



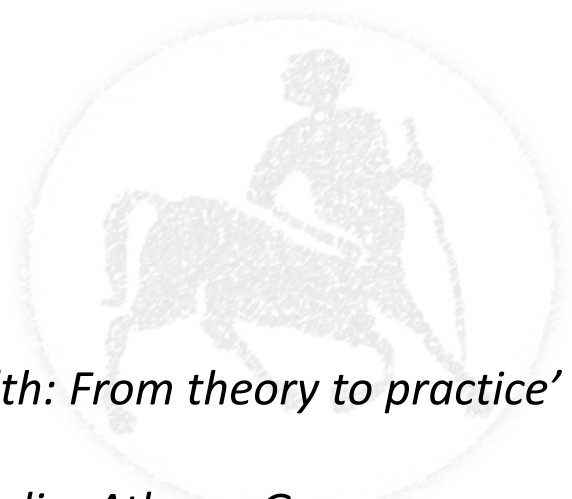
**University of Thessaly**  
**School of Physical Education &**  
**Sport Sciences**

**Lab of Exercise Psychology & Quality of Life**



# **Physical Exercise and Major Depressive Disorder: Towards Exercise on Prescription in Greece**

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**Postdoctoral Fellow**



*European Conference, 'Sport & Physical Activity for Mental Health: From theory to practice'*  
*October, 23rd & 24th, 2018*  
*Auditorium-Ministry of Digital Policy, Telecommunications & Media, Athens, Greece*



*Lab of Exercise Psychology & Quality of Life*



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## **POSTGRADUATE PROGRAMS**

- 1.EXERCISE & HEALTH***
- 2.PSYCHOLOGY OF EXERCISE***

## **INTERNATIONAL POSTGRADUATE PROGRAMS**

***EUROPEAN MASTER  
IN SPORT & EXERCISE PSYCHOLOGY***

**SCHOOL RESEARCH BUDGET 2010-2017:  
€ 21.500,000.00**





## Major Depression

- Syndrome - complex/heterogeneous
- Lethal -12% suicide rates
- Prevalent - up to 10%
- Economical Burden -2<sup>nd</sup> only to cardiovascular
- Undiagnosed - 30% proper treatment
- Disabling - 40% of unemployment benefits due to depression
- Women - twice as common in women than in men
- Treatment Resistant, Relapse, Chronicity
- Anxious Distressed - 50%
- Comorbidity with anxiety - 60%

Pan-epidemic Public Health Problem – Top Interventional Target  
World Health Organization (2001)





## Major Depression – Physical Health

- More sedentary
- Higher smoking rates
- Lower Vo2max
- Higher mortality rates by all causes
- Higher osteoporosis rates
- Depression is an independent osteoporosis risk factor
- Psychiatric hospitalization is prolonged when poor physical health is present





# LEADING CAUSES OF DISABILITY-ADJUSTED LIFE YEARS

**Projections**



R a n k	2000	2020
	1 Lower respiratory infections	Ischaemic heart disease
	2 Perinatal conditions	Unipolar depressive disorders
	3 HIV/AIDS	Road traffic accidents
	4 Unipolar depressive disorders	Cerebrovascular disease
	5 Diarrhoeal diseases	Chronic obstruct. Pulm. disease





## Main causes of death 15-35 years old

### ***European Region***

<i>Both sexes</i>	<i>Males</i>	<i>Females</i>
1. Transport accidents	Transport accidents	All cancers
2. <b>Suicide</b>	<b>Suicide</b>	Transport accidents
3. All cancers	All cancers	<b>Suicide</b>

### ***China***

<i>Both sexes</i>	<i>Males</i>	<i>Females</i>
1. <b>Suicide</b>	Transport accidents	<b>Suicide</b>
2. Transport accidents	All cancers	All cancers
3. All cancers	<b>Suicide</b>	Cardiovasc. dis.



# MAJOR DEPRESSION AND PHYSICAL ILLNESS PREVALENCE

**Hypertension**

**Up to 29%**

**Myocardial Infarction**

**Up to 22%**

**Epilepsy**

**Up to 30%**

**Stroke**

**Up to 31%**

**Diabetes**

**Up to 27%**

**Cancer**

**Up to 33%**

**HIV/AIDS**

**Up to 44%**

**Tuberculosis**

**General Population**

**Up to 10%**

**Up to 46%**

## Negative Trends



- Resources still insufficient or lacking
- Human rights situation of mentally ill not improving sufficiently
- Predominance of acute and medical care with disregard to long-term and **psychosocial needs**
- Increasing influence of pharmaceutical industry

## Positive Trends



- Development of newer and more effective interventions (pharmacological and psychosocial)
- Movement for community based services
- Awareness and involvement of user and family groups



## Shifting Paradigms



- From Exclusion to Inclusion
- From bio medical to biopsychosocial approach
- From "bed" to "opportunities"
- From Short Term to Long Term Care
- From Clinical to Public Health



# **EU Physical Activity Guidelines**

## **Recommended Policy Actions in Support of Health-Enhancing Physical Activity**

Approved by the EU Working Group "Sport & Health"  
at its meeting on 25 September 2008

Confirmed by EU Member State Sport Ministers  
at their meeting in Biarritz on 27-28 November 2008

### Guideline 19 :

“Health Insurance Schemes should encourage clients to be physically active and should offer financial incentives. Physical Activity upon prescription should become available in all EU Member States”, pp.22



## **Why do we need Exercise Treatment??**

### **Major Depression - Conventional Treatments**

- Approx. 50% of depressed patients remain unresponsive to psychotropic medication
- Approx. 50% of depressed patients take medication sporadically and thus, cannot benefit accordingly
- Approx. 50% depressed patients reject psychotropic medication
- New & previous agents detect comparable status
- Traditional therapies are often related with social stigma, side-effects, inaccessibility, ineffectiveness, costs





## Major Depression - **Exercise** Treatment

- **Exercise** shows moderate or large antidepressant effects in samples with various depressive disorders who were recruited via health services and media advertisements
- **Exercise** represents a preferred antidepressant treatment for approx. 55-65% of depressed patients
- **Exercise** is not related to social stigma, can be cost-effective, is widely accessible, and brings about minimum or no side-effects
- **Exercise** brings about depression relief in parallel to physical health benefits



