Relaxation as a technique to enhance outcomes from cardiac rehabilitation

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Purpose of the presentation

- Define relaxation therapy
- Describe controlled studies
- Systematic review of outcomes
- Propose guidelines for implementation

Review of Relaxation Therapy for cardiac patients

In collaboration with

Adrian A White,
University of Exeter
(until september 2003)

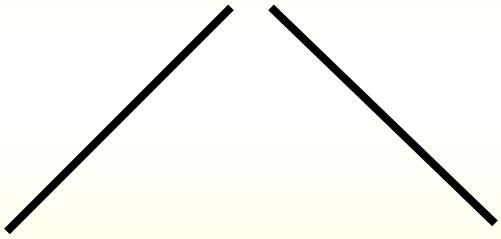
Reprinted from AMERICAN HEART JOURNAL, St. Louis
Vol. 118, No. 3, pp. 545-552, Sept., 1989, (Printed in the U.S.A.)

Physical training and relaxation therapy in cardiac rehabilitation assessed through a composite criterion for training outcome

Jan van Dixhoorn, MD, Hugo J. Duivenvoorden, PhD, Hans A. Staal, MD, and Jan Pool, MD *Haarlem and Rotterdam, The Netherlands*

156 MI patients

random assignment



exercise

exercise + relaxation

Relaxation format

- 6 one hour sessions, individual
- With the aid of EMG Biofeedback
- Instructions for passive relaxation, supine
- Small movements and breathing instruction
- Sitting and standing positions
- Manual techniques

Physical Outcomes

- More pronounced training bradycardia
- No effect on blood pressure or maximal watts
- Remarkable reduction of exercise induced ST-abnormalities (> 2 mm)
- Composite criterion: training failure occurred less often

Effect of Relaxation Therapy on Cardiac Events After Myocardial Infarction: A 5- Year Follow-Up Study

*Jan J. van Dixhoorn, MD, PhD, * and Hugo J. Duivenvoorden, PhD.*

J Cardiopulmonary Rehabil 1999; 19:178-185

Relaxation therapy for rehabilitation and prevention in ischaemic heart disease: a systematic review and meta-analysis

Jan van Dixhoorn, Adrian White

European Journal of Cardiovascular Prevention and Rehabilitation, 2005, 12: 193-202

Relaxation Therapy (RT)

- Primary relaxation skills = training
  ability for internal self-regulation of tension
- Secondary Relaxation skills = discussion
  application in daily life: recognizing cues for increase and decrease of tension, dealing with tension, when to practice

Primary relaxation skills

- focus on internal state,
- using posture, breathing, muscle relaxation or small movements, attention, images or verbal formulas, or biofeedback
- to induce a temporary change in mental or physical tension state
- which is concretely perceptible and may become a *new internal reference*

Effect of primary on secondary skills

- Awareness of stressors: more realistic of nature and costs, more detailed and precise
- Dealing with stressors: finding new ways, creating and utilising moments of rest and recovery

Full relaxation therapy (RT)

- includes primary and secondary skills
- provides supervised practice
- is a form of stress management
- individualizes stress coping based on personal relaxation experiences

Relaxation therapies

- All forms include cognitive restructuring:
  - importance of regular relaxation practice
  - effects of stress

Relaxation instruction

- Abbreviated: 3 hours or less of instruction
- Full: > 3 hours of instruction
- Expanded: full RT + specific cognitive treatment

Abbreviated RT

- Once or twice supervised instruction
- Unimodal= one form of instruction
- Taperecorded or written instructions
- Urge to practice daily
- Provide a logbook of practice
- Discuss experiences with daily practice

Full RT

- Series of supervised practice sessions (9 hours, on average)
- Several instruction forms (multimodal)
- Emphasis on mastery of technique and increasing sensitivity to tension and relaxation signals (no tape)
- Discuss application in daily life, before, during or after stress

Expanded RT

- Discussion group format, about 11 hours
- Regular supervised relaxation instruction
- Sometimes with tape or written instructions
- Specific cognitive treatment:
  - Risk factors, illness, lifestyle
  - Psychological themes: depression, anger, hostility, Type A, time urgency

Reviews of stress management for cardiac patients

- Linden et al, 1996: *'Psychosocial interventions' or 'stress management'*
- Dusseldorp et al., 1999 *'Psychoeducational programs'*
- Several studies include relaxation
- Psychosocial treatment is effective, but ***it is unclear which component is effective***

Purpose of present review of RT

- Does RT improve outcome better than usual care, with or without exercise rehabilitation?
- Is there any longterm benefit?
- Does the effect vary with the extent of RT?

