Action planning and coping planning for long-term lifestyle change: Theory and assessment

FALKO F. SNIEHOTTA[1]*, RALF SCHWARZER[2], URTE SCHOLZ[2] AND BENJAMIN SCHÜZ[2]
[1]*University of Aberdeen, UK*
[2]*Freie Universität Berlin, Germany*

Abstract

Planning is regarded as highly valuable in the process of health behaviour change. It bridges the gap between behavioural intentions and health behaviour. To further develop this concept, a distinction is made between action planning and coping planning. The latter refers to the mental simulation of overcoming anticipated barriers to action. Action planning and coping planning for physical exercise were examined in a longitudinal study with 352 cardiac patients. They were approached during rehabilitation treatment and followed up at two and four months after discharge. Both planning cognitions were psychometrically identified, and it was found that they operated differently in the behavioural change process. Action plans were more influential early in the rehabilitation process, whereas coping plans were more instrumental later on. Participants with higher levels of coping planning after discharge were more likely to report higher levels of exercise four months after discharge. It is suggested to include both kinds of planning in interventions at different stages in health behaviour change.

Changes in lifestyle are a major goal in the rehabilitation of coronary heart disease (CHD). In 2001, almost half of all deaths in Germany were caused by diseases of the circulatory system Federal German Statistical Office, 2003). Systematic modification of behavioural CHD risk factors, such as sedentary lifestyle, cigarette smoking, and poor diet improve the prognosis (Krantz & Lundgren, 1998). Regular aerobic physical exercise is associated with lower mortality, lower relapse rates, and reduced symptoms (cf. Thompson et al., 2003). Nevertheless, these risk factors are difficult to change in CHD patients (Johnston, 1999). Psychological theories and constructs have been suggested to explain health behaviour change, among them the construct of behavioural intentions (Fishbein & Ajzen, 1980). Intentions comprise a person's motivation towards a goal in terms of direction and intensity and

*Correspondence to: Dr F. F. Sniehotta, School of Psychology, College of Life Sciences & Medicine, King's College, William Guild Building, University of Aberdeen, Aberdeen AB24 2UB, UK. E-mail: f.sniehotta@abdn.ac.uk

they are a necessary prerequisite for lifestyle changes (Sheeran, 2002). Social-cognitive models of behaviour propose that intentions are the most proximal and powerful predictor of subsequent behaviour (Ajzen, 1991; Conner & Armitage, 1998; Sheeran, 2002). However, good intentions do not necessarily guarantee corresponding actions. Intentions to change one's habitual lifestyle are seldom successful (Sutton, 1994). Moreover, the predictive power of behavioural intentions is rather modest (Johnston, Johnston, Pollard, Kinmonth, & Mant, 2004). Therefore, the concept of behavioural intentions alone is insufficient to understand lifestyle changes. There is a missing link in understanding health behaviour, a 'gap' between intentions and actions (Orbell & Sheeran, 1998). The present study contributes to the scientific debate surrounding the gap between intentions and action by proposing two distinct planning cognitions, namely action planning and coping planning. It aims to provide evidence for the usefulness of this distinction in understanding lifestyle changes.

The intention-behaviour gap is mainly due to individuals who form intentions, but subsequently fail to act on them (Orbell & Sheeran, 1998). This indicates that intention formulation and intention implementation are different processes. A theoretical distinction between a motivation phase, in which an individual forms an intention to adopt a precautionary action, and a volition phase, in which the aim is to implement an intention, provides a more comprehensive understanding of health behaviour change processes (Abraham, Sheeran, & Johnston, 1998; Heckhausen, 1991; Schwarzer, 1992). Understanding problems of action initiation and maintenance as well as identifying self-regulatory processes to solve them are the paramount tasks for volitional research.