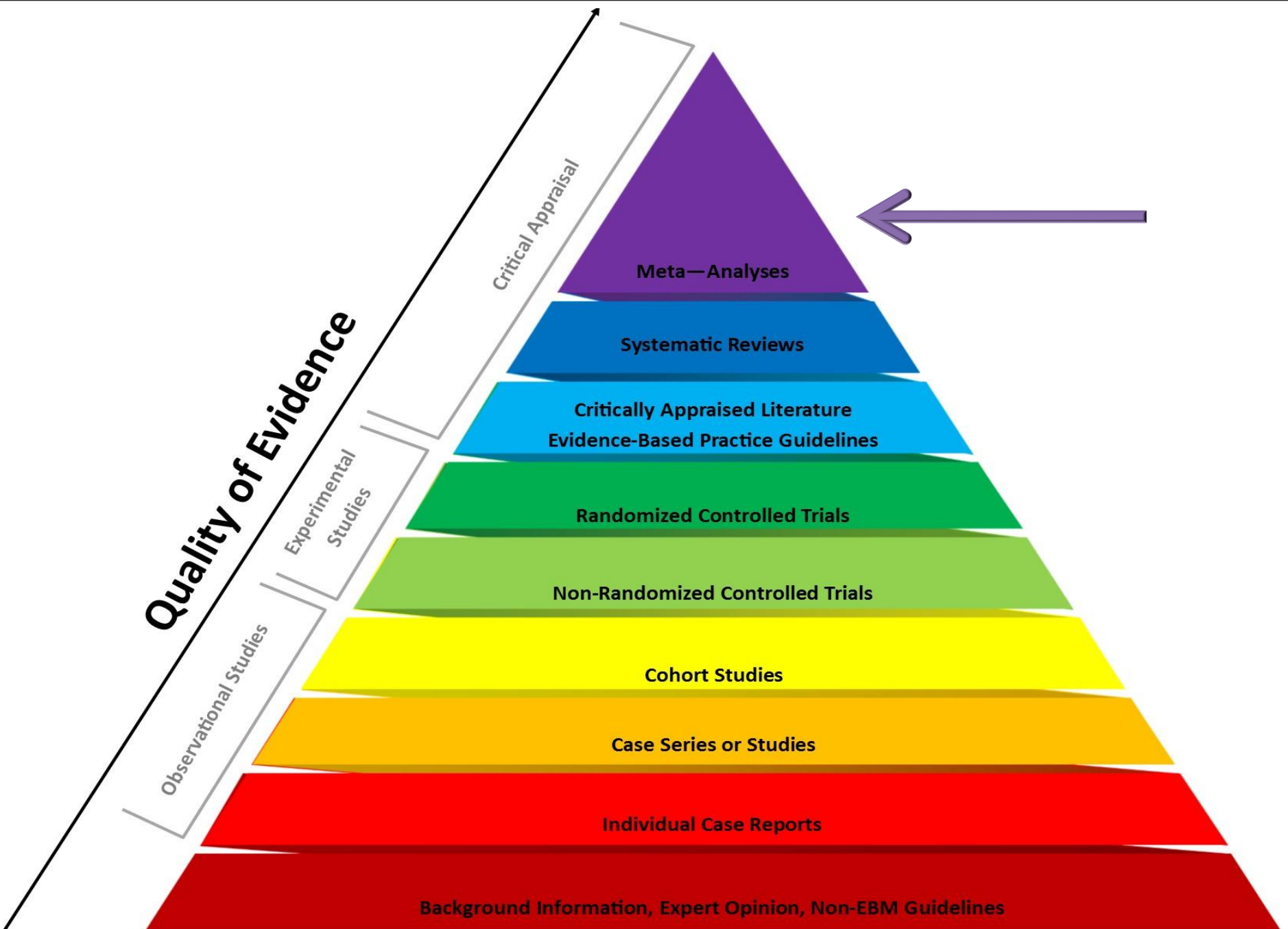


## Major Depression - **Exercise** Treatment

### WHAT ELSE NEEDS TO BE EXAMINED FOR EXERCISE ON DEPRESSION??

- **Exercise effects** on samples with exclusively clinically diagnosed major depressed
- **Exercise effects** while controlling for risk of bias via exercise-specific design quality tools where number of dropouts are included
- **Exercise effects** with clinical/practice/significant analyses and advanced meta-analytic techniques and criteria





**REVIEW**

**Depression  
AND Anxiety**

The official journal of ADAA



# Aerobic exercise for adult patients with major depressive disorder in mental health services: A systematic review and meta-analysis

