CHAPTER 2

A systematic review of randomized controlled trials on the effectiveness of computer-tailored physical activity and dietary behavior promotion programs: an update

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Background
Since the first systematic review of randomized controlled trials (RCTs) on the effectiveness of computer-tailored physical activity (PA) and dietary behavior promotion programs was performed in 2006, additional studies have been published, thus necessitating an update.

Purpose
To summarize the latest evidence on the effectiveness of computer-tailored PA and nutrition education programs, and to compare the results to the 2006 review.

Methods
Databases were searched for RCTs evaluating computer-tailored PA and nutrition education aimed at primary prevention in adults, published from September 2004 through June 2011.

Results
Fifty publications were identified. Compared to the findings in 2006, a larger proportion of studies found positive effects for computer-tailored programs compared to generic or no information, including those for PA promotion. The positive results were generally for short- or medium-term follow-up and effect sizes were small). There were also more studies with long-term follow-up, particularly on dietary behavior. Objective outcome indicators were most often used in PA studies.

Conclusions
The results of the 2006 review were confirmed and reinforced. Future interventions should focus on establishing larger effect sizes and sustained effects, and should use more objective measurements in studies on dietary behavior, use more generic health education control groups, and include longer follow-up.

INTRODUCTION

The potential impact of physical activity (PA) and healthy dietary habits on the prevention of a range of chronic conditions is substantial. [1,2] Effective PA and dietary promotion interventions are needed. Successful intervention strategies and techniques to motivate and guide people to adopt healthy choices need to be identified. Over the last decades, computer tailoring has proven to be an innovative and promising health education technique. [3-12] A computer-tailored intervention mimics interpersonal counseling using a computerized process, but, unlike interpersonal counseling, it can be widely distributed through interactive media channels at a relatively low cost. Computer tailoring allows for individualized feedback and advice on personal behavior, personal motivation, outcome expectations, self-efficacy, social and physical environmental opportunities, and other behavioral determinants.

In recent years, a number of systematic reviews and meta-analyses have been published on the effectiveness of computer-tailored health education covering a range of behaviors. [5,9,10,13-15] The effects of tailoring may, however, be behavior-specific. It has been argued that computer tailoring may be especially promising for complex health behaviors, such as PA and dietary behaviors. [16] Examples of complex health behaviors are gaining increased awareness of personal behavioral patterns, comparing one's own behaviors with recommendations, and setting and monitoring progress towards behavior change goals. The first systematic review that explicitly focused on the effectiveness of computer-tailored health education on PA and dietary behaviors was published in 2006 and included intervention studies published up to September 2004. [3] In concordance with other more narrative reviews on computer-tailored health education [16,17], the authors concluded that computer tailoring was promising, especially for dietary behaviors, although the effect sizes were small. The authors made key recommendations for improving research on computer tailoring, i.e., using objective outcome measures instead of self-report or using generic health education (HE) comparison groups instead of or in addition to no-intervention control groups. The latter would allow more precise evaluation of the effects of tailoring health education interventions. Finally, it was concluded that longer follow-up was needed to assess the sustained effects in all studies.

Since many original studies have been published since 2004, a review update is needed to document evidence regarding the effectiveness of computer-tailored PA and nutrition education programs. Furthermore, responding to recommendations made in 2006, comparing effects and specific study and intervention characteristics over time is additive to other systematic reviews and meta- analyses. This review update aims to: 1) review the evidence on computer-tailored PA and nutrition education from studies published since September 2004, 2) compare the evidence from this review update to that derived from the

original review regarding intervention characteristics, study characteristics and effects, and 3) provide updated recommendations for further research and practice.

METHODS

This paper reports on a second systematic review conducted using the study protocol of the original 2006 review. This protocol was based on guidelines extracted from the Cochrane Reviewers' Handbook. [18]

Search strategy and data sources

For the original review, intervention studies published from 1965 to September 2004 were identified through a structured computerized search of PubMed, PsychInfo and Web of Science. For this update, a nearly identical search was conducted from September 2004 to June 2011. The review differed from 2006 as we added the search engines' most recent thesaurus terms, resulting in the following search terms for nutrition: ((nutrition OR feeding OR food OR diet OR dietary OR intake OR nutritional status OR feeding behavi* OR food consumption) AND (education OR behavior OR behavio* OR education)) AND (tailored OR tailoring OR tailor* OR expert system) and for PA: (exercise OR motor activity OR sports OR leisure activities OR (physical* AND active) OR (physical* AND activity) OR (physical* AND activities) OR exercis* OR walking OR cycling OR sport* OR leisure activit* AND (education OR behavior OR behavio* OR education) AND (tailored OR tailoring OR tailor* OR expert system). No limitations for age or study design were added.