Intentional behaviour requires self-regulation. Self-regulation refers to individuals' efforts to avoid spontaneous learned, habitual or innate responses to situational cues and to act in an intentional way. Self-regulation failure occurs particularly in situations, where personal resources are limited (e.g. stress or lack of attention), with particular social characteristics (e.g. going out with friends), or where strong habitual routines are involved (Baumeister, Heatherton, & Tice, 1994). If a person encounters risk situations and lacks the necessary resources, the danger of relapsing into habits is high.

Heckhausen (1991) distinguishes three main types of volitional problems: problems with action initiation, problems associated with overcoming obstacles to action implementation, and the need for persistent effort over time. Individuals who are absorbed in their everyday activities might lack the opportunities to get started and initiate goal-related actions. They may face a variety of problems or encounter a temporary lack of personal resources. Once action has been taken, goal pursuit needs to be protected from tempting distractions and competing goals. Persistence is required to reactivate intentions blocked by other concerns, when facilitating situations are re-encountered (e.g. Atkinson & Birch, 1970). In situ attempts to cope with volitional problems often fail. Individuals are susceptible to failure, when they encounter risk situations and lack the resources and means necessary to exploit available resources successfully, or make good decisions or avoid spontaneous unwanted responses. The effective strategies required to overcome such difficulties are unlikely to be developed in 'the heat' of such situations.

Planning is a prospective self-regulatory strategy, a mental simulation of linking concrete responses to future situations. Using this strategy, the ineffective, spontaneous reactions formed in-situ are replaced by pre-planned, details of action implementation and detailed strategies for coping with anticipated obstacles. Nevertheless, planning requires time and resources in order that premature and unrealistic plans are avoided.

Plans are subordinate to and serve the purpose of a specific intention. By planning, individuals form an active mental representation of the target situation. This representation makes situational target cues more easily accessible and critical situations more easily detectable (Gollwitzer, 1999). Consequently, planned responses can be performed immediately.

Planning can be further divided into two subconstructs: action planning and coping planning. *Action planning* (Leventhal, Singer, & Jones, 1965) can help initiate action by specifying when, where

and how to act and can be considered synonymous with implementation intentions (Gollwitzer, 1999). Furthermore, action planning can solve persistence problems because the underlying perceptual, attentional, and mnemonic mechanisms endure even if the execution of a behavioural intention has been postponed without conscious self-control. *Coping planning* (Sniehotta, Scholz, & Schwarzer, in press a) can help a person to overcome obstacles and to cope with difficulties by anticipating personal risk situations (i.e. situations that endanger the performance of intended behaviour) and planning coping responses in detail.

ACTION PLANNING

Action planning is the process of linking goal-directed behaviours to certain environmental cues by specifying when, where, and how to act. These cues can trigger the initiation of action without conscious intent. Engaging in planning enables individuals to make strategic use of environmental cues and act successfully without the requirement of investing self-regulatory resources (Gollwitzer, 1999). People who form action plans are more likely to act in the intended way (Gollwitzer & Brandstätter, 1997), and they initiate the goal behaviour faster (Orbell & Sheeran, 2000) than those who do not form action plans. The beneficial effects of action planning have been shown for different health-behaviour domains such as tetanus inoculation (Leventhal et al., 1965), cervical cancer screening (Sheeran & Orbell, 2000), breast self-examination (Luszczynska & Schwarzer, 2003), maintaining a healthy diet (Verplanken & Faes, 1999), and physical activity (Sniehotta, Scholz, & Schwarzer, in press b). Only a few studies (e.g. Luszczynska & Schwarzer, 2003) have investigated the effects of action planning over a period of more than a few weeks. Long-term effects of action planning leading to behavioural lifestyle changes are yet to be examined.

Action planning helps individuals in implementing their intentions. However, habitual responses, competing intentions, and actual demands (e.g. job-related deadlines) can interfere with the execution of action plans.