Inclusion criteria for review

- Presence of myocardial ischemia / cardiac pathology
- Only risk factors: excluded

  e.g. Patel et al, 1985: Trial of relaxation in reducing coronary risk: four year follow-up. Br. Med J; 1103-1106

Inclusion criteria for review

- Measuring recovery in time
- Only momentary effects: excluded

  e.g. stress of procedures like angiography

  e.g. immediate effects during hospitalisation for mi or cabg (nurse studies, n=6)

Inclusion criteria for review

- RT was the primary intervention
- RT as component of multimodal treatment: excluded

  e.g. Alteration of Type A behavior

  e.g. Lifestyle Heart Trial (Ornish et al)

  e.g. The Heart Manual and Angina Management Programme (Lewin et al.)

Inclusion criteria for review

- RT was the primary intervention
- Stress management without RT skills: excluded

  e.g. Ischemic Heart Disease Life Stress Monitoring Program (Frasure Smith et al.)
- Studies of the relaxing effect of music: excluded

Inclusion criteria for review

- Sufficient data
- Outcome without quantitative information for pooling: excluded

  e.g. Langosh et al (1982), Cunningham (1980), Krampen & Ohm (1984)

27 controlled studies

- RT: Abbreviated : n=6
  Full RT: n= 13
  Expanded RT: n=8
- Random assignment: n=13
- Control treatment includes exercise: n=7
- Patients: post MI: n=15; and/or post surgery or PTCA: n=12; angina pectoris only: n=4

Abbreviated relaxation

Hase & Douglas, 1987	Relaxation training
Munro *et al.,* 1988	Relaxation therapy
Amarosa-Tupler, 1989	Stress management
Gallagher *et al.,* 1997	Stress management
Collins & Rice, 1997	Relaxation intervention
Wilk & Turkofski, 2001	Progressive muscle relaxation

Full relaxation therapy

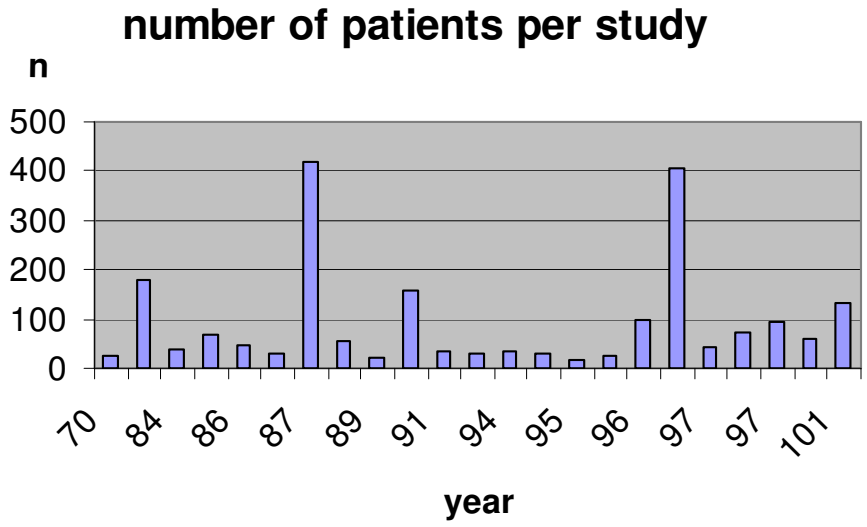
Kavanagh *et al,* 1970	Hypnosis
Polackova *et al,* 1982	Autogenic training
Bohachick, *et al* 1984	Relaxation training
Baer *et al,* 1985	Stress management
Ohm, 1987	Relaxation training
Van Dixhoorn, *et al,* 1991	Relaxation therapy
Winterfeld, *et al,* 1991	Koncentrative entspannung

Full relaxation therapy

Winterfeld, *et al,* 1993	Autogenic training
Nelson, *et al,* 1994	Stress management
Zamarra, *et al,* 1995	Transcendental meditation
Luskin, *et al,* 2002	Stress management
Kanji, *et al*, 2004	Autogenic training
Del Pozo, *et al*, 2004	Biofeedback

Expanded relaxation

Valliant & Leigh, 1986	Relaxation training
Bundy *et al,* 1994	Psychological treatment
Turner *et al,* 1995	Stress management
Trczienicka-Green & Steptoe, 1996	Stress management
Blumenthal *et al,* 1997	Stress management
Appels *et al,* 1997	Psychological intervention
Bundy *et al,* 1998	Stress management
Cowan *et al,* 2001	Psychosocial nursing therapy