Selection of studies

Just as in the original 2006 review, new studies had to examine a computer-tailored intervention aimed at promoting healthy PA or dietary behaviors for primary prevention of chronic diseases in apparently healthy adults. Evaluation studies that used an RCT were included. Tailoring was defined by Kreuter (1999) as "the intention to reach one specific person, based on characteristics that are unique to that person, are related to the outcome of interest, and have been derived from an individual assessment". [19] Interventions were considered to be computer-tailored if the tailored advice was generated through a computerized process. RCTs were included if: 1) published in a peer reviewed scientific journal, 2) published in English, and 3) conducted in an adult sample (18+ years). Studies were excluded if the tailored intervention was part of a larger intervention program that made it impossible to isolate the effect of tailoring components from the other intervention components.

Data extraction

Detailed information was extracted only from new studies that met the aforementioned inclusion criteria. Two reviewers independently summarized the new studies for content and methods. The following intervention characteristics were extracted: theories used for intervention development, variables used to

tailor the computer-tailored information, the 'tool' that was used to provide individual feedback, frequency of tailored feedback, and additional health-education activities. Extracted study characteristics were: the country where the study was conducted, size and source of the study population, eligibility criteria, intervention modes, and primary outcome measures. Results from single and multiple post-test measurements were extracted. The outcomes included all PA and dietary behavior measures. To interpret and compare results from the studies that used differing measures to assess PA and dietary outcomes, effect sizes (ESs) were calculated if significant effects were found (provided the data were available). The effect size, Cohen's ES, was calculated by dividing the difference between two means at follow-up by their pooled standard deviation. [20,21] Cut-off points for ESs were 0.2-0.5 for small ES, 0.5-0.8 for moderate ES and >0.8 for large ES. [22] The findings were summarized per behavioral outcome (PA, fat intake, fruit and vegetable consumption and other dietary behaviors) and separately for short- (<3 months), medium- (3-6 months), and long-term (>6 months) follow-up.

Apart from reporting the results found in the current review, we compared these with the results of the original 2006 review. In order to check whether recommendations from the original review were met, we compared intervention and study characteristics of the present review with the original one. Frequencies on the number of studies that found significant effects, as well as the number of studies that used objective outcome measures, various types of comparison groups (generic HE versus no-intervention control groups) and long-term follow up, as well as delivery mode (printed versus electronically) are listed in Table 2, linked to the original or current review.

RESULTS

Study selection

The initial cross-database search resulted in 2590 publications. After eliminating duplicates, 1562 remained. Titles and abstracts were reviewed for eligibility criteria, resulting in 141 publications that were fully considered. Fifty publications were finally included: 29 studies on PA and 34 on dietary behaviors, 21 on fat consumption, 18 on fruit and vegetable consumption and 14 on other dietary topics. Other dietary topics included: energy/carbohydrates intake, the consumption of sugar, dairy, fiber, whole-grain, and body fat, as well as weight and waist circumference. Thirteen studies in the current review evaluated interventions that targeted both PA and diet. Some publications reported on the characteristics and effects of one intervention using various follow-up measurements (e.g. short- and long-term effects) [23-28], effects in a variety of study samples [29-32], effects on other types of outcomes (e.g. fruit intake and variety of fruit intake) [34-37], or the effects of various doses of the intervention (e.g. delivered at once or at multiple time points). [38,39] As a consequence, this review update reports on the characteristics and effects of 25 interventions targeted at PA, 27 interventions targeted at dietary behavior, and 10 interventions for both behaviors. Of

the 27 interventions on dietary behavior, 17 were directed at fat reduction, 14 at increasing fruit and vegetable intake, and 12 at other dietary behaviors. The main reasons for exclusion were: the age of the study population was not in the required range, lack of RCT design, no focus on primary prevention, absence of behavioral outcomes, or the computer tailoring was part of a multi-component intervention that made it impossible to isolate the effect of tailoring.

