



Universiteit  
Leiden  
The Netherlands

## Effects of a self-regulation lifestyle program for post-cardiac rehabilitation patients

Janssen, V.R.

### Citation

Janssen, V. R. (2012, September 25). *Effects of a self-regulation lifestyle program for post-cardiac rehabilitation patients*. Retrieved from <https://hdl.handle.net/1887/19850>

Version: Not Applicable (or Unknown)

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/19850>

**Note:** To cite this publication please use the final published version (if applicable).

Cover Page



Universiteit Leiden



The handle <http://hdl.handle.net/1887/19850> holds various files of this Leiden University dissertation.

**Author:** Janssen, Veronica Regina

**Title:** Effects of a self-regulation lifestyle program for post-cardiac rehabilitation patients

**Issue Date:** 2012-09-25

1.

## General Introduction

## Coronary Heart Disease

Coronary heart disease (CHD) is the leading fatal illness in most Western countries, claiming more deaths and disability than any other disease. Over the past decades, improvements in diagnosis, treatment and prevention have reduced CHD mortality rates, leaving an increasingly large group of people to live with CHD as a chronic disease (1). In the Netherlands, incidence statistics vary between 6/ 1000 for men and 4 /1000 for women. In 2009, CHD prevalence rates were an estimated 84.000 to 85.000 in the Netherlands (2). As hypertension, abnormal lipids, abdominal obesity, physical inactivity, smoking and consumption of (saturated) fat have been shown to account for most of the risk in both the onset and prognosis of CHD (3,4), adequate disease management requires control of risk factors through medication and lifestyle change.

### **Cardiac rehabilitation: the lifestyle changes necessary to modify risk factors seem virtually impossible to maintain for life**

Cardiac rehabilitation programs focus on restoring a patient to full physical and psychosocial functioning, as well as on limiting further progression of the disease by aiding lifestyle change and adequate risk factor management (5). Next to pharmacological therapies and interventional cardiology, cardiac rehabilitation programs are widely recognized as essential to the care of CHD patients. Traditionally, cardiac rehabilitation programs have placed large emphasis on exercise training, but gradually they have become supplemented with health education components, lifestyle counselling and psychological treatment to better address the full range of modifiable risk factors. While (meta-analytic) evidence for the effectiveness of such comprehensive cardiac rehabilitation programs is abundant (6–10), studies show that 1.5 years after discharge from hospital

most beneficial effects of cardiac rehabilitation on risk factor profiles have been lost (11,12). This situation is especially glaring given that evidence is emerging that the mortality-reducing potential of lifestyle changes is at least comparable to that demonstrated for cardiopreventive drug usage (13,14). Seemingly, many cardiac patients adopt healthier lifestyles during cardiac rehabilitation, but relapse into old habits when returning to everyday life (15–17). Research on the maintenance of lifestyle change following cardiac rehabilitation shows relapse rates as high as 60% over the first six months (16,17). Typically, most cardiac rehabilitation programs in Europe commence soon after hospital discharge and terminate around 8 – 12 weeks thereafter. Thus, patients are left to their own devices at an especially vulnerable time under the erroneous assumption that they will be able to self-maintain their new, healthy lifestyles. However, good intentions alone are not sufficient to consolidate behavior change.

## **Changing for good? The role of self-regulation**

Self-regulation theories of behavior extend beyond the strength of a person's intention and presume that health behavior change can be achieved by setting salient goals and regulating behavior, thoughts and emotions across changing circumstances in order to attain these goals (18). Thus, behavior change is viewed as a dynamic goal-guided process, occurring in phases. A central tenet in all self-regulation theories is that human behavior is inherently organized around the pursuit of goals as goals provide meaning to people's lives (19,20). The motivation to change behavior stems from a perceived discrepancy between an individual's actual state (the input value) and an ultimately desired state (the reference value), leading to adoption of a specific goal. Both cognitions and skills help translate this intention into action and maintenance. Self-monitoring, anticipatory coping, emotion regulation and feedback strategies,

for instance, guide goal attainment. Adaptive cognitions, such as self-efficacy, realistic outcome expectancies, satisfaction with the new behavior and ownership of the changed behavior, are thought to be important in subsequent maintenance (18,21,22). Trials and meta-analyses in various domains show that lifestyle modification programs based on self-regulation theory have lasting effects, for example in terms of sustenance of weight loss (23,24), physical activity (25–27), or healthy eating (28). However, the theory has not been applied yet to comprehensive lifestyle modification programs in the area of cardiac rehabilitation.