Outcome measurements

- ***Physiological***: resting heart rate & blood pressure, heart rate variability, maximum watts, serum cholesterol, HDL
- ***Psychological***: anxiety, depression
- ***Cardia***c: angina pectoris, arrhythmia, ischemia (ST)
- ***Function***: return to work (at six months)
- ***Cardiac events***, up to five years follow-up

Continuous measurements

Weighted mean difference (WMD):

Pre-post difference of treatment group, minus pre-post difference of control group, in units of relevant measurement

Standardised mean difference (SMD) = 'effect size', to compare between different measurements

dividing by pooled standard deviation

> 0.2 – 0.5: small effect

0.5 – 0.8: moderate effect

> 0.8: large effect

Resting heart rate: *clear, small effect*

7 studies, 381 patients

WMD = -3.8 bpm, $p<0.01$ (smd=0.29)

Exercise as control (3 studies) : -4.3 bpm

Abbreviated RT (2 studies): -8.5 bpm

In another 3 studies insufficient data, two of which found positive effect

Blood pressure: *No effect*

10 studies, 773 patients
WMD systolic= -0.4 mmHg, ns (smd=-.05)
WMD diastolic= -0.13 mmHg, ns

Abbreviated RT (n=4): 5.5 mmHg SBP
Full/expanded RT (n=6): - 2.8 mmHg SBP
Statistically non significant

Heart rate variability: *small effect*

3 studies, 168 patients
SMD = 0.35, $p<0.05$

All three full RT
In two studies 3 months follow-up:
SMD= 0.58 ($p<0.001$), *moderate effect*

Maximum Watts: *clear effect*

4 studies, 168 patients

SMD = 0.44, $p < 0.01$

effect size: small

2 studies expanded RT, 2 studies full RT

two studies with exercise as control condition excluded

Serum lipids: *partial, small effect*

3 studies, 527 patients

Total cholesterol: WMD = -0.08, ns, (smd: -.1)

HDL: WMD = 0.06, $p < 0.01$ (smd: 0.23)

clinically insignificant

2 studies expanded, 1 study abbr. RT

Anxiety state: *small, reliable effect*

13 studies, 1185 patients

SMD state anxiety: -0.35, $p < 0.001$

Effect size small, statistically highly significant, no heterogeneity between studies

Exercise as control condition (n=4): -0.31

Abbreviated RT (n=4): -0.09 *no effect*

Full RT (n=6): -0.54, *moderate effect*

Expanded RT (n=3): -0.23, *small effect*

Depression: *unreliable effect*

9 studies, 957 patients

SMD : -0.48, $p < 0.05$

Effect size small, statistically significant, strong heterogeneity between studies

Excluding two studies with low internal validity and positive outcome removes heterogeneity:

SMD = -0.14, ns

Angina Pectoris: *clear effect*

4 studies, 565 patients

SMD : -0.60, $p < 0.001$

Effect size moderate, statistically highly significant

Reduced frequency of attacks

Abbreviated RT (n=1): smd= -0.26, $p<0.02$

Expanded RT (n=3): smd= -0.79, $p<0.001$

Another four studies were uniformly positive

Effect sizes in 3 reviews

	Linden	Dusseldorp	RT
Heart rate	**-0.30**** N=354		**-0.29**** N=293
SBP	**-0.14*** N=298	**-0.16*** N=471	**-0.05** N=685
Cholesterol	**-0.95**** N=939	**-0.65*** N=812	**-0.10** N=527
Angina		**-0.10*** N=2878	**-0.60**** N=565

**** P<0.05, ** P < 0.01***

Effect sizes in 3 reviews

	Linden	Dusseldorp	RT
Distress	**-0.30**** N=1259		
Anxiety		**-0.03** N=2796	**-0.35**** N=1097
Depression		**-0.04** N=3097	**-0.48*** (-0.14) n=918

** P<0.05, ** P < 0.001*

- Psychoeducation and psychosocial treatment reduce risk factors and promote healthy behavior, RT does not
- Psychoeducation does not improve emotional or physical state, RT does
- The effect size of RT and psychosocial treatment (stress management) is equal

Myocardial ischemia: *positive effect*

4 studies, 255 patients

ST depression during exercise

Kavanagh: average depression reduced

Zamarra: time of occurrence later

Van Dixhoorn: less patients with ST> 2mm

ST depression during ambulatory monitoring

Blumenthal: reduced occurrence

Arrhythmia: *positive effect*

3 studies, 135 patients

Odds Ratio: 0.20, $p < 0.001$

Reduction of occurrence, but

nature of arrhythmia not specified

Abbreviated RT (n=1): OR= 0.42 (at discharge, ns)