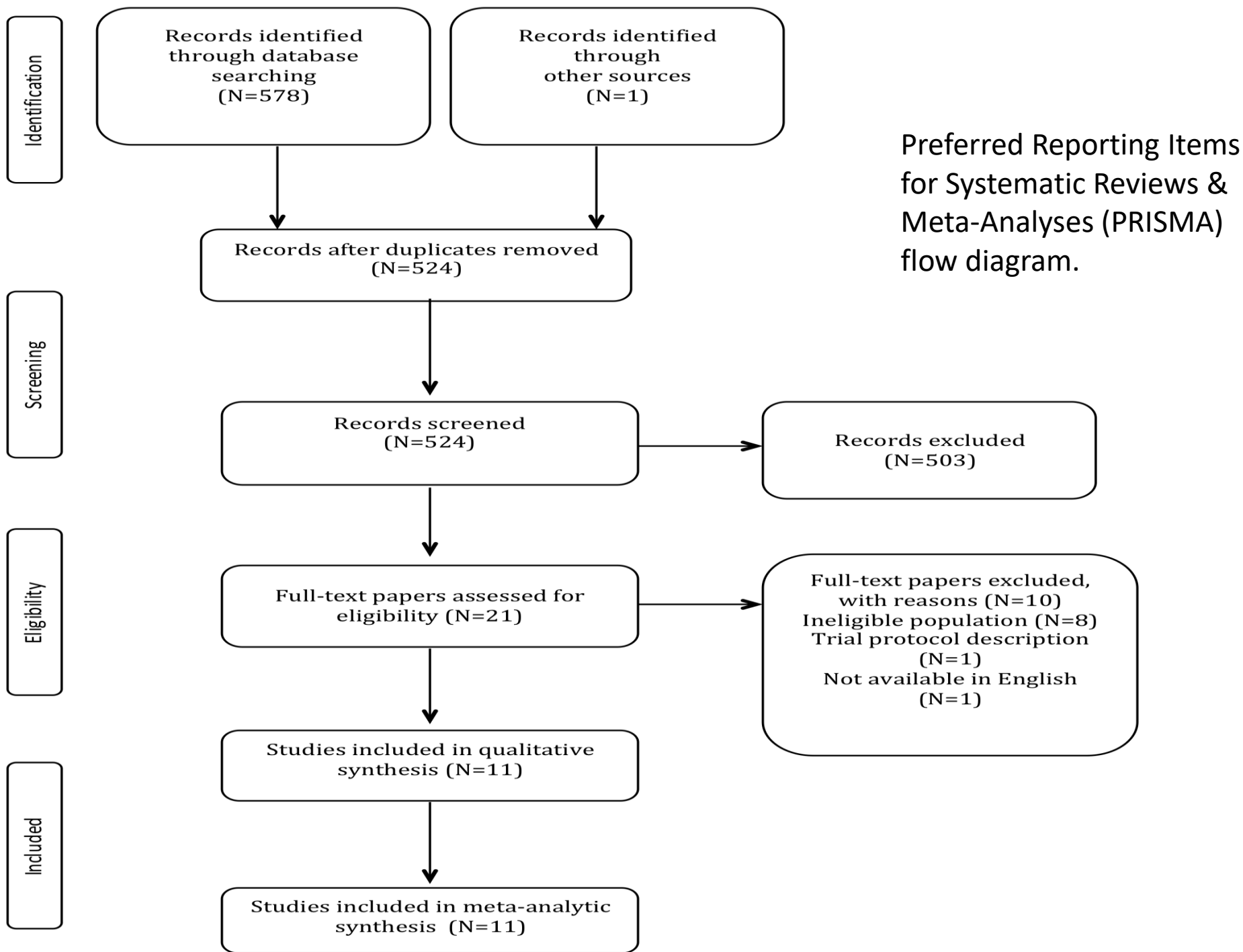
Ioannis D. Morres<sup>1</sup> | Antonis Hatzigeorgiadis<sup>1</sup> | Afroditi Stathi<sup>2</sup> |  
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Yannis Theodorakis<sup>1</sup>

# Aerobic exercise for adult patients with major depressive disorder in mental health services: A systematic review and meta-analysis

Aim: Comparison of Exercise VS. Antidepressant Treatments

## Method

- Eleven e-databases and nineteen systematic reviews were searched for randomized controlled clinical trials (RCTs)
- Meta-analytic techniques to compute this comparison
- Risk of Bias Analysis with PEDro Scale (designed for physical therapy interventions such as exercise)



# Meta-analysis – Overall Effect of Aerobic Exercise on Depression

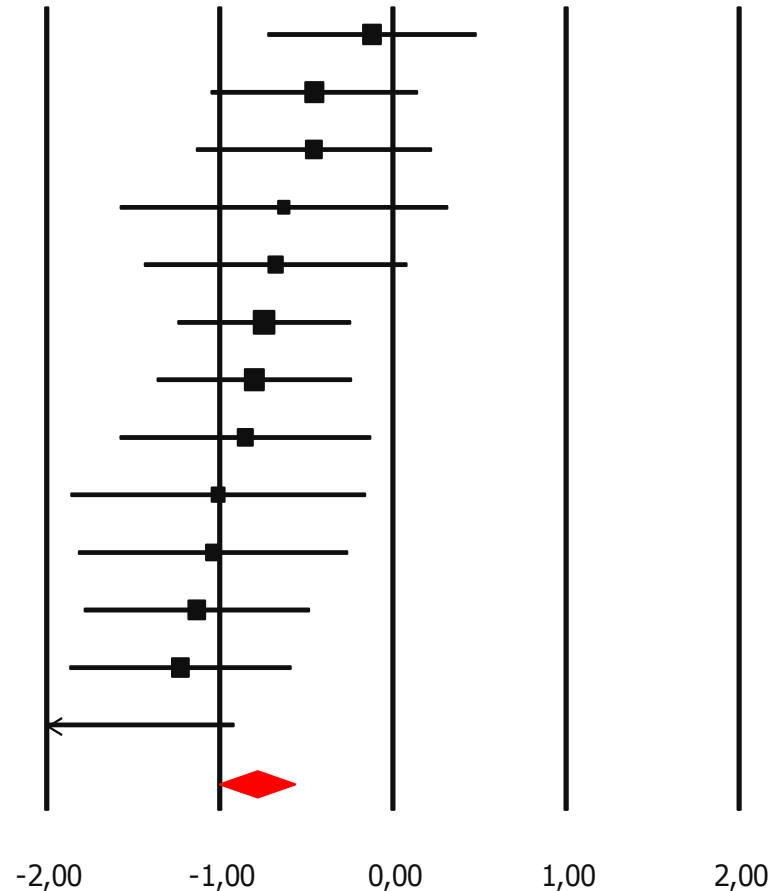
## Study name

## Statistics for each study

## Hedges's g and 95% CI

	Hedges's g	Standard error	Variance	Lower limit	Upper limit	Z-Value	p-Value
Salehi 2016-a	-0,12	0,31	0,10	-0,73	0,49	-0,39	0,70
Kerling 2015	-0,45	0,31	0,09	-1,06	0,15	-1,48	0,14
Sadeghi 2016-b	-0,46	0,35	0,12	-1,14	0,23	-1,31	0,19
Ortel-Knoechel 2014	-0,63	0,49	0,24	-1,58	0,32	-1,30	0,19
Mota-Perreira 2011	-0,68	0,39	0,15	-1,44	0,09	-1,74	0,08
Veale 1992	-0,74	0,26	0,07	-1,25	-0,24	-2,89	0,00
Schuch 2015	-0,80	0,29	0,08	-1,37	-0,23	-2,76	0,01
Sadeghi 2016-a	-0,85	0,37	0,14	-1,58	-0,12	-2,29	0,02
Legrand 2016	-1,01	0,44	0,19	-1,87	-0,15	-2,31	0,02
Pilu 2007	-1,04	0,40	0,16	-1,82	-0,25	-2,60	0,01
Salehi 2016-b	-1,13	0,33	0,11	-1,79	-0,48	-3,38	0,00
Martinsen 1985	-1,23	0,33	0,11	-1,87	-0,58	-3,73	0,00
Reuter 1980	-2,01	0,56	0,31	-3,11	-0,91	-3,59	0,00
	-0,79	0,11	0,01	-1,01	-0,57	-7,17	0,00