COPING PLANNING

Coping planning is a barrier-focused self-regulation strategy. It represents a mental link between anticipated risk situations and suitable coping responses. For example, 'If I wanted to go running, but I'm tired, I won't let myself sit down, but start running at once'. By predeciding 'how to best escape these unwanted influences on behavior' (Gollwitzer, 1999, p. 494), individuals can act on their intentions even in situations in which barriers and obstacles constrain intended actions or evoke contra-intentional behaviour. Coping planning can protect good intentions from distractions because a concrete coping procedure is at hand when the risk situation is entered.

In a study on exercise adherence, Simkin and Gross (1994) asked previously sedentary women who planned to take up a self-instructed training programme to report in detail how they would cope with ten common and difficult high-risk situations for exercise relapse, such as negative mood, lack of time, bad weather, fatigue or social situations. Women who reported fewer behavioural and cognitive coping strategies relapsed more often. Similar effects of planning can be found for distraction inhibition. Distraction-inhibiting plans (i.e. ignoring distractions) and task-facilitating plans (i.e. increasing effort on task in the face of distractions) to cope with distractions were successful in protecting participants

from these distractions and improved performance on the instructed task (Gollwitzer & Schaal, 1998; Patterson & Mischel, 1976)..

The anticipation of personal risk situations and the preparation of coping responses are essential parts of various classic techniques in cognitive behavioural therapy, such as prehearsal (Kanfer, 1979) or covert modelling (Cautela & Kearney, 1986). Likewise, similar approaches are used in cessation programmes for addictive behaviours (Marlatt, 1996). The anticipation of situations that provoke unwanted responses takes place within a controllable setting with sufficient resources, and coping strategies are prepared and learned by means of anticipatory or vicarious practice.

Coping planning in health self-regulation does not necessarily require professional consultation or expert advice. Individuals are the best experts of their own weaknesses and strengths once they experience themselves in the domain of interest. In an experimental study, we compared a standard care group of cardiac rehabilitation patients to an action planning group in which participants formed action plans for when, where and how to act, and a combined planning group, in which participants formed action plans jointly with coping plans consisting of anticipated risk situations and ways to master them. Participants who formed coping plans in addition to action plans showed the highest increase in levels of exercise and leisure time activities two months after discharge (Sniehotta et al., in press a). Coping planning and action planning are conceptualized as two separate constructs. Action planning is a task-facilitating strategy, while coping planning is mainly a distraction-inhibiting strategy. Although content and purpose of the planning constructs are different, it is assumed that the mediating perceptual, attentional (e.g. by facilitating the detection of situational cues) and mnemonic processes (e.g. by remembering the cues) are the same. For action planning, the modalities of action, in terms of when, where, and how, can easily be defined and the necessary knowledge can be provided by simple interventions (e.g. Leventhal et al., 1965). The modalities of coping planning such as knowledge about one's personal risk situations (i.e. habits, temptations, or distractions) that may hinder successful goal attainment are grounded in experience. Individuals are able to define and anticipate these personal risk situations and make efficient coping plans (Sniehotta et al., in press a). For efficient coping plans, however, experience is a prerequisite. Therefore, it is assumed that the predictive power of coping planning develops over time while the necessary experiences are being made. Thus, coping planning assessed at the beginning of a behaviour change process should be less predictive of behaviour change than coping planning assessed during the course of action.

The behavioural (or cognitive) response of a coping plan is not necessarily goal-related (e.g. reminding oneself of the severity of a disease to motivate oneself is not directly related to physical activity), but it should block the automatic initiation of unwanted responses and thus serve the purpose of the goal intention. Although action plans and coping plans are structurally similar, local or temporal aspects in the *environment* do not define the situational component of a coping plan. Rather, this situational component is conceptualized as subjective barriers or interactions between individuals and the environment (e.g. the tendency to react to environmental cues in an unwanted way).