Full RT (n=2): OR= 0.19 (six month)

All patients were post-MI, data taken from medical records

Return to work: *positive effect*

3 studies, 376 patients

Odds Ratio: 1.83, $p < 0.01$

All full RT. In 2 studies exercise as control

All patients post-MI or CABG, data taken at six month follow-up

Long-term effects on cardiac events

Cardiac death

Myocardial infarction

CABG

Re-PTCA or restenosis

Follow-up period: from six months to 5 years

Cardiac events: *positive effect*

7 studies, 916 patients

Odds Ratio: 0.39, $p < 0.0001$

no heterogeneity between studies

Exercise as control (n=2): OR = 0.54

Full RT (n=4, 631 patients): OR = 0.48

Random assignment (n=2): OR = 0.43

No abbreviated RT

Cardiac death: *positive effect*

4 studies, 694 patients

Odds Ratio: 0.29, $p < 0.01$

Death occurred much less

Exercise as control (n=2): OR = 0.47

Full RT: n=3, Expanded: n=1

Random assignment, n=2

Occurrence of death within 2 years

Cardiac death within 2 years

	treatment	control	period
Cowan ***random***	1/67	7/66	2 years
Nelson	1/19	4/16	6 months
Ohm	4/197	5/173	6 months
Van Dixhoorn ***random***	1/76	5/80	2 years

Effect of Relaxation Therapy on Cardiac Events After Myocardial Infarction: A 5- Year Follow-Up Study

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*Jan J. van Dixhoorn, MD, PhD, * and Hugo J. Duivenvoorden, PhD.*

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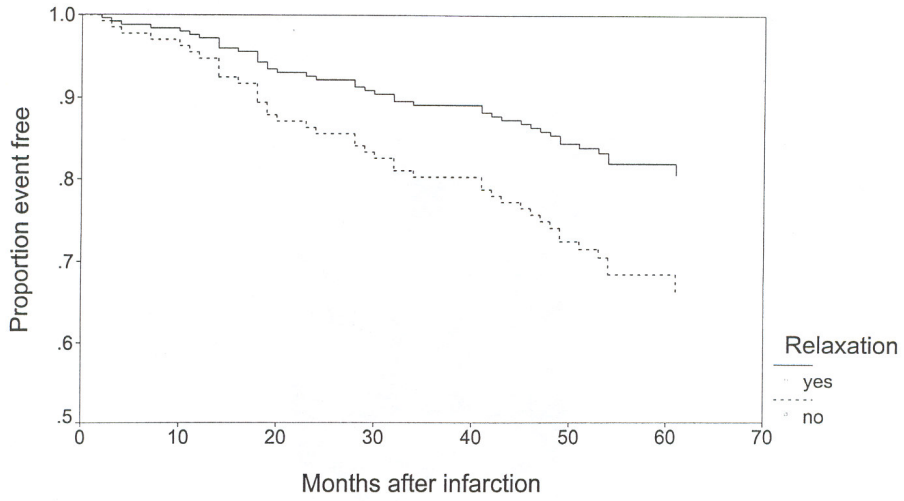
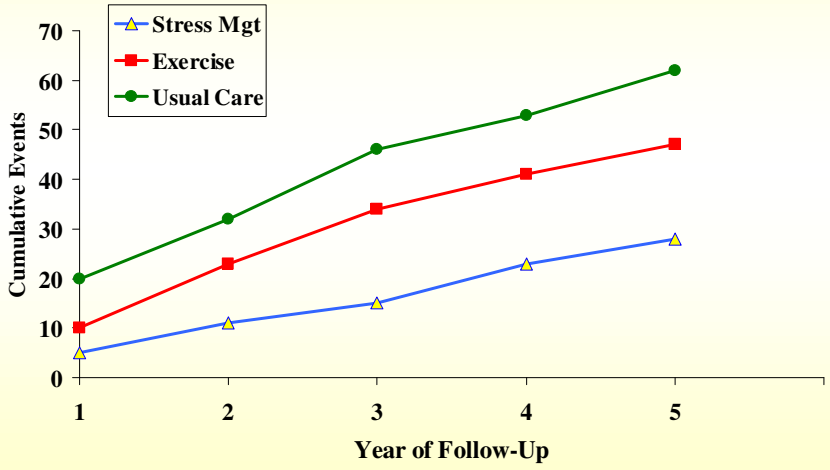


Figure 1. Hazard rate for major cardiac events (cardiac death, reinfarction, cardiac surgery) in 5 years after myocardial infarction for patients with and without relaxation instruction. Yes: Relaxation instruction plus exercise training; No: exercise training only

Psychological Treatment of Mental Stress-Induced Ischemia: Five-year clinical and economic follow-up analysis

James A. Blumenthal, Ph.D., Michael Babyak, Ph.D., Jiang Wei, M.D., Christopher O'Connor, M.D., Daniel Mark, M.D., Pamela S. Woodley, FSA, MAAA, Richard J. Irwin, ASA, MAAA, Geoffrey Reed, Ph.D.