## **Aim**

This thesis focuses on the role of self-regulation cognitions and skills in relation to health behavior change in (post-) cardiac rehabilitation patients. In a first study, we attempted to determine the effects of a comprehensive cardiac rehabilitation program on illness beliefs, as these are closely related to personal (health) goals and disease outcome. In a second study, we conducted a systematic review and meta-analysis of lifestyle modification programs for CHD patients and examined the efficacy of incorporating self-regulation intervention strategies as a means of changing behavior. In a next step, we developed a brief self-regulation program focused on maintenance of lifestyle change and risk factor modification in post-cardiac rehabilitation patients and tested the efficacy in a randomized controlled design. A more specific aim of this thesis was to investigate whether this self-regulation lifestyle program for post-cardiac rehabilitation patients is capable of instigating and maintaining changes in risk factors and related health behaviors at follow-up.

## Outline

### ***Chapter 2: Changes in illness perceptions and quality of life during cardiac rehabilitation***

When behavior change is viewed in light of dealing with illness, it is likely to be influenced by the beliefs patients hold about their disease and the corresponding treatment. According to self-regulation theories, such disease-related beliefs, or ‘illness perceptions’, fuel subsequent coping behaviors and underlie adjustment (29). Reviews have acknowledged the link between illness perceptions and outcomes across a range of diseases (30,31). In cardiac patients, illness perceptions have consistently been related to psychosocial adjustment. More specifically, negative illness beliefs in cardiac patients have been related to (onset of) depressive symptomatology (32–34), whereas positive illness beliefs seem to be associated with better health-related quality of life (34,35). However, the beliefs patients hold about their illness are likely to be influenced by changes in disease status or treatment. In the early phase of the illness (i.e., hospital admission and cardiac rehabilitation) patients continuously acquire new experiences and knowledge. Not surprisingly, health-related quality of life in cardiac patients has been shown to change in the year following the cardiac event (36) with improvements being most apparent during the early phase of illness (37–39). It has been argued that illness perceptions also change during this period (40) and that such changes may be responsible for the observed improvements in quality of life, but there is little research investigating this. Thus, the first chapter aims to examine whether illness beliefs change after participation in a comprehensive cardiac rehabilitation program and, if so, whether these changes are related to improvements in health-related quality of life.

### ***Chapter 3: Lifestyle modification programs for patients with coronary heart disease: a systematic review and***

## ***meta-analysis of randomized controlled trials***

Lifestyle modification programs for coronary heart disease (CHD) patients have been shown to effectively improve risk factors and related health behaviors, quality of life, re-incidence and mortality (6–10). However, several researchers have called attention to the large amount of variation in effectiveness between separate programs and have pointed out that lifestyle modification programs typically comprise a variety of psychological techniques that support behavior change, but that it is unclear which (combination of) techniques is most effective in modifying lifestyle behaviors. Therefore, we undertook a systematic review and meta-analysis of lifestyle modification programs for CHD patients and examined whether programs that incorporate self-regulation techniques (i.e., goal-setting, planning, self-monitoring and feedback) are more effective than programs that do not employ these techniques. Chapter three describes the results.

## ***Chapter 4: Beyond resolutions? A randomized controlled trial of a self-regulation lifestyle program for post-cardiac rehabilitation patients***

On the basis of self-regulation theory, we developed a relatively brief intervention focused on maintenance of lifestyle change and risk factor modification in post-cardiac rehabilitation patients. The program started with an individual motivational counseling session with a health psychologist during which important life goals for the patients were explored and a personal health goal was set. Patients then attended seven group sessions, which were structured around the self-regulatory phases of goal pursuit and focused on enhancing the relevant self-regulation skills. For instance, patients were encouraged to self-monitor their goal-related behavior, develop specific action plans when necessary, form realistic outcome expectancies, obtain progress-related feedback, and discuss problem-solving strategies. We tested this program in a randomized controlled



design and describe effects on risk factors and related health behaviors at posttreatment assessment (6 months after termination of cardiac rehabilitation).

### ***Chapter 5: Long-term follow-up of a lifestyle program for post-cardiac rehabilitation patients: are effects maintained?***

Most trials investigating lifestyle maintenance programs in cardiac patients show that effects largely waned over time after termination of the program (41–43). Chapter five assesses effects of the self-regulation lifestyle program on risk factors and related health behaviors at long-term follow-up (15 months after termination of cardiac rehabilitation). The time frame of this follow-up is comparable to that used by the EUROASPIRE II and III surveys. These surveys were conducted on a mere 2500 coronary patients from 15 European countries and investigated their lifestyles, risk factors and use of drug therapies  $\approx$  1.4 years after discharge from hospital. They showed that by that time, most of the cardiac rehabilitation treatment benefits had worn off and the majority of patients failed to meet secondary prevention targets (44–46). Thus, this chapter also investigates the proportion of patients that achieve target goals for secondary prevention at long-term follow-up.