PSYCHOLOGICAL ASSESSMENT OF PLANNING

Some authors have assessed planning in a dichotomous way, inquiring whether people had formed a plan or not (e.g. Orbell & Sheeran, 2000). It is assumed that a plan only works if a clear representation of a situation is accompanied by a clear representation of a response (Gollwitzer, 1999). Nevertheless, other authors successfully assessed planning as a continuous process (e.g. Jones, Abraham, Harris, Schulz, & Chrispin, 2001; Luszczynska & Schwarzer, 2003). The basic assumption behind this approach is that the degree of elaboration of planning cognitions can vary. Plans become more

concrete and elaborated with deliberation and experience over time. Someone may have already made precise plans to exercise in a gym, but has not yet decided when to go. It is therefore worthwhile to use scalar measures of planning. In addition, the use of scales allows for psychometric analyses and for the inclusion of continuous measures of planning in social cognitive models of behaviour (e.g. Jones et al., 2001).

AIM OF THE STUDY

The aim of the study is to apply a new instrument for the psychometric assessment of both action planning and coping planning to a sample of CHD rehabilitation in-patients and to examine these scales for reliability as well as for factorial and predictive validity. Changes in planning and intentions are examined over time.

HYPOTHESES

It is hypothesized that levels of planning increase during the weeks after discharge from rehabilitation due to the experience of with physical exercise. It is further hypothesized that this increase is higher in coping planning than in action planning, because participants experience barriers when trying to translate their exercise goals into action which, in turn, may lead to higher levels of coping planning. Finally, the study will examine whether action planning and coping planning predict physical exercise two and four months after discharge when the effects of intentions and previous exercise behaviour have been accounted for. Because planning, especially coping planning, reflects personal experience, its predictive power is assumed to be higher after discharge than before discharge.

METHOD

Participants and Procedure

A total of 484 CHD in-patients with the medical indication to adhere to strenuous physical exercise were recruited from three rehabilitation centres in Germany. To ensure anonymity each participant was given a personal code. This code was used to collate the three questionnaires. The first questionnaire was completed in the second week of a three- to four-week rehabilitation programme consisting of medical, psycho-educational and psychological treatments. Two follow-up questionnaires were sent two and four months after discharge with a prepaid return envelope. Three hundred fifty two participants completed all three questionnaires (72.7% of the total sample).

The mean age of participants in the initial sample was 58.5 years ($SD = 10$) with a range from 31 to 86 years; 382 (79%) of the participants were men. The majority of the participants were married or living with a partner (371 = 76.7%), 36 persons (7.4%) were single, 24 (5%) were widowed, and 44 (9.1%) divorced. Nine participants specified no marital status. Most of the participants reported a maximum of nine years of school education (167 = 34.5%); 102 participants (21.1%) had ten years, 115 (23.8%) 12 years, and 100 (20.7%) 13 years of schooling. Approximately half of the sample was currently employed (225; 46.5%).

Measures

Questionnaires contained several psychometric scales in addition to demographic information. All item examples given below were translated from German. Each item was scored on a 4-point scale from *completely disagree* (1), *disagree* (2), *agree* (3), to *totally agree* (4). For reliability coefficients, see Table 2.

The items measuring behavioural intentions, action planning, and coping planning are displayed in Table 1. For the assessment of physical exercise, the Kaiser Physical Activity Survey (Ainsworth, Sternfeld, Richardson, & Jackson, 2000) was adapted to the special characteristics of a cardiac patient sample. Five domains of recommended *physical exercise* were taken into consideration (a) vigorous exercise (e.g. swimming), (b) fitness activities (e.g. gymnastics), (c) game sports such as volleyball or tennis, (d) moderate exercise to train muscle strength, and (e) other prescribed exercises. At Time 1 participants were asked to indicate how often per week and how long per unit they engaged, on average, in each domain in the time period before their acute CHD event. For the follow-up measures they were asked how often per week and how long per unit they engaged, on average, in each domain during the previous four weeks. For each domain, the amount of exercise was computed by multiplying exercise days per week with minutes per exercise session. The five domains were added to form a sum score. Since the resulting distribution was positively skewed, a logarithmic transformation was conducted (cf. Bland & Altman, 1996).