Intervention characteristics

Characteristics of the interventions from studies in the current review are summarized in appendix 1. Both PA and nutrition education interventions were predominantly guided by the Trans Theoretical Model and Social Cognitive Theory. Most interventions (81% of PA, 84% of nutrition) provided tailored feedback on self-reported behavior. Two interventions (4%) also provided feedback based on more objective data obtained from pedometers [40] or accelerometers. [41] Most interventions (92% of PA, 68% of nutrition) were tailored on presumed behavioral determinants such as intention, motivation and stage of change, as well as self-efficacy and skills. Regarding nutrition education interventions, equal numbers of interventions provided print-delivered and electronically tailored feedback; however, the majority of PA interventions used electronic feedback formats (see also Table 2). Some interventions using electronic feedback had additional online discussion/message boards [42-44] (6% of all interventions) or an e-buddy system (2% of all interventions). [23,44] Electronic feedback was given on-screen (41% of all interventions), by email reports (10%), CD-ROM (4%) or by mobile phone(2%). Approximately one third of the interventions provided additional information such as booklets or information sheets. One intervention included weekly home visits. [45,46] Less than half of the interventions provided tailored feedback more than once for dietary behaviors (48%) and 65% did so for PA.

Appendix 1: Intervention characteristics

See end of chapter.

Study characteristics

The characteristics and effects for studies in the current review are shown in Table 1. The majority of studies were conducted in the US, followed by the Netherlands and Belgium, the UK, and several other countries. Studies in the US predominantly assessed PA with the validated 7-day PA Recall (PAR) [47-50]; this was the most commonly used tool. The next most common tool was the validated Short QUestionnaire ASsessing Health-enhancing PA (SQUASH) [51] predominantly used by Dutch researchers. The International PA Questionnaire (IPAQ) [52,53] was the third most commonly used assessment tool. Six studies (21%) included objective assessments of PA, i.e. pedometer, actigraph or accelerometer. Five studies (17%) measured aerobic fitness by either a (1 mile) walking test [54,55], the Chester step test [56] or the submaximal exercise

treadmill test. [57]

Fat reduction was most often assessed using food frequency questionnaires. In the US, the Block questionnaire was used most frequently [58] and in the Netherlands, a questionnaire developed by Van Assema et al. [59] Two studies obtained data from either an electronic scanner [60] or shopping receipts [40] in a supermarket setting. Data on fruit and vegetable consumption was obtained from questionnaires (the Block questionnaire in the majority of studies); one study also used shopping receipts. [40] Studies that included measures of weight or BMI either used self-report [44,61] or measured. [25,29,30,40,62,63] Fiber, grain, energy or added sugars intakes were assessed by food frequency questionnaires. [64,65]

Table 1: Study characteristics and effects found in the studies included in the review.
See end of chapter.

Effects on physical activity (section A, Table 1)

Of the 29 studies on PA, 20 (69%) showed significant differences in favor of the computer-tailored intervention. Five studies looked at short-term effects [42,43,75-77], of which four found significant effects for the tailored intervention [42,43,75,76] with small effect sizes, compared to no intervention. In one study, this applied to participants who did not comply to the PA guidelines at baseline. [76] Of the 17 studies with medium-term follow-up periods, 12 found significant effects with small effect sizes: six compared to no intervention [23,42,67,78-80], five compared to generic HE [25,38,39,81,82] and one compared to a health risk assessment. [61] Studies that investigated two computer-tailoring techniques [23,61,78,82] found significant effects for both tailoring conditions. Six of the 13 studies with long-term follow-up found significant effects of the tailored intervention. [24,26,38,40,80,82] Effect sizes were small except for one study that reported medium effect size for one of the two computer-tailored interventions investigated. [82] Of the eight studies that assessed effects at various follow-up periods, four studies reported no effects at either short-, medium- or long-term [36,41,77,83], six studies reported sustained effects over time[23,24,26,40,42,80,82] and one study reported no effect at short-term but a significant effect at medium-term. [67]

Effects on fat consumption (section B, Table 1)

Of the 21 studies on fat consumption, 17 (81%) showed significant differences in favor of the computer-tailored intervention. Six studies tested short-term effects, and reported significant effects of tailoring compared to no intervention [42,76,84,85], or generic HE [86,87] with small effect sizes. Two of those studies (also) targeted an at-risk population. [76,86] At medium-term, all eight studies found significant

effects compared to no intervention [42,33,84], or generic HE. [33,39,86-88] One of those studies targeted a low-income ethnically diverse population [88] and a second study also found a significant effect among risk consumers (i.e. people with fat intake levels higher than recommended at baseline). [86] Ten studies tested the long-term effects of an intervention and five found significant effects for tailoring compared to no intervention [31,32,84] or generic HE [25,38] with small effect sizes. Two of the ten studies (also) targeted high-risk populations [31,32], and another study targeted women aged 50-69 years. [25] Multiple measurements in time were reported for seven studies, of which five studies reported sustained significant effects [26,42,84,86,87], one study reported a significant effect at short-term [45] that was not sustained in the long-term [46] and one study reported no effects at both medium- and long-term time periods. [37]

Effects on fruit and vegetable consumption (section C, Table 1)