$I^2 = 21\%$

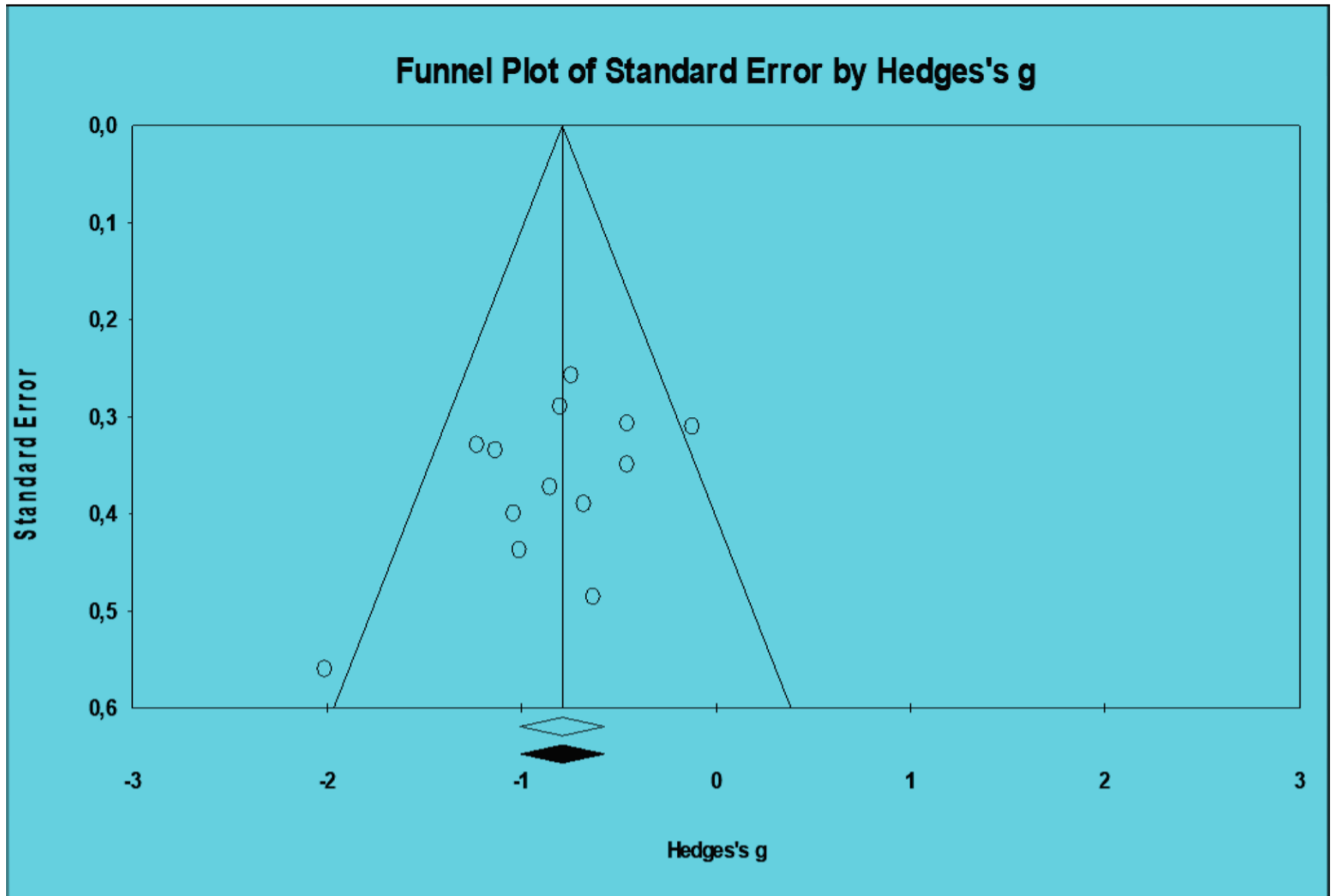


Favours Aerobic Exercise

Favours Controls





## No Publication Bias







## Subgroup Analysis - Participants

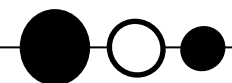
	Trials/Arms	Treatment Effectiveness			Publication Bias		Heterogeneity	
		g	CI 95%	p value	Egger intercept	Begg-Mazumbar	Cochrane Q	I <sup>2</sup>
						Kendall's tau		
Participants								
Outpatients	5/6	-0.84	-1.16, -0.51	0.00	-3.14, p=0.13	-0.53, p=0.13	6.12, p=0.29	18%
Inpatients	6/7	-0.75	-1.06, -0.44	0.00	-1.36, p=0.67	-0.00, p=1.00	8.89, p=0.18	32%
Mild-moderate/moderate	4/5	-0.97	-1.43, -0.51	0.00	-2.58, p=0.48	-0.10, p=0.81	6.79, p=0.15	41%
Moderate-severe/severe	7/8	-0.71	-0.94, -0.48	0.00	-1.92, p=0.42	-0.18, p=0.54	7.16, p=0.41	2%





## Subgroup Analysis - Intervention

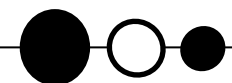
Trials/Arms		Treatment Effectiveness			Publication Bias		Heterogeneity	
		g	CI 95%	p value	Egger intercept	Begg-Mazumbar Kendall's tau	Cochrane Q	I <sup>2</sup>
Intervention								
Equipment-based	5/6	-0.67	-0.98, -0.35	0.00	-1.59, p=0.63	-0.00, p=1.00	6.59, p=0.25	24%
Equipment-free	5/6	-0.94	-1.28, -0.60	0.00	-3.00, p=0.17	-0.40, p=0.26	6.96, p=0.22	28%
Group exercise	5/5	-0.80	-1.09, -0.51	0.00	-0.62, p=0.80	-0.00, p=1.00	3.48, p=0.48	0%
Individual exercise	5/6	-0.87	-1.30, -0.43	0.00	-4.39, p=0.14	-0.40, p=0.26	10.78, p=0.06	53%
Indoors	7/8	-0.77	-1.10, -0.44	0.00	-3.54, p=0.13	-0.25, p=0.39	12.05, p=0.09	41%
Outdoors	3/3	-0.94	-1.30, -0.58	0.00	-1.95, p=0.59	-0.00, p=1.00	1.37, p=0.50	0%
Hospital	4/5	-0.61	-0.96, -0.27	0.00	-0.64, p=0.88	-0.00, p=1.00	5.62, p=0.23	28%
Non-hospital	5/5	-1.07	-1.41, -0.72	0.00	-3.08, p=0.09	-0.30, p=0.46	4.65, p=0.33	14%