RESULTS

To examine whether the longitudinal subsample was representative of the initial sample, Time 1 responses of participants who completed all three questionnaires ($n = 352$) were compared with those who did not ($n = 132$). No significant differences were found regarding age, sex, marital status, number of children, years of education and work status. Likewise, participants in the longitudinal subsample did not differ from those who filled out only the first questionnaire with regard to coping planning. However, there was a difference in behavioural intentions, $p < 0.01$, action planning, $p < 0.01$, and physical exercise, $p = 0.01$. Controlling for behavioural intentions, the differences between the longitudinal sample and the participants who did not complete all three questionnaires were no longer significant for action planning ($p = 0.11$) and for exercise ($p = 0.06$). Thus, the main difference was that participants in the longitudinal sample had higher behavioural intentions, $M = 3.44$, $SD = 0.53$, than those who had not completed all three questionnaires, $M = 3.29$, $SD = 0.58$.

A principal component analysis (PCA) with varimax rotation was conducted to examine the factorial structure of the intention and planning items. Three factors were extracted (Eigenvalue distribution: 7.19; 2.02; 1.36; 0.76, etc.). The rotated factor solution is displayed in Table 1.

The resulting factor loadings correspond to the theoretical assumptions. The six items for behavioural intentions had their highest loadings on Factor 1, ranging from 0.61 to 0.79, with little or medium second loadings on the other factors. The PCA clearly separated the items for action planning (Factor 2) and coping planning (Factor 3). Planning items 1–4 had high loadings (0.78–0.85) on Factor 2 whereas the planning items 6–10 loaded highly (0.76–0.84) on Factor 3. With the exception of planning, Item 5, all second loadings in the matrix were 0.30 or below. A confirmatory factor analysis with nested-model comparisons using AMOS 4 (Arbuckle & Wothke, 1999) was conducted to compare a three-factorial solution (Model 1) to a combined action planning and coping planning factor plus a separate factor for intentions (Model 2) and to a model with only one combined planning and intentions factor (Model 3) using maximum likelihood estimation. The χ^2-difference

Table 1. Rotated component matrix of intention and planning items based on PCA with varimax rotation

	Component		
	1	2	3
I intend to...			
Int. 1: ...exercise several times a week	**0.69**	0.28	0.15
Int. 2: ...work up a sweat regularly	**0.61**	0.14	0.15
Int. 3: ...exercise regularly	**0.72**	0.22	0.03
Int. 4: ...be physically active regularly for a minimum of 30 minutes at least three times a week	**0.73**	0.11	0.22
Int. 5: ...to increase my leisure time activity	**0.79**	0.15	0.07
Int. 6: ...to adhere to the exercise regime prescribed to me during the rehabilitation	**0.67**	0.11	0.21
I have made a detailed plan regarding...			
Plan 1: ...when to exercise	0.21	**0.78**	0.30
Plan 2: ...where to exercise	0.24	**0.85**	0.26
Plan 3: ...how to exercise	0.25	**0.84**	0.24
Plan 4: ...how often to exercise	0.23	**0.81**	0.26
Plan 5: ...with whom to exercise*	0.15	0.54	0.41
Plan 6: ...what to do if something interferes with my plans	0.16	0.28	**0.78**
Plan 7: ...how to cope with possible setbacks	0.18	0.25	**0.81**
Plan 8: ...what to do in difficult situations in order to act according to my intentions	0.16	0.26	**0.84**
Plan 9: ...which good opportunities for action to take	0.18	0.25	**0.76**
Plan 10: ...when I have to pay extra attention to prevent lapses	0.14	0.18	**0.79**

Note: Loadings > 0.60 are in bold face, *excluded from further analysis.

tests were highly significant for both comparisons, indicating that the three-factorial model was the best representation of the data ($\Delta\chi^2 = 50.89$, df = 1, $p < 0.001$ for the difference between Model 1 and Model 2 and $\Delta\chi^2 = 246.12$, df = 3, $p < 0.001$ for the difference between Model 1 and Model 3. The three-factorial model fitted the data satisfactorily with $\chi^2 = 267.52$ (df = 87), NFI = 0.94, TLI = 0.96, and RMSEA = 0.06. Based on this analysis, three scales were computed, namely, intentions (Int1–Int6), action planning (plan1–plan4), and coping planning (plan6–plan10). The planning item 5 did not load exclusively on any of the three factors and was, therefore, excluded from further analyses.