Of the 18 studies on fruit and vegetable consumption, 15 (83%) showed significant differences in favor of the computer-tailored intervention. Two of these studies measured the short-term effects of a computer-tailored intervention, and both found significant effects compared to no intervention [42,85] with small effect sizes in a general population. Six studies measured medium-term effects, of which five found significant effects compared to no intervention [35,42,80] or generic HE [39,88] with small effect sizes. One study investigated the effects of two intervention conditions (either delivered in one or four installments) compared to generic HE and measured the effects of retailored feedback. [88] The latter measured the effect of retailored feedback provided in four installments. Eight of the twelve studies that tested the long-term effects of an intervention found significant effects for tailoring interventions compared to no intervention [34,40,89,80] or generic HE. [25,38,90,91] The eight studies found small effect sizes, except for one that had targeted church members, which found a large effect size over the long-term. [34] Two studies with effective long-term interventions targeted populations who were over 50 years of age. [25,63] Heimendinger and colleagues found a significant effect of (re)tailored advice when spread across four booklets, as opposed to no effect when the advice was delivered in a single booklet. [91] Nine studies reported multiple measurements in time, and seven of these reported sustained effects. [26,35,38,40,42,80,88] One of the nine studies reported no medium-term effect but a significant long-term effect [89], and one study reported no medium- or long-term effect. [37]

Effects on other diet-related behaviors (section D, Table 1)

Of the 14 studies on other dietary behaviors, eight (57%) showed significant differences in favor of the computer-tailored intervention. Four interventions for weight loss found significant effects including: one short-, medium- and long-term[30], one medium- and long-term [44], and two long-term only. [40,62] Effect sizes were small [40,62], medium [30], or large. [44] Of the three interventions on energy intake, one

reported a significant short- and medium-term effect. [86] The corresponding effect size was small for the general study population and medium among risk consumers in the short-term. In addition, at medium-term, only the effect of print-based advice (as opposed to delivery through CD-ROM) was of significance in the general population with a small effect size. Both studies considering fiber consumption found significant short-, medium-term effects [84], and long-term effects [40] with small effect sizes. The intervention on grain intake showed no significant effect, nor did an intervention aimed at reducing added sugar. No significant effect was observed for the intervention to change dairy consumption. [92]

A comparison between the present update and the original 2006 review

The present review, included 50 publications over just under seven years, while the original review in 2006 included 30 publications over 13 years, showing an apparent increase in studies on PA and tailored nutrition education. This increase was most obvious for PA (29 studies in the present review, 11 in the original review).

Since 2004, the number of computer-tailored interventions electronically delivered has increased, particularly in PA studies (see Table 2). New delivery modes, such as mobile phone and CD-ROM were introduced since 2004. Similar to the original review, in the majority of studies included in the present update, a no-intervention control group was included without a generic HE comparison group. Most studies continue to lack objective assessments of effects of nutrition interventions, but PA intervention studies often used objective assessments for behavior changes. As recommended in the original 2006 review, more nutrition intervention studies included long-term follow-up.

In this update, the majority of studies reported significant effects of computer-tailoring, both for dietary and PA behavior (the largest increase). However, effects sizes remained small in general for dietary as well as PA behavior.

Table 2: Study characteristics and effects of studies from the original (<2004) and updated review (>2004) compared

See end of chapter.

DISCUSSION

The present review update confirms and further strengthens the evidence that computer-tailored PA and nutrition education is likely to be effective [5,9,10,14,15,93], although effect sizes related to tailored PA and nutrition education interventions are likely to be small. The evidence for long-term effects of computer-tailoring remains inconclusive.

The present review is an update of a 2006 review of the literature published up to September 2004. A number of differences in the results of the original and updated review are noteworthy. First, both for PA and dietary behavior, the number of published studies has increased substantially. In addition, a larger proportion of published studies reported favorable effects of tailored interventions in the update period than in the original review. Evidence on the efficacy of computer-tailored education is now also apparent for PA promotion. Second, the use of objective outcome measurement instruments increased in studies on PA education, but not for nutrition education studies. Third, overall there was no increase in comparisons of interventions with generic HE since 2004. Fourth, remarkably more studies with long-term follow-up were performed in the past years, particularly on nutrition education. Finally, the electronic delivery of feedback increased, particularly in studies on PA promotion; discussion boards/forums were frequently added to interventions.