### ***Chapter 6: Changing for good: the role of self-regulation in exercise adherence following cardiac rehabilitation***

Several researchers have criticized the single-pointed focus on performance measures at the expense of theory-building in the field of cardiac rehabilitation (47,48). They have pointed out that the efficacy of the various components of lifestyle modification programs is unclear (48–50) and have emphasized the importance of clarifying the factors that moderate or mediate program effectiveness. Meta-analyses have identified specific program characteristics, such as setting, timing and duration, as moderating factors (6,49,51), but less is known

about the psychological mechanisms by which lifestyle modification programs bring about change. The aim of this chapter is to investigate the mechanism that might explain any observed treatment effects of the self-regulation lifestyle intervention. It is hypothesized that the self-regulation lifestyle program promotes self-regulation skills, and that self-regulation skills will mediate any observed effects of the program on health behaviors.

## ***Chapter 7***

In the concluding chapter, the findings from the different studies are integrated and discussed. Directions for future research and recommendations for clinical implementation of the self-regulation lifestyle program are presented.

## References

1. Allender S, Scarborough P, Peto V, Rayner M, Leal J, Luengo-Fernandez R, et al. European cardiovascular disease statistics 2008 edition. European Heart Network. 2008; 7-111.
2. Vaartjes I, Peters R. Hart-en vaatziekten in Nederland. Hart-en vaatziekten in Nederland. 2006;7-28.
3. Yusuf S, Hawken S, Ounpuu S, Dans T, Avezum A, Lanas F, et al. Effect of potentially modifiable risk factors associated with myocardial infarction in 52 countries (the INTERHEART study): case-control study. *Lancet*. 2004;364(9438):937-52.
4. Kromhout D, Menotti A, Kesteloot H, Sans S. Prevention of coronary heart disease by diet and lifestyle: evidence from prospective cross-cultural, cohort, and intervention studies. *Circulation*. 2002;105(7):893-8.
5. Balady GJ, Williams M a, Ades P a, Bittner V, Comoss P, Foody JM, et al. Core components of cardiac rehabilitation/secondary prevention programs: 2007 update. A Scientific Statement From the American Heart Association Exercise, Cardiac Rehabilitation, and Prevention Committee, the Council on Clinical Cardiology, the Councils on Cardiovascular Nursing, Epidemiology and Prevention, and Nutrition, Physical Activity, and Metabolism; and the American Association of Cardiovascular and Pulmonary Rehabilitation. *Circulation*. 2007 May;115(20):2675-82.
6. Dusseldorp E, Meulman J, Kraaij V, van Elderen T, Maes S. A meta-analysis of psychoeducational programs for coronary heart disease patients. *Health Psychology*. 1999;18(5):506-19.
7. Jolliffe J a, Rees K, Taylor RS, Thompson D, Oldridge N, Ebrahim S. Exercise-based rehabilitation for coronary heart disease. *Cochrane Database of Systematic Reviews* (Online). 2001 Jan;(1):CD001800.
8. Taylor RS. Exercise-based rehabilitation for patients with coronary heart disease: systematic review and meta-analysis of randomized controlled trials. *The American Journal of Medicine*. 2004;116(10):682-92.
9. Clark AM, Hartling L, Vandermeer B, McAlister FA. Meta-Analysis: Secondary Prevention Programs for Patients with Coronary Artery Disease. *Ann Intern Med*. 2005 Nov;143(9):659-72.
10. Linden W, Phillips MJ, Leclerc J. Psychological treatment of cardiac patients: a meta-analysis. *European Heart Journal*. 2007;28(24):2972-84.
11. Willich SN, Müller-Nordhorn J, Kulig M, Binting S, Gohlke H, Hahmann H, et al. Cardiac risk factors, medication, and recurrent clinical events after acute coronary disease; a prospective cohort study. *Eur Heart J*. 2001 Feb;22(4):307-13.
12. Kotseva K, Wood DA, De Bacquer D, Heidrich J, De Backer G. Cardiac rehabilitation for coronary patients: lifestyle, risk factor and therapeutic management. Results from the EUROASPIRE II survey. *Eur Heart J Supplements*. 2004;6(J):J17-26.
13. Iestra J a, Kromhout D, van der Schouw YT, Grobbee DE, Boshuizen HC, van Staveren W a. Effect size estimates of lifestyle and dietary changes on all-cause mortality in coronary artery disease patients: a systematic review. *Circulation*. 2005 Aug 9;112(6):924-34.
14. Franklin B a, Cushman M. Recent advances in preventive cardiology and lifestyle medicine: a themed series. *Circulation*. 2011 May 24;123(20):2274-83.
15. Mittag O. Outcomes of cardiac rehabilitation with versus without a