Table 2 presents alpha coefficients and the time-lagged correlations between intentions, action planning, coping planning, and physical exercise. The internal consistencies for all scales were high ranging from $\alpha = 0.82$ to $\alpha = 0.88$ for intentions, $\alpha = 0.92$ to $\alpha = 0.95$ for action planning and $\alpha = 0.90$ to $\alpha = 0.91$ for coping planning. The retest reliability for all scales was higher from Time 2 to Time 3 than from Time 1 to Time 2, reflecting the fact that participants were in an ongoing treatment programme at Time 1.

Exercise was positively correlated with intentions, action planning and coping planning at all three time points (see Table 2). Intentions, action planning and coping planning were highly intercorrelated at each time point. Action planning highly correlationed with, intentions and coping planning, while the latter showed slightly lower correlations.

The mean values and standard deviations for all variables at all measurement points are shown in Table 3. Since the scales range from 1–4, participants can be regarded as being highly motivated. They also reported high levels of action planning; the levels of coping planning were somewhat lower. The raw scores for physical exercise showed high standard deviations indicating the heterogeneity of the sample in terms of activity.

Table 2. Correlations and Cronbach's alphas for intentions, action planning, coping planning, and physical exercise at three measurement points in time

	2	3	4	5	6	7	8	9	10	11	12
Time 1											
1. Intentions $\alpha = 0.82$	0.52**	0.42**	0.25**	0.56**	0.31**	0.29**	0.26**	0.55**	0.37**	0.33**	0.25**
2. Action planning $\alpha = 0.92$		0.58**	0.25**	0.43**	0.34**	0.26**	0.19**	0.41**	0.35**	0.32**	0.24**
3. Coping planning $\alpha = 0.90$			0.30**	0.33**	0.21**	0.34**	0.16**	0.31**	0.23**	0.38**	0.19**
4. Physical exercise				0.20**	0.10*	0.03	0.24**	0.22**	0.16**	0.16**	0.35**
Time 2											
5. Intentions $\alpha = 0.84$					0.52**	0.42**	0.34**	0.72**	0.49**	0.42**	0.33**
6. Action planning $\alpha = 0.95$						0.66**	0.27**	0.46**	0.55**	0.49**	0.27**
7. Coping planning $\alpha = 0.91$							0.16**	0.41**	0.42**	0.56**	0.30**
8. Physical exercise								0.33**	0.31**	27**	0.39**
Time 3											
9. Intentions $\alpha = 0.88$									0.63**	0.55**	0.40**
10. Action planning $\alpha = 0.94$										0.63**	0.36**
11. Coping planning $\alpha = 0.91$											0.31**
12. Physical exercise											

Note: $*p < 0.05$; $**p < 0.01$.

Repeated measures analyses of variance (ANOVAs) revealed significant changes in intentions, coping planning, and physical exercise between the first assessment, taken during the rehabilitation treatment, and the follow-up measures taken two and four months after discharge. Participants reported engaging in more physical exercise at at both follow-ups than prior to their acute coronary event. Intentions decreased and coping planning increased over the three time points. Action planning increased over time, but this change did not reach statistical significance. The change in coping planning was stronger than the change in action planning and intentions. The change in coping planning primarily took place between the first assessment and two months after discharge.