The observed differences over time for the use of objective outcome measurements and various types of control groups, follow-up periods and delivery modes require more attention. Since 2004, a larger number of objective measures have been included in tailoring studies, especially regarding PA education. In this field, accelerometers and pedometers have grown in popularity, due to increased usability and feasibility. [94] In the field of nutrition, no such development was seen. The objective measurement of dietary intake can be achieved by monitoring biologic dietary indicators, such as serum cholesterol and serum carotenoids. [95] However, the assessment of biologic indicators is relatively expensive and these indicators are subject to genetic differences. Alternatively, two studies used shopping receipts and electronic shop scanners as objective indicators of food purchases. [40,60] In addition, anthropometrics and waist circumference were the most frequent objective indicators.

The fact that the evidence in favor of computer-tailored PA and nutrition education is now stronger than based on the studies published up to 2004 is promising and important. However, the most evidence comes from studies that compared tailored interventions to no-intervention control groups. Thus, these studies could not assess the effects of tailoring compared to non-tailored interventions. Significant effects were most often found in studies with a no-intervention control group. These findings do not different from the results of the original review or other comparable reviews. [3,6-8,14] Therefore, the evidence is stronger for a comparison between tailored interventions and with no intervention than with generic HE. However, this is probably because of the larger number of studies that included a no-intervention control group. If generic HE control groups were included in a study, the evidence was quite consistently in favor of tailoring. If this review had been restricted only to comparisons between tailored interventions with generic HE comparison groups, it would have focused specifically on the additional effects of tailoring in health education.

Nevertheless, we believe that the comparison with no intervention control conditions is also important, because it shows that tailored interventions are likely to be effective—because of the tailoring or other factors—and that is important information for health education practice. In addition, further exploration of the effectiveness of computer-tailored interventions compared to other control conditions, such as theory-based or personalized interventions, would be valuable to verify whether individually-tailored education is better than theory-based and/or personalized education.

For PA and nutrition interventions to have an effect on health, the effects should be sustained over long periods of time. [97] The present review update shows that since 2004 more studies with long-term follow-up (>6 months) have been published. However, the positive effects of these studies were generally observed at short- and medium-term follow-up. Lack of long-term effects of health education interventions has been reported before. In a meta-analysis of computer-tailored interventions, Krebs and colleagues also found a significant trend of decreasing effect size when follow-up time increased. [4] Some evidence suggests that 'dynamic tailoring' with more tailored feedback moments throughout a long intervention period may improve effects beyond the short term. The present updated review further shows that iterative feedback and tools supporting self-regulatory skills (e.g. goal setting activities, self-monitoring tools, skills building activities, e-mail reminders, booster sessions and interactive activities) are ways to realize such repeated tailoring. [4,5,16,98]

Not only has the number of electronically delivered interventions grown since 2004, but evidence for effectiveness has too. Before 2004, only a third of these 'second-generation' dietary interventions were effective, compared to 60% after 2004. For effective promotion of PA, the likelihood of effect appears not to be dependent on delivery mode. Furthermore, mobile phones were a delivery mode that was not yet available in the studies in the original 2006 review. A study by Haapala et al. indicates that mobile phone delivery can be an effective method for supporting weight loss. By allowing for two-way communication and showing a log-on frequency that is twice the rate of other web-based programs [99,100], mobile phones have potential for the future. Because of these advantages and given the massive increase of the use of smartphones worldwide, mobile technologies will and probably should be used more often to promote lifestyle changes. [101]

Overall, studies published since 2004 appear to have partially taken into account the recommendations for further research in the original review. Although more objective outcome measurement instruments were used in studies published after 2004, this was restricted to interventions on PA. Further, despite the increased number of studies, the proportion of comparisons with generic HE has not increased since 2004. Long follow-ups have been included more frequently in more recent studies, but only in nutrition

interventions. Comparisons with generic HE, instead of no-intervention control groups, are most important because they provide information on the effects of tailoring. Therefore, we repeat and strongly advocate the recommendation to study tailoring as compared to other intervention methods, such as generic HE. Long-term follow-up should remain a priority, as well as the inclusion of objective outcome measures including their use in nutrition intervention research.

This review update has limitations. We used the same review protocol as was applied in the original 2006 review. Therefore, potential limitations such as the non-blinding of reviewers to authorship or the journal of the reviewed publications also applied to the present review. A lack of unequivocal scientific evidence that blinding is essential to obtain valid review results, was already discussed in the original 2006 review. [3,102,103] In addition, a new independent reviewer assessed eligibility of the studies for the present update, which could have led to some differences in decisions and interpretations. Previous research has shown that updating a review can affect both the direction and the precision of the outcome. [104,105] Yet, two reviewers who were involved in the reviewing process of the original 2006 review were also part of the present update team. No risk of bias and/or quality assessments evaluations were performed for either the original and updated review; although the use of such tools has been recommended for systematic reviews. [18] Fortunately, because only RCTs were included, the variety in methodological quality was small. Nevertheless, the methodological quality of the studies included in this review could have had an impact on estimates of effects, which might have affected the validity of the conclusions. Finally, as any review of published literature, the present update may have been affected by publication bias that may have caused an overestimation of the positive findings.

