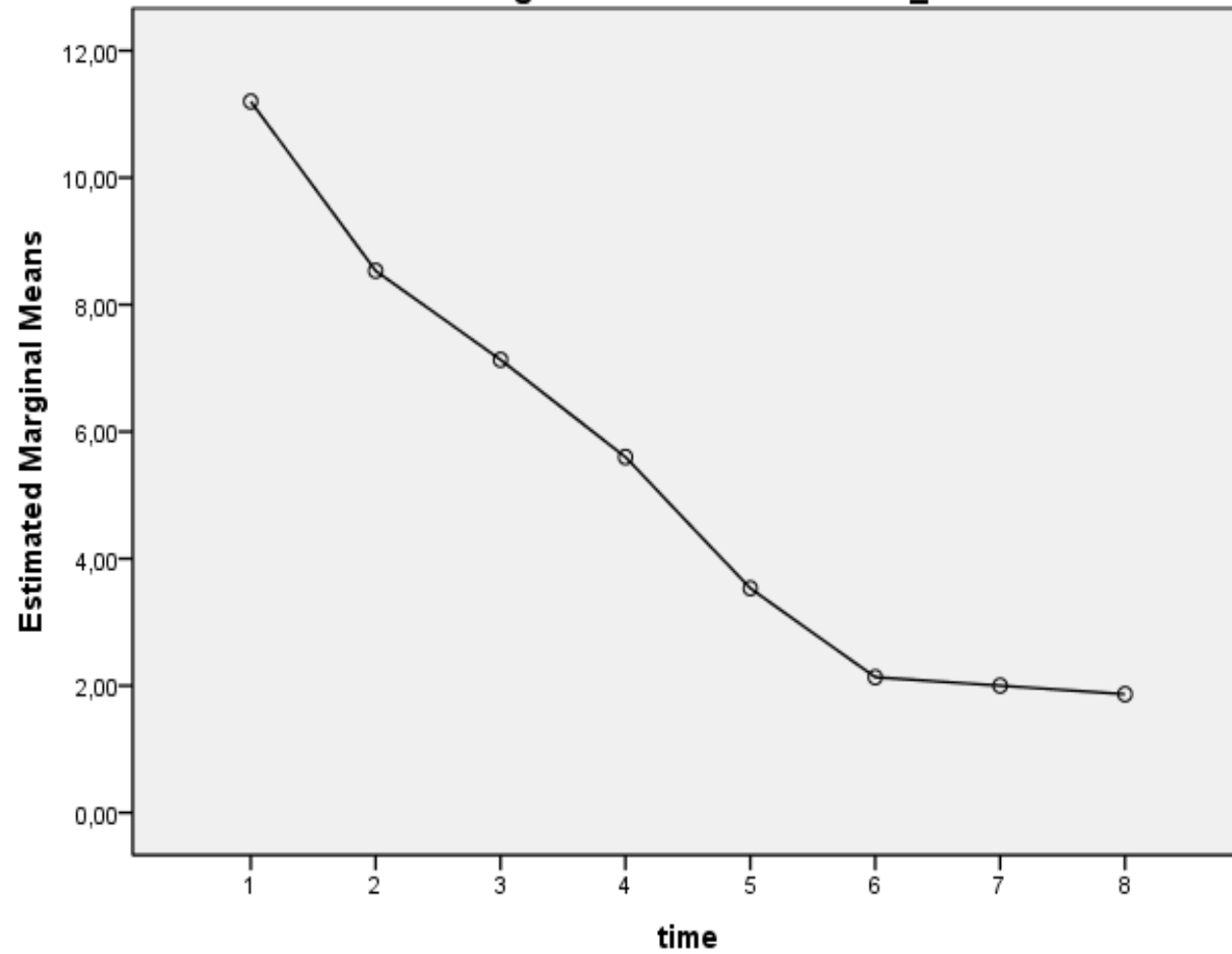
1. This week the total amount of time that I'll dedicate for exercise is..... minutes
2. How confident are you ?  
(not at all confident) 1 2 3 4 5 6 7 8 9 10 (totally confident)