- follow-up intervention rendered by telephone (Luebeck follow-up trial): overall and gender-specific effects. *International Journal of Rehabilitation Research*. 2006;29(4):295–302.
16. Moore SM, Ruland CM, Pashkow FJ, Blackburn GG. Women's patterns of exercise following cardiac rehabilitation. *Nursing Research*. 1998;47(6):318–24.
  17. Brubaker PH, Rejeski WJ, Smith MJ, Sevensky KH, Lamb KA, Sotile WM, et al. A home-based maintenance exercise program after center-based cardiac rehabilitation: effects on blood lipids, body composition, and functional capacity. *Journal of Cardiopulmonary Rehabilitation*. 2001;(1):50–6.
  18. Maes S, Karoly P. Self-regulation assessment and intervention in physical health and illness: A review. *Applied Psychology*. 2005;54(2):267–99.
  19. Gollwitzer PM, Fujita K, Oettingen G. Handbook of self-regulation: Research, theory, and applications. In: Baumeister, Roy F; Vohs KD, editors. *Handbook of Self-Regulation: Research, Theory, and Applications*. New York: Guilford Press; 2004. p. 221–8.
  20. Baumeister RF, Vohs KD. The pursuit of meaningfulness in life. In: Snyder CR, Lopez SJ, editors. *Handbook of Positive Psychology*. Oxford University Press; 2002. p. 608–18.
  21. Bellg AJ. Maintenance of health behavior change in preventive cardiology - Internalization and self-regulation of new behaviors. *Behavior Modification*. 2003;27(1):103–31.
  22. Rothman AJ. Toward a theory-based analysis of behavioral maintenance. *Health Psychology*. 2000;19(1):64–9.
  23. Huisman SD, De Gucht V, Dusseldorp E, Maes S. The effect of weight reduction interventions for persons with type 2 diabetes: a meta-analysis from a self-regulation perspective. *The Diabetes Educator*. 2011;35(5):818–35.
  24. Wing RR, Tate DF, Gorin A a, Raynor H a, Fava JL. A self-regulation program for maintenance of weight loss. *The New England Journal of Medicine*. 2006 Oct 12;355(15):1563–71.
  25. Chase J-AD. Systematic review of physical activity intervention studies after cardiac rehabilitation. *The Journal of Cardiovascular Nursing*. 2011 Jan;26(5):351–8.
  26. Knittle K, Maes S, de Gucht V. Psychological interventions for rheumatoid arthritis: examining the role of self-regulation with a systematic review and meta-analysis of randomized controlled trials. *Arthritis Care & Research*. 2010 Oct;62(10):1460–72.
  27. Sniehotta FF, Fuhrmann B, Kiwus U, Scholz U, Schwarzer R, Vller H. Long-term effects of two psychological interventions on physical exercise and self-regulation following coronary rehabilitation. *Int J Behav Med*. 2005;12(4):244–55.
  28. Michie S, Abraham C, Whittington C, McAteer J, Gupta S. Effective techniques in healthy eating and physical activity interventions: a meta-regression. *Health Psychology*. 2009 Nov;28(6):690–701.
  29. Leventhal H, Leventhal EA, Contrada RJ. Self-regulation, health, and behavior: A perceptual-cognitive approach. *Psychology & Health*. 1998;13(4):717–33.
  30. Hagger MS, Orbell S. A meta-analytic review of the common-sense model of illness representations. *Psychology & Health*. 2003;18(2):141–84.
  31. Hall S, French DP, Marteau TM. Causal Attributions Following Serious Unexpected Negative Events: A Systematic Review. *Journal of Social and Clinical Psychology*. 2003;22(5):515–36.
  32. Grace SL, Krepotman S, Brooks