Events per group during follow-up



Conclusions

Relaxation Therapy enhances effectiveness of rehabilitation, ìn a wide range of effects:

physical, psychological, social and cardiac

It is an important ingredient of cardiac rehabilitation,

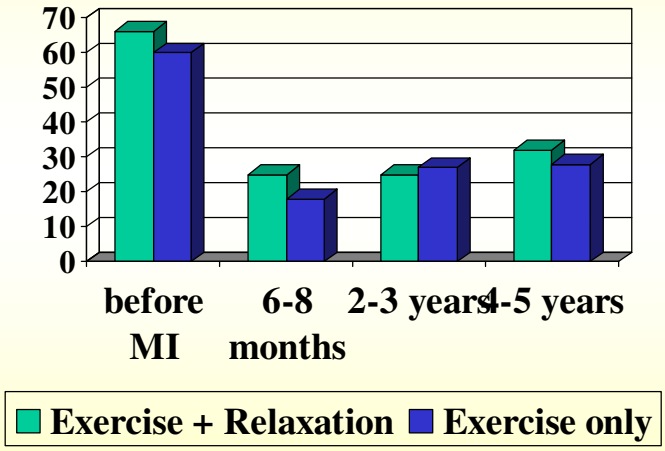
It complements exercise: heart rate, anxiety, return to work, cardiac events

It complements psycho-education:

RT does not or hardly influence risk factors: blood pressure, cholesterol, smoking

Psychoeducation hardly influences emotional state (anxiety, depression)

Smoking before and after MI (%)



Van Dixhoorn, et al.

Abbreviated Relaxation Therapy

- Reduces resting heart rate
- small effect on angina pectoris
- no effect on anxiety or depression
- no effect on blood pressure or arrythmia
- No evidence of longterm effect available

Full or Expanded Relaxation Therapy

- good effect on resting heart rate, frequency of angina pectoris and anxiety
- no effect on blood pressure, cholesterol
- effect on arrythmia, maximum watts, ischemia
- evidence of longterm effect on return to work, cardiac events, cardiac death

There is little difference between Full or Expanded Relaxation Therapy

There is no evidence for superiority of RT expanded with cognitive treatment

The cognitive implications of full RT may be sufficient for most cardiac patients

Cognitive implications of RT

Healthy respect for rest and need for balance between rest and effort

Respect for body signals of stress and tension

Awareness of 'cost' of stress

Differentiating stress signals from cardiac signals

Understanding role of mental factors in physical function

Implementation of RT

If you use Relaxation Therapy, do it well

Sufficient time: at least 6-9 hours,

In small groups

Teach different forms

Experienced trainers

Assess mastery

Individual sessions optional

Multimodality of full RT

- Unimodal use of cognitive form (hypnosis, meditation, autogenic training) in 5 studies requires

  on average 19, median 14 hours

- Multimodal treatment (muscle relaxation, attention, small movements, breathing, biofeedback) in 8 studies requires

  on average 9, median 9 hours

Dutch Guidelines for Cardiac Rehabilitation (2004)

- Recommends a full RT program, multimodal, for 9 hours
- In addition to abbreviated, introductory RT as part of the exercise and lifestyle program

- www.hartstichting.nl
- www.methodevandixhoorn.com

Designing instructions

- Reduce traditional methods to their elements or modalities
- Add new modalities
- Create new instructions with different combinations of modalities

Modalities of relaxation

- Attention: active = focussed
  Passive = receptive, listening
- Muscle relaxation (contract/release)
- Movements: small, repetitive
- Breathing: direct and indirect regulation
- Posture: lying (supine, prone), sitting, standing
- Biofeedback (HRV, EMG)

Process model of relaxation

- Offer many modalities, do not stick to a fixed protocol or method
- Find at least one modality that the patient is able to utilize to create a change of tension
- Proceed from there, practice and expand the ability for selfregulation of tension
- Adapt instruction to the patient
- Assess mastery