- Participants: 16
- Men: 7, Women: 9, Mean age: 39years
- Number of cigarettes smoked: 18,8
- 10 persons quit smoking. Eight of them cut smoking between week 5 and week 6. One person in week 1 and one person in week 8.
- 6 persons reduced smoking. Mean: 4,6 cigarettes
- 3 out of 10 persons that had quit smoking relapsed. 1 of them relapsed in 2 weeks and the other 2 persons relapsed in one month and a half.
- Goals setting was the most helpful technique.
- The most useful distraction strategy were “water” and “delay”



### Number of cigarettes smoked

#### Estimated Marginal Means of MEASURE\_1



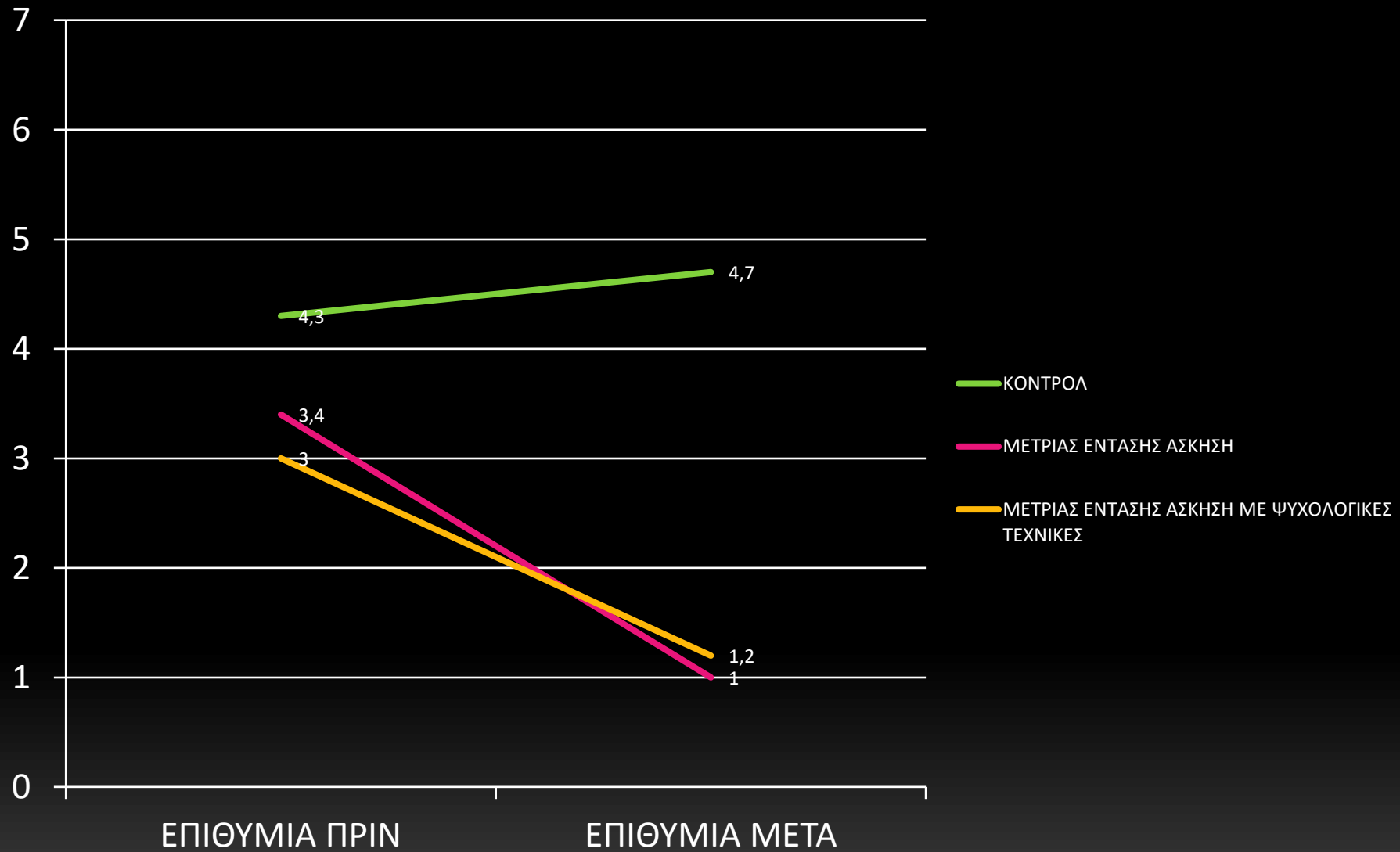
Footnote