- D, Arthur H, Scholey P, Suskin N, et al. Illness perceptions among cardiac patients: relation to depressive symptomatology and sex. *Journal of Psychosomatic Research*. 2005;59(3):153–60.
33. Dickens C, McGowan L, Percival C, Tomenson B, Cotter L, Heagerty A, Creed F. Negative illness perceptions are associated with new-onset depression following myocardial infarction. *General Hospital Psychiatry*. 2008 Jan;30(5):414–20.
34. Stafford L, Berk M, Jackson HJ. Are illness perceptions about coronary artery disease predictive of depression and quality of life outcomes? *Journal of Psychosomatic Research*. 2009;66(3):211–220.
35. French DP, Lewin RJP, Watson N, Thompson DR. Do illness perceptions predict attendance at cardiac rehabilitation and quality of life following myocardial infarction? *Journal of Psychosomatic Research*. 2005 Nov;59(5):315–22.
36. Mayou R, Bryant B. Quality of life in cardiovascular disease. *British heart journal*. 1993 May;69(5):460–6.
37. Roebuck a, Furze G, Thompson DR. Health-related quality of life after myocardial infarction: an interview study. *Journal of advanced nursing*. 2001 Jun;34(6):787–94.
38. Worcester MUC, Murphy BM, Elliott PC, Le Grande MR, Higgins RO, Goble AJ, et al. Trajectories of recovery of quality of life in women after an acute cardiac event. *British journal of health psychology*. 2007 Feb;12(Pt 1):1–15.
39. Oldridge N, Guyatt G, Jones N, Crowe J, Singer J, Feeny D, et al. Effects on quality of life with comprehensive rehabilitation after acute myocardial infarction. *The American journal of cardiology*. 1991 May 15;67(13):1084–9.
40. Devcich DA, Ellis CJ, Gamble G, Petrie KJ. Psychological responses to cardiac diagnosis: Changes in illness representations immediately following coronary angiography. *Journal of Psychosomatic Research*. 2008;65(6):553–6.
41. The Vestfold Heartcare Study Group. Influence on lifestyle measures and five-year coronary risk by a comprehensive lifestyle intervention programme in patients with coronary heart disease. *Eur J Cardiovasc Prev Rehabil*. 2003;10(6):429–37.
42. Hofman-Bang C, Nygren A, Rydn L, Sundin O, Lisspers J, Nordlander R, et al. Two-year results of a controlled study of residential rehabilitation for patients treated with percutaneous transluminal coronary angioplasty. A randomized study of a multifactorial programme. *Eur Heart J*. 1999;20(20):1465–74.
43. Lear SA, Brozic A, Haydn Pritchard P, Kiess M, Ignaszewski A, Linden W, et al. The Extensive Lifestyle Management Intervention (ELMI) following cardiac rehabilitation trial. *Eur Heart J*. 2003;24(21):1920–7.
44. EUROASPIRE II Study Group. Lifestyle and risk factor management and use of drug therapies in coronary patients from 15 countries; principal results from EUROASPIRE II Euro Heart Survey Programme. *Eur Heart J*. 2001;22(7):554–72.
45. Kotseva K, Wood DA, De Bacquer D, Heidrich J, De Backer G. Cardiac rehabilitation for coronary patients: lifestyle, risk factor and therapeutic management. Results from the EUROASPIRE II survey. *Eur Heart J Supplements*. 2004;6(J):J17–26.
46. Kotseva K, Wood D, De Backer G, De Bacquer D, Pyörälä K, Keil U. EUROASPIRE

III: a survey on the lifestyle, risk factors and use of cardioprotective drug therapies in coronary patients from 22 European countries. *Eur J Cardiovasc Prev Rehabil.* 2009 Apr;16(2):121–37.

**47.** Siegert RJ, McPherson KM, Taylor WJ. Toward a cognitive-affective model of goal-setting in rehabilitation: is self-regulation theory a key step? *Disability and Rehabilitation.* 2004 Oct 21;26(20):1175–83.

**48.** Clark AM, MacIntyre PD, Cruickshank J. A critical realist approach to understanding and evaluating heart health programmes. *Health.* 2007 Oct;11(4):513–39.

**49.** Linden W. Psychological treatment of cardiac patients: a meta-analysis. *Eur Heart J.* 2007;28(24):2972–.

**50.** Clark AM. A realist study of the mechanisms of cardiac rehabilitation. *Journal of Advanced Nursing.* 2005;52(4):362–71.

**51.** Clark AM, Hartling L, Vandermeer B, Lissel SL, McAlister F. Secondary prevention programmes for coronary heart disease: a meta-regression showing the merits of shorter, generalist, primary care-based interventions. *Eur J Cardiovasc Prev Rehabil.* 2007 Aug;14(4):538–46.