## Subgroup Analysis - Comparisons

	Trials/Arms	Treatment Effectiveness			Publication Bias		Heterogeneity	
		g	CI 95%	p value	Egger intercept	Begg-Mazumbar Kendall's tau	Cochrane Q	I <sup>2</sup>
Comparisons		↓						↓
Antidepressants or TAU	6/6	-0.75	-1.01, -0.48	0.00	-1.38, p=0.35	-0.27, p=0.45	1.87, p=0.87	0%
Psychological treatments	5/6	-0.85	-1.21, -0.48	0.00	-3.69, p=0.16	-0.40, p=0.26	8.64, p=0.12	42%





## Subgroup Analysis - Outcome Measures

	Trials/Arms	Treatment Effectiveness			Publication Bias		Heterogeneity	
		g	CI 95%	p value	Egger intercept	Begg-Mazumbar Kendall's tau	Cochrane Q	I <sup>2</sup>
Outcomes		↓						↓
Self-rated	5/6	-0.97	-1.35, -0.59	0.00	-2.50, p=0.41	-0.13, p=0.71	6.81, p=0.24	26%
Clinician-rated	6/7	-0.69	-0.94, -0.44	0.00	-1.56, p=0.62	-0.09, p=0.76	6.65, p=0.35	9%





## Sensitivity Analysis

	Trials/Arms	Treatment Effectiveness			Publication Bias		Heterogeneity	
		g	CI 95%	p value	Egger intercept	Begg-Mazumbar Kendall's tau	Cochrane Q	I <sup>2</sup>
		↓						↓
PEDro score of $\geq 6$	7/8	-0.70	-0.94, -0.45	0.00	-1.87, p=0.42	-0.03, p=0.90	7.16, p=0.41	2%
Up to 4 weeks	4/5	-0.71	-1.09, -0.34	0.00	-1.18, p=0.74	-0.00, p=1.00	5.79, p=0.22	30%
Exercise preferences	4/4	-0.84	-1.17, -0.51	0.00	-3.73, p=0.52	-0.17, p=0.73	3.23, p=0.36	7%



**REVIEW****Depression  
AND Anxiety**

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# Aerobic exercise for adult patients with major depressive disorder in mental health services: A systematic review and meta-analysis

## SUMMARY FINDINGS:

--- **Aerobic Exercise** of 45minutes, 3 times/week for 9.2 weeks  
**BRINGS ABOUT LARGE ANTIDEPRESSANT EFFECTS !!**

**MOREOVER,**

--- **65%** of eligible patients agreed to participate in **exercise**

--- **ONLY 14.7%** dropped out before the end of the **exercise** program

--- Risk of Bias analysis did NOT affect the anti-depressiveness  
of **aerobic exercise**

In line to our findings.....

..... Physical exercise is widely recommended in depression treatment (NICE, 2009; Ravindran, 2016; Stanton & Reaburn, 2014). It has been associated with depression relief in various meta-analytic reviews (Craft & Landers, 1998; Rethorst, Wipfli, & Landers, 2009; Robertson, Robertson, Jepson, & Maxwell, 2012; Schuch et al., 2016; Silveira et al., 2013; Stanton & Reaburn, 2014), even after risk of bias was considered (e.g., Rethorst et al., 2009; Schuch et al., 2016).

## CONCLUSION

This is the first meta-analytic study to compare the antidepressant effects of AE to treatments for depression excluding exercise activities, in adult patients (18–65 years) with a referral or clinical diagnosis of major depression, who were recruited through mental health services and not through media advertisements. Supervised AE compared favorably to treatments for depression across various delivery formats, comparisons, or settings, and regardless symptom severity



- **Exercise on Referral (Prescription)** for Depressed Patients  
What is the evidence in real-life (pragmatic) settings??





- Exercise on prescription for depressed people in **Exercise Referral Schemes (ExRefSch - gyms)**

Referral

GP



ExRefSch 1st appointment - gym

Take up

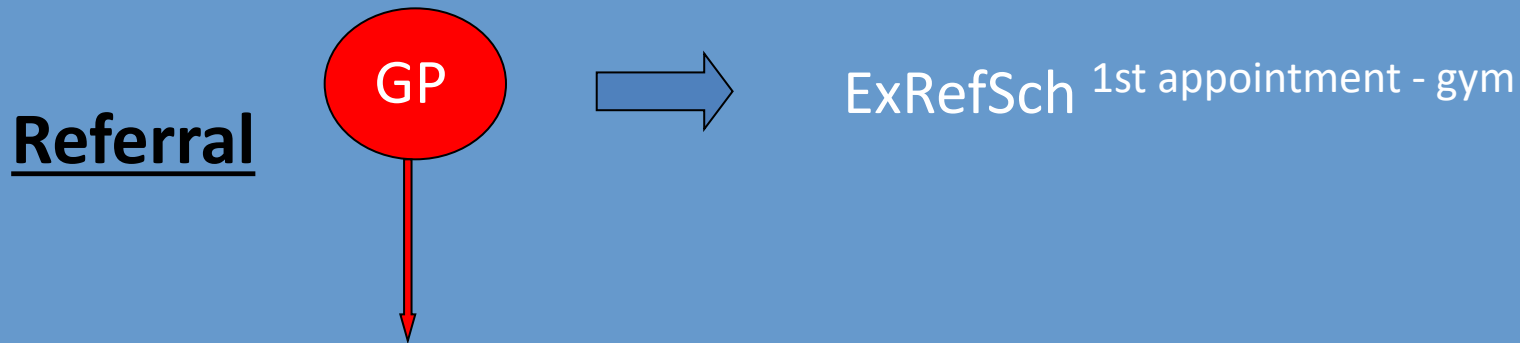


ExRefSch 1st ExSession - gym

Completion



ExRefSch Last ExSession - gym



Approximately 25% may prescribe exercise for depression

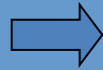
**GPs** often promote exercise with confidence, enthusiasm regardless patients' conditions while erroneously think that they are aware of National Exercise Guidelines (exercise 3times/week/10-14weeks)