## **The acute effect** of an exercise program combined with psychological self-regulation strategies on smoking delay

The effects of an acute bout of moderate aerobic exercise on smoking urge and smoking delay. Participants were 11 adults, non physically active, smokers. They all participated in two moderate intensity exercise conditions; one of them included self-regulatory strategies, and a control condition. Results indicated that 30 minutes of moderate intensity exercise combined with self-regulatory strategies (goal setting, breathing and self-talk) reduce smoking desire and delay smoking for 32 minutes.

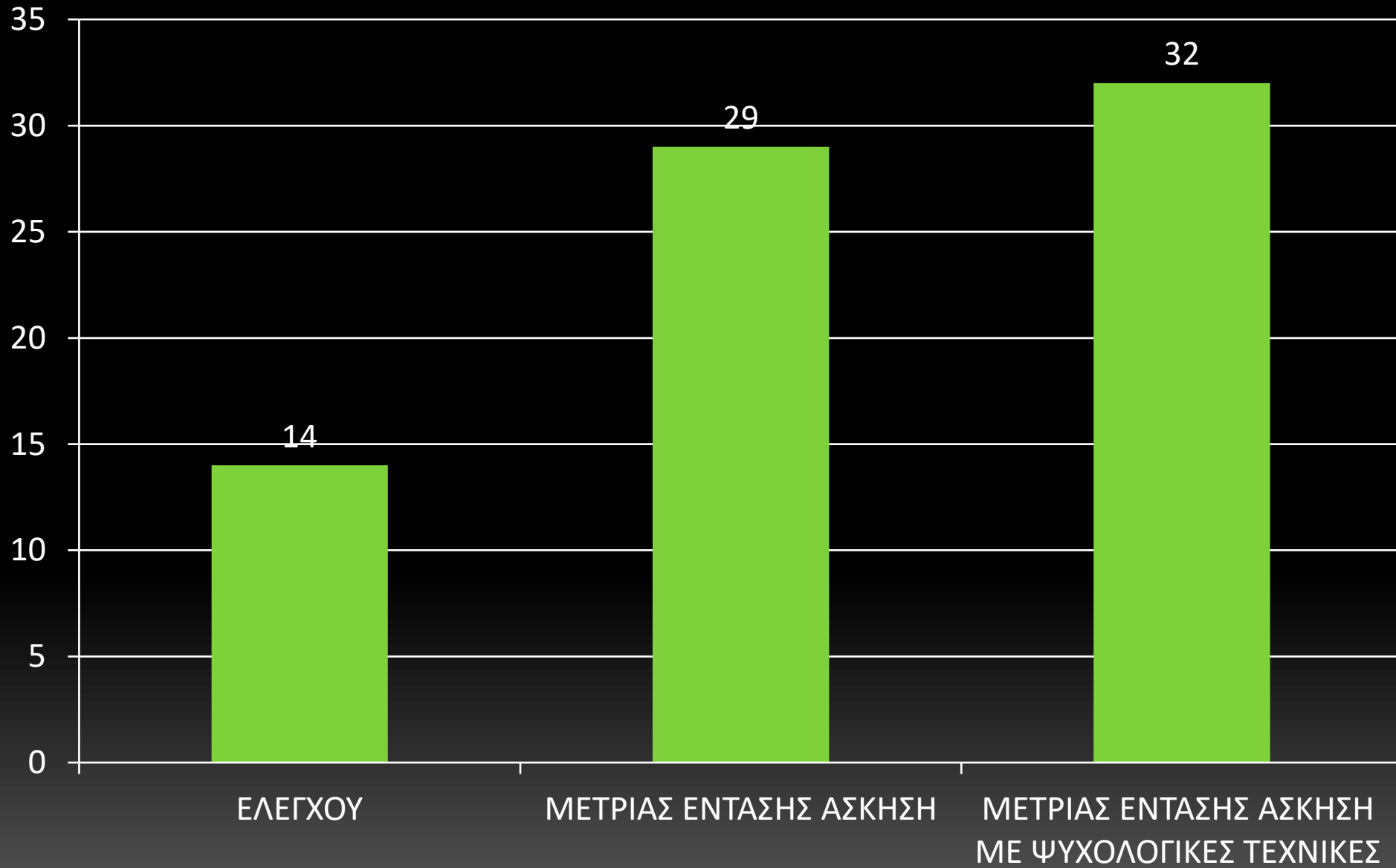
**Additionally 30 minutes of moderate intensity exercise delay smoking for 29 minutes. The role of psychological self-regulation strategies is proved to be crucial according to the results.**