Notwithstanding these potential limitations, this review importantly updates the systematic overview of developments and evidence regarding computer-tailored PA and nutrition education over the past years. Furthermore, this review update provides the most recent overview of the content and effects of computer-tailored interventions in the field of PA and nutrition. Reviews of the literature need to be updated regularly in order to provide up-to-date overviews of the evidence-base to inform health promotion practice, and to provide new recommendations for research to further strengthen the evidence base. This comparison is strengthened by our use of comparable reviewing methods at two time points, 2006 and 2011, giving us the opportunity to compare effects, intervention and study characteristics over time. Such updating of reviews using similar methodology is advocated and common practice in review consortia such as the Cochrane collaboration.

On the whole, from this updated review it can be concluded that the evidence on computer-tailored interventions for the promotion of PA and dietary change has become stronger and now is also convincing

for PA promotion. However, this effect particularly accounted for studies with no-intervention control groups, effect sizes were generally small and the evidence is generally restricted to rather short-term effects, i.e. up to 3 months follow-up. Further, it remains unclear whether the effect of tailored interventions is caused by tailoring as such or by the fact that tailored interventions are more likely to be carefully designed and based on behavioral theory. Previously formulated recommendations regarding the use of objective outcome measurements, generic HE control groups and long-term follow-up periods for the development of computer-tailored interventions were only partially met. Based on the present review, the use of computer-tailored interventions in PA and healthy nutrition promotion can be advocated, but future interventions should especially focus on: 1) establishing larger effect sizes and sustained effects, 2) using more objective measurements in studies on dietary behavior, 3) using more generic HE control groups, and especially control groups in which the generic HE is also carefully designed and theory-based in order to distinguish the effect of tailoring from the effects of theory-based intervention development, and 4) including more long-term follow-up measurements. Future research should also focus on why and how computer-tailored PA and nutrition interventions are effective, by conducting mediation analyses [24,106], and supporting large-scale dissemination of such interventions. [107]

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Table 1: Study characteristics and effects found in the studies included in the review

First author(s)[1] ***reference number(s)***	**Country**	**Study population [N]**	**Intervention modes[2]**	**Validated question-naire**	**Outcome measurement instruments**	**Outcome measurement units**	**Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]**
A. PHYSICAL ACTIVITY							
Adachi, 2007 [30] *154* Tanaka, 2010 [29] *369*	JAP	Overweight Japanese women [205] recruited from the general population (Adachi, 2007) Overweight Japanese men [51] recruited from the general population (Tanaka, 2010)	**C** Self-help booklet **EXP1** C + self-monitoring of weight and walking **EXP2** CT advice **EXP3**[6] CT advice + self- monitoring of weight and walking	?	15-item Pedometer	Self-rated physical activities (points 1 (bad) – 3 (good) Daily walking steps	**LT** No significant effects
Carroll, 2010 [66] *488*	USA	Inactive participants [394] recruited through primary care providers	**C** Generic HE **EXP1** CT advice	Yes	7-Day PA Recall (7-Day PAR)	Leisure-time PA (min/wk) Non leisure-time PA (min/wk)	**MT** No significant effects
Dunton, 2008 [67] *599*	USA	Women [156] (21-65) recruited from the general population	**C** No intervention **EXP1** CT advice	Yes	Standardized activity inventory	MVPA (min/wk) Walking (min/wk)	**ST** No significant effects **MT** Significant effect on MVPA ES: 0.24 **MT** Significant effect on Walking ES: 0.21
Hageman, 2005 [81] *768*	USA	Women [31] (50-69 yrs) recruited through newspaper advertisement	**C** Generic HE **EXP1** CT advice	Yes	Modified 7-Day Activity Recall (PAR) Fitness Walking Test Sit and reach test	MVPA (min/wk) Calories expended daily Aerobic fitness (VO2max in ml/kg/min) Flexibility (cm)	**MT** Significant effect on VO2 max ES: 0.42
Hurling, 2007 [43] *691*	UK	Participants [77] (30-55 yrs) recruited through market research recruitment agency	**C** No intervention **EXP1** CT advice	Yes	IPAQ Accelerometer	Overall PA (MET min/wk) Leisure-time PA (MET min/wk) Overall sitting time (hours/wk) Weekday sitting time (hours/wk) Weekend sitting time (hours/wk)	**ST** Significant effect on leisure-time PA <u>Accelerometer data</u> Significant effect on MPA (3-6 MET range) ES: N/A
Jacobs, 2004 [68] *884*	USA	Women [511] (50-64) recruited from nutrition and PA program (WISEWOMAN)	**C** Generic HE **EXP1** CT advice	?	31-item PAA questionnaire	Score from 31-item scale : Not very active (0) – Very active (42)	**LT** No significant effect on PA score