Douglas et al., 2006;McKenna, Naylor, McDowell, 1998;Horne, 2009



## Referral

GP



Exercise on Prescription 1st appointment - gym



Amongst 8 referral groups, Mental Health Referral was the top predictor to attendance, uninfluenced by GP/Distance related factors (Harrison et al., 2005)

Mental Health Referrals showed the top attendance rate at the ExRefSch 1st appointment - gym

Fewer Mental Health than Physical health Referrals drop out between the GP referral endorsement and the ExRefSch 1st appointment - gym (Crone et al., 2008)

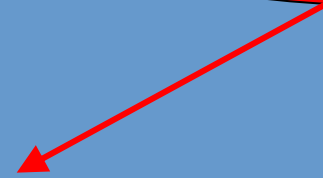


## Take up

ExRefSch 1st appointment - gym



ExRefSch 1st ExSession - gym



A small number of depressed patients  
shows up in the gym for the 1<sup>st</sup> Exercise Session !!



## Completion

ExRefSch 1st ExSession - gym



ExRefSch Last ExSession - gym



Less Mental than Physical Health Referrals complete the exercise program



So, ..... we see that

**EXERCISE IS A REAL ANTIDEPRESSANT !!**

**&**

DEPRESSED PEOPLE SHOW IMPRESSIVELY HIGH:

1. ATTENDANCE RATES AT **1<sup>ST</sup> GYM APPOINTMENT**
2. DROP-OUT RATES AFTER **THE 1<sup>ST</sup> GYM APPOINTMENT**

ARE THEY MOTIVATED TO EXERCISE OR NOT??  
IS IT A MATTER OF MOTIVATION???





## **University of Thessaly Research Project:**

### **Physical Activity in major depressed outpatients in Greece: A self-determination approach**

**April 2014 – May 2016**

Dr Ioannis D. Morres, Professor Antonis Hatzigeorgiadis,  
Associate Professor Nikos Comoutos, Professor Yannis Theodorakis

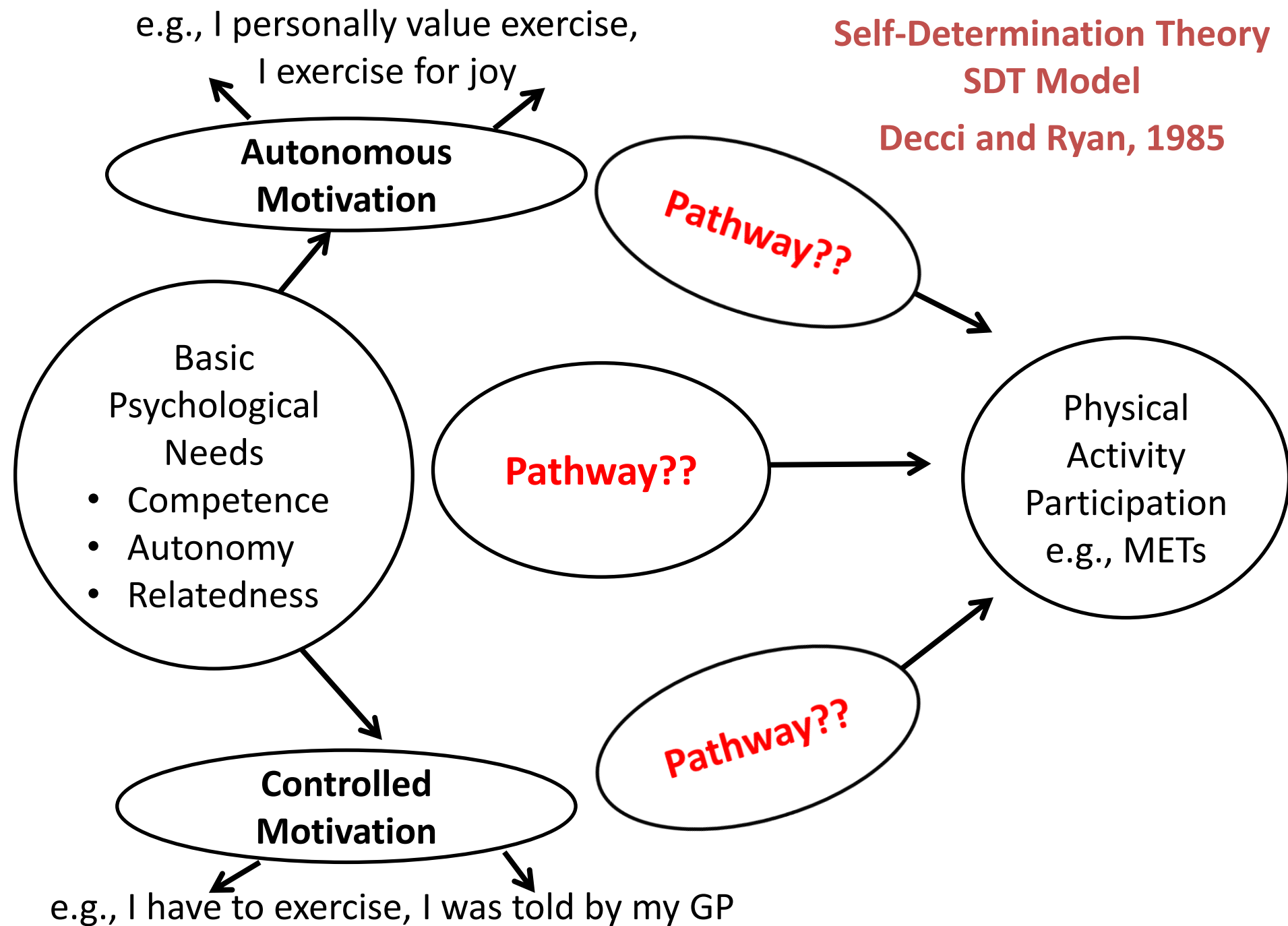
A total of 206 clinically diagnosed major depressed outpatients  
were recruited at the Community Mental Health Centre, Eginition  
Hospital, Athens, Greece