To examine the predictive power of intentions and planning for changes in physical exercise, hierarchical linear regression analyses were conducted. In the first step, baseline measures of physical exercise and age were entered into the equation. In a second step, behavioural intentions were added. In step 3, action planning, and in step 4, coping planning completed the final model. Table 4 shows the regression of Time 2 physical exercise on Time 1 past exercise, age, intentions, action planning, and coping planning.

The model accounted for 12% of the variance in exercise two months after discharge. While the inclusion of intentions to the model led to a significant R^2 change, the inclusion of both kinds of planning, assessed during rehabilitation, did not add incremental explanatory power to the model. In the final model, past exercise was the best predictor of Time 2 exercise. Age and intentions contributed significantly to the prediction.

Table 3. Mean levels (and standard deviations) for intentions, action planning, and coping planning (Time 1 to Time 3)

	Time 1	Time 2	Time 3	F	df	p	eta^2
Intentions	3.44 (0.53)	3.40 (0.57)	3.29 (0.65)	13.53	2, 350	<0.001	0.07
Action planning	3.13 (0.93)	3.24 (0.88)	3.23 (0.85)	2.34	2, 350	<0.10	0.01
Coping planning	2.50 (0.93)	2.78 (0.89)	2.80 (0.86)	17.87	2, 350	<0.001	0.09
Physical exercise (min/week)	98.11 (221)	157.42 (162)	163.54 (181)	25.41	2, 351	<0.001	0.29

Note: For illustration purposes, the untransformed values in minutes per week are reported in this table. (F values and eta^2 from repeated measures ANOVAs.)

Table 4. Hierarchical linear regression of physical exercise at Time 2 onto age and Time 1 measures of physical exercise, intentions, action planning, and coping planning

Step	Time 1 predictors	Beta 1	Beta 2	Beta 3	Beta 4
1	Age	−0.18**	−0.17**	−0.17**	−0.18**
	Physical exercise	0.22**	0.17**	0.16**	0.16**
2	Intentions		0.20**	0.17**	0.17**
3	Action planning			0.06	0.04
4	Coping planning				0.04
R^2 change		0.09**	0.04**	0.00	0.00

Note: $^{**}p < 0.01$; adjusted $R^2 = 0.12$.

Table 5. Hierarchical linear regression of physical exercise at Time 3 onto age and Time 2 measures of physical exercise, intentions, action planning, and coping planning

Step	Predictors	Beta 1	Beta 2	Beta 3	Beta 4
1	Age	−0.05	−0.04	−0.03	−0.04
	Physical exercise	0.38**	0.30**	0.29**	0.30**
2	Intentions		0.22**	0.18**	0.15**
3	Action planning			0.10	−0.02
4	Coping planning				0.20**
R^2 change		0.15**	0.04**	0.01*	0.02*

Note: $^{*}p < 0.05$; $^{**}p < 0.01$; adjusted $R^2 = 0.22$.

Table 5 presents a similar analysis as Table 4, but here Time 3 exercise was regressed on age, and Time 2 measures of exercise, intentions, action planning, and coping planning, measured after the participants had completed their rehabilitation treatment programme and spent two months back home.

The predictors in this model jointly accounted for 22% of the exercise variance at Time 3. As in the previous analysis, intentions at Time 2 predicted Time 3 exercise over and above the concurrently assessed Time 2 exercise. The subsequent addition of Time 2 action planning and coping planning enhanced the predictive power of the model at both steps. They explained variance in Time 3 physical exercise over and above the measures of age, Time 2 exercise, and Time 2 intentions. In the final model, coping planning was the strongest unique predictor of changes in exercise.

DISCUSSION

This study aimed to test conceptually independent measures of action planning and coping planning for their predictive power in explaining changes in physical exercise of patients with CHD. PCA and confirmatory factor analysis provided strong evidence for the theoretical claim that action planning and coping planning can be construed as distinct strategies, as well as for the factorial validity of the scales. The item 'I have planned precisely with whom to exercise' was excluded from further analyses because it showed substantial loadings on both planning factors. In the case of physical exercise, planning with whom to act can be seen as an action plan when a partner is essential for the performance of the target behaviour (e.g. playing tennis). On the other hand, it can be part of a coping plan because exercising with a partner can help to overcome barriers for acting.