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
A. PHYSICAL ACTIVITY (cont)							
Marcus, 2007 [82] *679*	USA	Sedentary participants [239] (18-65) recruited from the general population	**C** Generic HE **EXP1** CT advice (print-based) **EXP2** CT advice (telephone-based)	Yes	7-Day PAR Actigraph Submaximal exercise threadmill test	MPA/VPA (min/wk) Aerobic fitness (VO2max in ml/kg/min)	**MT** Significant effect on PA in EXP2 compared to C ES: 0.46 **MT** Significant effect on PA in EXP1 compared to C ES: 0.39 **MT** No significant difference between EXP1 and EXP2 **LT** Significant effect on PA in EXP2 compared to C ES: N/A **LT** No significant effect on PA in EXP1 compared to C **LT** No significant difference between EXP1 and EXP2
Marcus, 2007 [83] *690*	USA	Sedentary participants [249] (18+) from the general population	**C** Generic HE **EXP1** CT advice (internet) **EXP2** CT advice (print-based)	Yes	7-Day PAR Submaximal exercise threadmill test	MPA/VPA (min/wk) Aerobic fitness (VO2max in ml/kg/min)	**MT/LT** No significant effect on MVPA.
Napolitano, 2006 [36] *724*	USA	Sedentary women [280] recruited from the general population	**C1** Generic HE **C2** Self-help booklet **EXP2** CT advice	Yes	7-Day PAR	MPA/VPA (min/wk)	**MT/LT** No significant effect on MVPA.
Oenema, 2008 [76] *86*	NL	Participants [2159] (> 30) recruited from online research panel	**C** No intervention **EXP1** CT advice	Yes	Short version of IPAQ	Self-rated PA level (scale from −2 to +2) % compliant to PA guideline (moderate intensity PA for at least 30 min/day in at least 5 days/wk)	**ST** Significant effect on % compliant to PA guideline in at-risk group (those who did not comply with the PA guidelines at baseline) ES: 0.16
Pekmezi, 2009 [69] *529*	USA	Sedentary Latinas [93] (18-65) recruited from the general population	**C** Generic HE **EXP1** CT advice	Yes	7-Day PAR	MPA/VPA (min/wk)	**MT** No significant effect on MVPA.
Prochaska, 2008 [61] *654*	USA	Participants [1400] at risk for at least one risk behavior (exercise, stress, BMI > 25 kg/m^2 and smoking) recruited from a major medical university	**C** Health Risk Assesment **EXP1** C + coaching **EXP2** C + TTM-based feedback	Yes	Self-reported level of exercise	% exercising moderately 30 min/day for at least 5 days/wk	**MT** Significant effect on % exercising moderately 30 min/day for at least 5 days/wk in EXP1 and EXP2 compared to C ES: N/A