# Desire for smoking pre post



$F(2,9) = 3.2, p < .05$

## Smoking delay in min



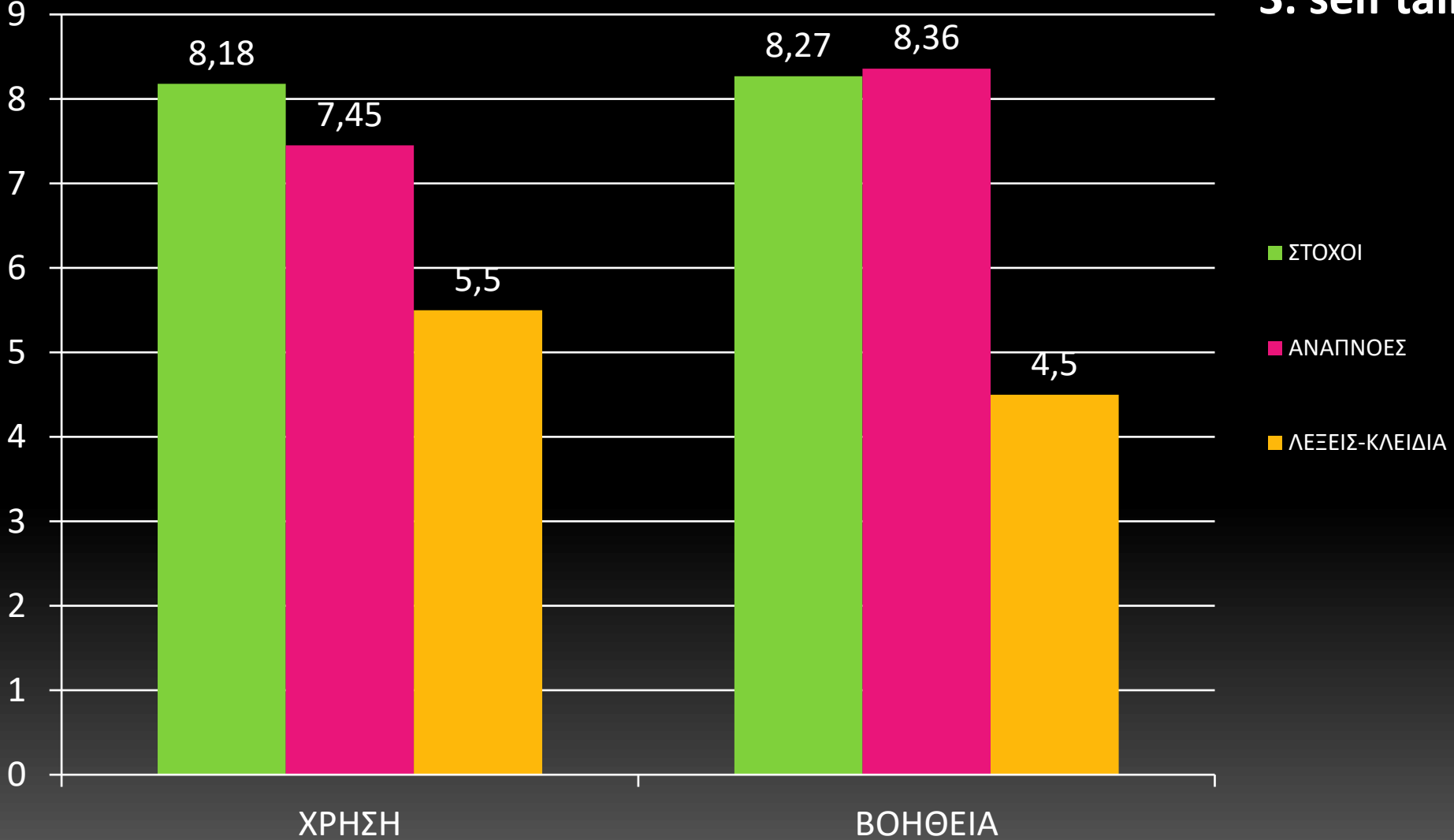
$F(2, 9) = 5.03, p < .05$

# Self regulatory strategies

1. goal setting,

2. breathing.