Compliments to:      Professor Dimitrios Ploumpidis  
                                 Professor Marina Economou

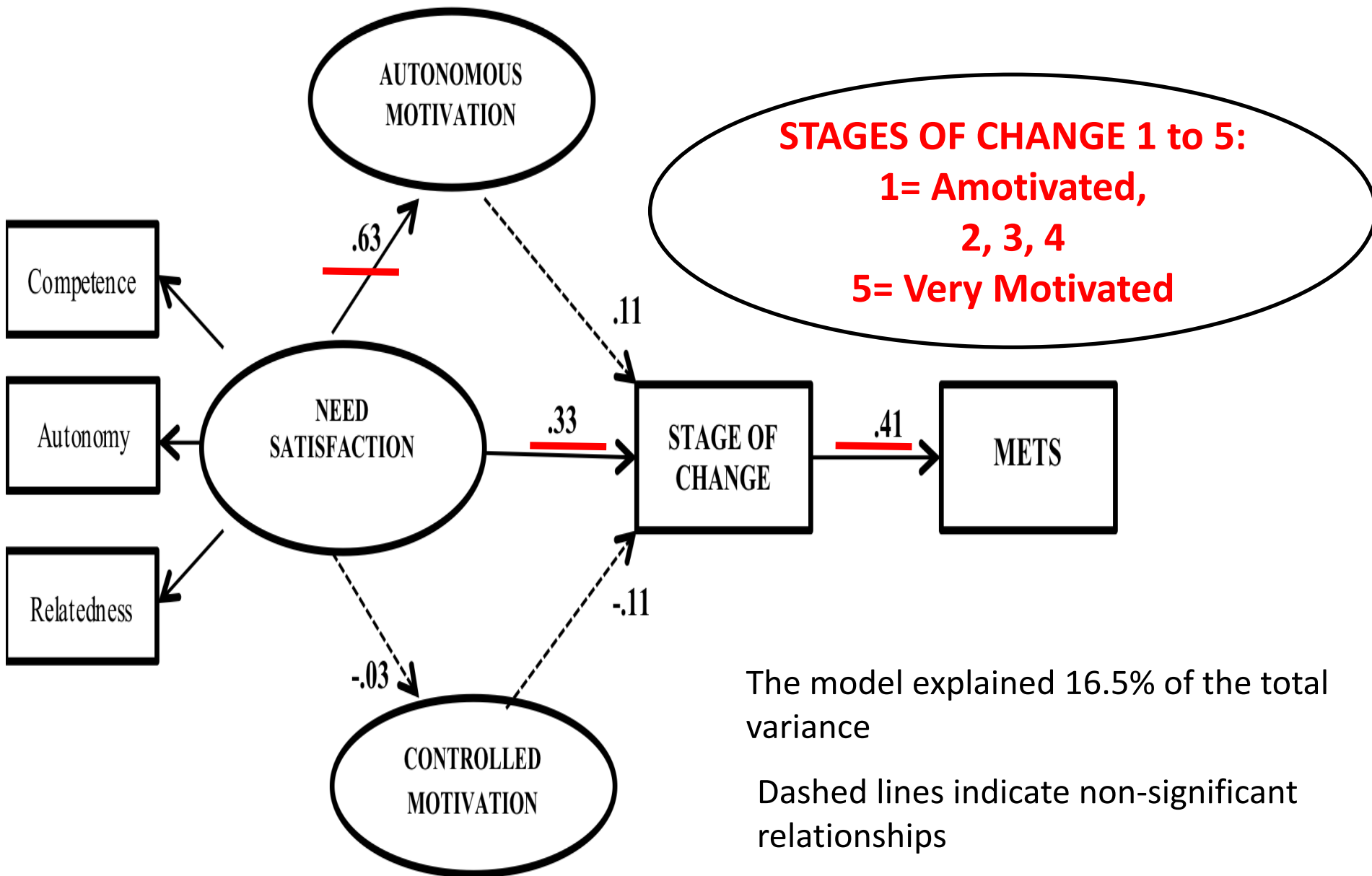


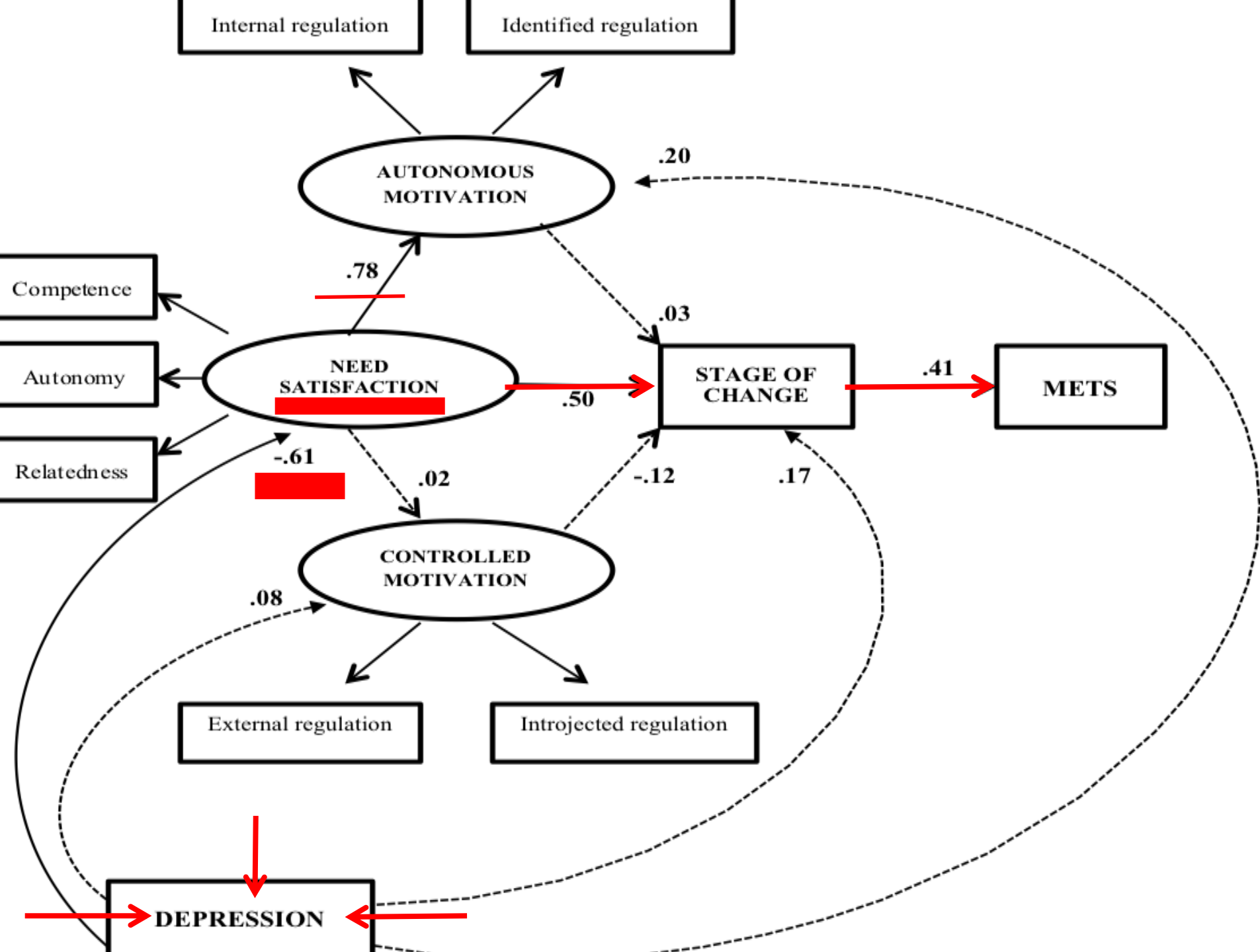
# Self-Determination Theory SDT Model

Deci and Ryan, 1985



# Structuring Equation Modeling of SDT dendrites for Physical Activity

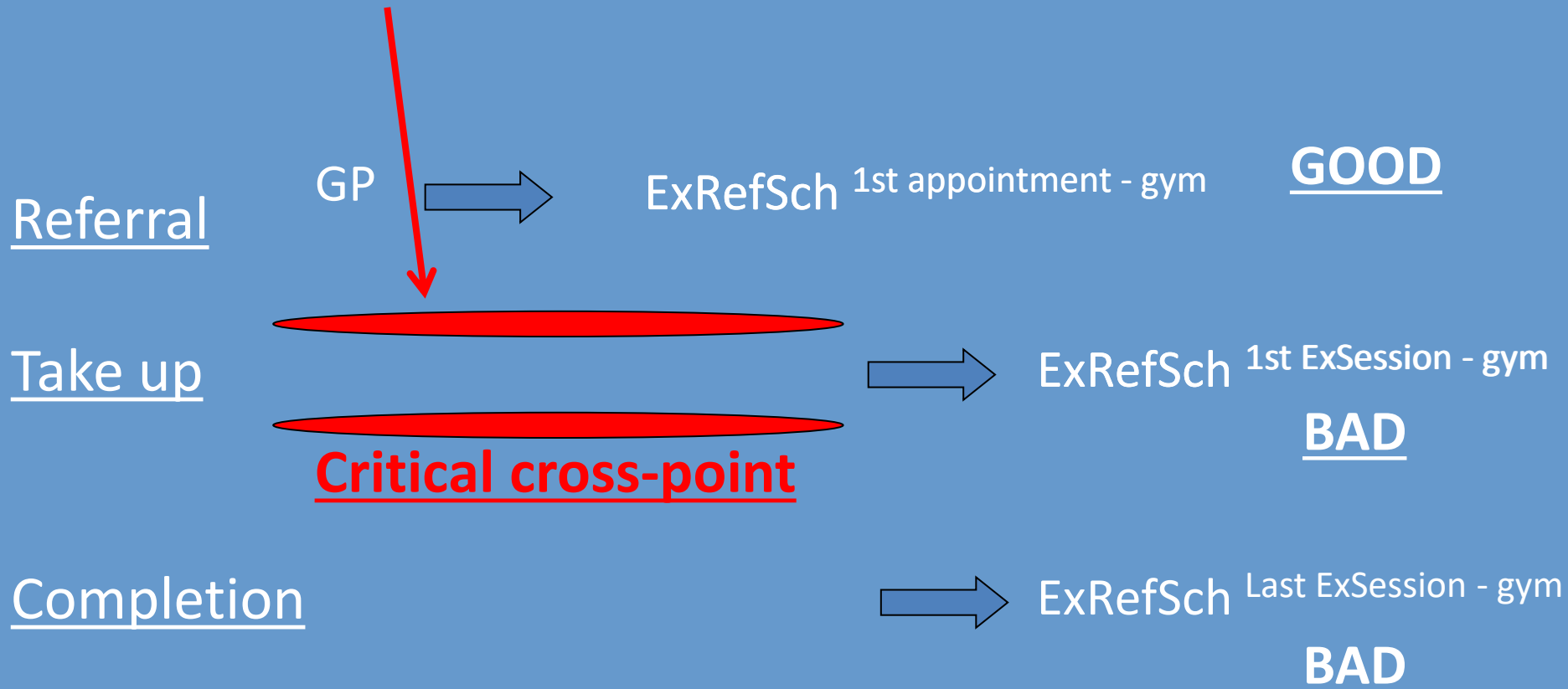






# Exercise on Prescription for depressed people

- Exercise on prescription for depressed people
- Psychological Need Satisfaction for Exercise





## Conclusions

***SDT **Motivational Constructs** are **NOT related** with Physical Activity Participation in Greek major depressed adult outpatients***

***SDT **Psychological Needs Satisfaction** (Competence Autonomy & Relatedness) **are related with** Physical Activity Participation in Greek major depressed adult outpatients***





## Send out Message

***Aerobic Exercise of 45minutes 3 times/week for 9 weeks  
is an effective antidepressant treatment***

***SDT Psychological Needs Satisfaction (Competence,  
Autonomy, & Relatedness) during the first appointment  
in the gym appears to be the key cross-point towards  
the adoption of exercise behavior***





**THANK YOU!**