In the present study, action planning showed incremental predictive validity for changes in exercise over and above behavioural intentions, when it was measured after discharge. It had no effects at all, when intentions and coping planning were controlled for. This is only partly in line with our hypotheses, however, the beneficial role of action planning in taking up new behaviours has been demonstrated in different studies (cf. Gollwitzer, 1999), although few have addressed repeated habitual behavioural patterns such as maintaining a healthy diet (Verplanken & Faes, 1999). Previous studies on action planning have predominantly examined short-term effects of up to two weeks and we assume that action planning is more important at an earlier stage of behaviour change. Action planning promotes initiation of action because it provides instrumental acts and links them to situational cues in the individual's environment. After two and four months however, many of these plans may have become routine (Sutton, 1994). Under such circumstances coping planning is required to protect these routines from distractions.

It was argued that planning, especially coping planning, was grounded on personal knowledge and experience. The predictive power of coping planning should, therefore, be revealed after the participants have had experience with their intended lifestyle change in their familiar surroundings. It is within the home environment that new obstacles, difficulties and problems emerge, which challenge the quality or suitability of the patients' previous plans. This may result in the anticipated risk situations becoming more realistic and the self-evaluation of one's plans more valid. Consequently, the most compelling changes were found in coping planning; the predominant increase in coping planning occurred between Time 1 and Time 2.

Due to the changes in planning observed between rehabilitation and the first weeks at home, Time 1 measures of action and coping planning had little or no predictive power to account for individual differences in exercise levels at Time 2 or Time 3. Without experience, coping planning is not a good predictor of behaviour change as indicated by the regression on Time 1 measures. However, once individuals gained experience with the intended behaviour, as the participants in this study did between discharge and Time 2, the predictive power of coping planning for lifestyle changes increased. Coping planning emerged as the strongest predictor of behavioural change when assessed following discharge.

Successful changes in habitual lifestyle behaviours are difficult to achieve. Especially in patients with severe chronic diseases, theoretical insights that allow for simple and cost-effective interventions are sought. In the present study, participants endorsed the intention items more than the coping planning statements, as indicated by the mean scores (see Table 3). Furthermore, coping planning increased strongly from rehabilitation to the two-month follow-up. Thus, treatments that aim to facilitate changes in habitual behaviours should address action planning and coping planning as proactive self-regulation strategies. The high scores on action planning point to the possibility that the rehabilitation treatment already promotes action planning, but there might be an additional need to foster coping planning during and after rehabilitation.

There are some possible limitations concerning the generalization of the present findings. Dropout analyses have shown that participants in the final longitudinal sample reported slightly higher behavioural intentions than those in the attrition sample. Nevertheless, the reported intentions of both groups were very high. It can therefore be assumed that the sample was highly motivated in general. The focus of this research addressed volitional processes that can bridge the gap between intention and action by translating intentions into behaviour. Therefore, small differences in the initial motivation may be less important.

Future research should study the differential effects of planning and intention, in different samples, at different stages of lifestyle change. Since planning has been described as a post-intentional process, it should be much less influential in a contemplation stage, where people have not yet formed an explicit intention to engage in healthy behaviours. Beneficial effects of planning can only be assumed

for individuals who have formed an intention. Thus, intentions should moderate the role of planning. In the present study no such moderator effects were found because the proportion of 'non-intenders' was very low. Moreover, moderator effects are usually hard to detect in such studies (McClelland & Judd, 1993).

The present findings support the conclusion that planning is a powerful self-regulatory tool that can help to translate goals into behaviour. The distinction between action planning and coping planning not only provides a clearer understanding of self-regulation mechanisms, but also opens an agenda for the design of cost-effective psychological interventions.

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