3. self talk

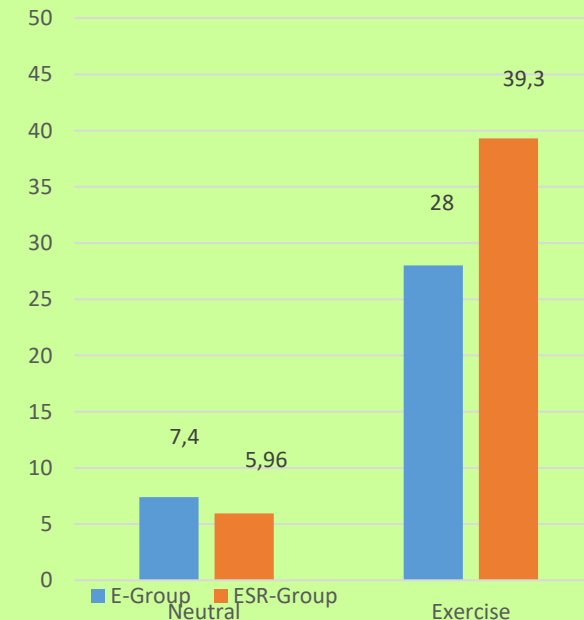


## The effects of self-regulation smoking-delay strategies following moderate intensity exercise

Maria Angeli, Antonis Hatzigeorgiadis, Yannis Theodorakis, Nikos Comoutos

**The effect of moderate intensity exercise on smoking delay. Participants were 40 adult smokers who were randomly assigned into two groups: plain exercise (E-group, control) and exercise and self-regulation (ESR-group, experimental).**

**The results showed that smoking delay increased significantly for both groups; however, the increase for the ESR-group was significantly larger than that of the control group. The results supported the anti-smoking effects of acute exercise; furthermore, they highlight the usefulness of self-regulation strategies, and in particular goal setting, in extending smoking delay.**



## Counseling intervention for smoking cessation in adults

Stamatia Gratsani:

- An implementation and evaluation of a smoking cessation program based on counseling and supportive psychological interventions, combined with enhancement of physical activity in daily life, and orientation to a healthier way of living. Based on the Transtheoretical Model.
- RESULTS a) the satisfaction and the utility of the supportive counseling and the psychological interventions were high, b) physical activity was increased during the intervention and maintained until the end, **c) 53.3% of the participants quit smoking and maintained the abstinence until the end of follow-up that lasted 12 months**

## Counseling intervention for smoking cessation in adults

Stamatia Gratsani:

### Why people smoke

- Pleasure alleging cigarette, the relaxation that smoking offers, stress management, companionship, habit and help offered by the cigarette in concentration,
- **The biggest challenges faced by people in smoking cessation** are the difficult and stressful situations they have to face, the stress they experience, the pleasure derived from smoking which they do not want to lose, the lack of decision and will to stop smoking, the environment and the lack of support from significant others and family, the addiction, the loneliness and the lack of support, the lack of interesting hobbies, all the habits connected with smoking, the evening hours where the craving increases, the lack of encouragement and support, the belief that a few cigarettes do not harm, the workplace,

## The main strategies that have helped people to stop smoking

- The communication, connection, cooperation and constant discussions with the consultant, the personal will, the integration of exercise and movement in everyday life, the setting of goals on a weekly basis and the commitment to them, the desire resistance and management techniques for cigarette, the information and knowledge, the relaxation techniques, the activities, exercises, questionnaires and tools used during the program, the program's adaptation to the needs of each individual, the duration, consistency and stability of the program, the gradual change of daily habits, the support from the environment, the health issues that played a motivational role,

# The strengths of the program

- The organized psychological support based on personalized counselling tailored to the needs of each person, the incorporation of exercise in daily life, the consistency and stability of the program and the consultant, the personal development processes and the training for skills towards the change of habits and the establishment of healthy behaviors, as well as the organization of an enhanced quality of life, the development of stress management skills, the increase of self-efficacy and self-confidence.
- The program was effective in smoking cessation and maintaining abstinence from it throughout the follow-up period, as well as in the integration of physical activity in the daily life of individuals and the adoption of a healthy and qualitative lifestyle.

# Smoking and depression

- People suffering from depression are more prone to smoking and to nicotine dependence which leads to worse their health.
- Two people with depression symptoms were tested at two conditions on 30 minutes exercise on cycle-ergometer . After completion of the experimental process people with symptoms of depression were interviewed. Both participants acknowledged the experimental procedure as an interesting experience which made them feel more powerful and active.
- They argued that the exercise reduces the desire to smoke, and that exercising at a high intensity for both is more interesting, but for the future they would prefer to participate in an exercise in moderate intensity.  
**Participants have linked depression symptoms with smoking, observing increased consumption of nicotine over the symptoms and reported on the benefits of exercise on mood, since the participation in the exercise leads to increased self confidence and self-esteem.**
- Tsiami, A., Kolovelonis, A., Goudas, M., & Theodorakis, Y. (2016). Exercise, Smoking and Depression Symptoms. A Qualitative Study. Inquiries in Sport & Physical Education, 14, 14 – 26.

## Exploring the acute effects of immersive virtual reality biking on self-efficacy and attention of individuals in the treatment of substance use disorder

- The role of exercise programs during SUD treatment is considered particularly supportive in fostering positive psychological and behavioral changes. The aim of this study was to explore the acute effects of cycling exercise in an immersive virtual reality (IVR) environment on attentional control and self-efficacy expectations of individuals undergoing SUD treatment. A total of 20 individuals (with a mean age of 37.75 years) enrolled in an SUD treatment program participated in the study. They were instructed to complete a single session of cycling with a self-selected duration within the IVR system.
- Following the cycling session,
- pre-post measures indicated
- a statistically significant
- improvement in self-efficacy
- expectations and attentional control
- measured with the Stroop test.



## Systematic reviews

### The effects of exercise with nicotine replacement therapy for smoking cessation in adults: A systematic review

- The authors identified 18 trials reporting data for a total of 2815 participants. There was moderate-quality evidence that aerobic exercise was better than usual care in promoting smoking cessation at short term (11 trials, risk ratio 0.79; 95% confidence interval, 0.66-0.94). However, there were no differences between aerobic exercises and usual care at medium- or long-term follow-ups.
- **Conclusions:** According to review, aerobic exercise may be effective in promoting smoking cessation at short-term, but not at medium- and long-term follow-ups.

## **Effectiveness of Aerobic Exercise on Smoking Cessation in Adults: A Systematic Review and Meta-Analysis**

- The authors identified 18 trials reporting data for a total of 2815 participants. There was moderate-quality evidence that aerobic exercise was better than usual care in promoting smoking cessation at short term (11 trials, risk ratio 0.79; 95% confidence interval, 0.66-0.94). However, there were no differences between aerobic exercises and usual care at medium- or long-term follow-ups.**
- Conclusions: According to review, aerobic exercise may be effective in promoting smoking cessation at short-term, but not at medium- and long-term follow-ups.**

## Conclusion

- **Exercise is now recognized as a low cost factor of prevention or treatment of many illnesses, and smoking cessation. also**
- It seems plausible to state that exercise can be used both for smoking prevention and for smoking cessation.
- However, preventive programs should focus on an overall healthy lifestyle including exercise, rather than on smoking solely. Moreover, long-term interventions employing exercise to stop smoking should be coupled with respective counselling strategies.
- Hassandra, M., Goudas, M. & Theodorakis, Y. (2015) Exercise and Smoking: A Literature Overview. *Health*, 7, 1477-1491. <http://dx.doi.org/10.4236/health.2015.711162>

# Topics for discussion

- What are the most important key points of the presentation? (the 3%)
- How relevant health and governmental bodies, and health or sports ministries, can help with this unhealthy behavior in society?
- How policy makers can promote healthy behaviors, and healthy lifestyles in society through sports?
- How sports and international organizations should emphasize the organization of relevant exercise programs?
- How national health systems should provide advice and support large social groups of all ages for exercise to prevent unhealthy behaviors?