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated questionnaire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
A. PHYSICAL ACTIVITY (cont)							
Quintiliani, 2010 [75] *176*	USA	Female college students [408] recruited from universities/colleges	**C** Generic HE **EXP1** CT advice (topic by choice) **EXP2** CT advice (topic by expert)	Yes	US Behavioral Risk Factor Surveillance Survey	MVPA (min/wk) VPA (min/wk)	**ST** Significant effect on VPA in EXP2 compared to C ES: 0.41
Slootmaker, 2009 [41] *550*	NL	Participants [102] (20-40 yrs) recruited from worksites	**C** Generic HE **EXP1** CT advice	?	AQuAA[70] Chester Step Test	LPA[a] / MPA[a] / VPA[a] (MET min/wk) Aerobic fitness (VO2max in ml/kg/min)	**MT/LT** No significant effects
Smeets, 2007 [39] *126* De Vries, 2008 [38] *72*	NL	Participants [2827] (18-65) recruited from companies and the general population	**C** Generic HE **EXP1** CT advice (once delivered in 3 months (Smeets et al)) **EXP2** CT advice (3 times delivered in 9 months (De Vries et al))	Yes	SQUASH	Action moments/wk % compliant to PA guideline (moderate intensity PA for at least 30 min/day in at least 5 days/wk)	**MT** Significant effect on PA of EXP1 compared to C ES: 0.12 **LT** Significant effect on PA and % compliance to PA guideline of EXP2 compared to C ES: 0.15 ES: 0.14
Smeets, 2008 [79] *715*	NL	Participants [487] (18-65 yrs) recruited from the general population	**C** No intervention **EXP1** CT advice	Yes	SQUASH	Total PA (MET min/wk) Transport related PA (MET min/wk) Leisure-time related PA (MET min/wk) Sports related PA (MET min/wk)	**MT** Significant effect on transport related PA and total PA among motivated participants ES: 0.48 ES: 0.49
Spittaels, 2007 [78] *705*	BEL	Participants [434] (20-55 yrs) recruited through parents and staff of primary / secondary schools	**C** No intervention **EXP1** CT advice **EXP2** CT advice + repeated feedback	**Yes**	IPAQ	Total MVPA (min/wk) Transportation PA (min/wk) Household PA (min/wk) Leisure-time PA (min/wk) Job-related PA (min/wk) Weekday sitting time (min/day) Weekend sitting time (min/day)	**MT** Significant effect on transportation PA, leisure-time PA and weekday sitting time in EXP1 and EXP2 compared to C <u>EXP2 compared to C</u> ES (transportation PA): 0.21 ES (leisure-time PA): 0.52 ES (weekday sitting time): 1.58 <u>EXP1 compared to C</u> ES (transportation PA): 0.18 ES (leisure-time PA): 0.40 ES (weekday sitting time): 1.62

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
A. PHYSICAL ACTIVITY (cont)							
Spittaels, 2007 [71] *720*	BEL	Participants [526] (25-55 yrs) recruited from worksites	**C**[1] Generic HE **EXP1**[2] CT advice **EXP2**[3] CT advice + stage-of-change based emails	**Yes**	IPAQ Accelerometer	Total PA (min/wk) MVPA (min/wk) 30 min of PA on most days (%)	**MT** No significant effects in EXP1 or EXP2 compared to C
Sternfeld, 2009 [42] *45*	USA	Participants [787] recruited from administration offices of a large healthcare organization	**C** No intervention **EXP1** CT advice	Yes	PAQ adapted from Cross-Cultural Activity Patterns Questionnaire	Total PA (MET-min/wk) MPA (min/wk) VPA (min/wk) Walking (min/wk) Sedentary behavior (min/wk)	**ST** Significant effect on MPA, VPA, walking and sedentary behavior **MT** Significant effect on MPA, walking and sedentary behavior **ST** Significant effect on MPA, VPA, walking and sedentary behavior among those who chose the PA path of the intervention ES: N/A
Van Keulen, 2011 [80] *2038*	NL	Participants [1629] (45-70) recruited from general practices	**C1** No intervention **C2** Coaching **C3** C2 + EXP1 **EXP1** TC advice	Yes	28-item modified Community Health Activities Model Program for Seniors	PA (hours/wk)	**MT** Significant effect of EXP1 compared to C1 ES: 0.20 **LT** (~11 months) Significant effect of EXP1 compared to C1 and C3 ES (EXP1-C1): 0.32 ES (EXP1-C3) : 0.15 **LT** (~18 months) No significant effects
Van Stralen, 2009 [23] *1212* Van Stralen, 2011 [24] *2039*	NL	Participants [1971] (>50 yrs) recruited from Regional Municipal Health Counsils	**C** No intervention **EXP1** CT advice (psychosocial) **EXP2** CT advice (psychosocial + environmental)	Yes	1-item from SQUASH	Self-rated PA (total weekly days of MPA) Self-rated compliance with PA guidelines (% of participants that show compliance with guidelines)	**MT** (3 months) Significant effect on self-rated PA in EXP1 and EXP2 compared to C; ES: 0.20; ES: 0.20 **MT** (3 months) Significant effect on PA initiation among insufficiently active participants in EXP1 and EXP2 compared to C ES: 0.26 ; ES: 0.21 **MT** (6 months) Significant effect on self-rated PA in EXP1 and EXP2 compared to C ; ES: 0.30; ES: 0.35 **MT** (6 months) Significant effect on PA initiation among insufficiently active participants in EXP1 and EXP2 compared to C ES: 0.32 ; ES: 0.27 **MT** (6 months) Significant effect on PA maintenance among sufficiently active participants in EXP 1 and EXP 2 compared to C ES: 0.33 ES: 0.34**LT** (12 months) Significant effect on self-rated PA in EXP1 and EXP2 compared to CES: 0.18 (for both EXP1 and EXP2)

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
A. PHYSICAL ACTIVITY (cont)							
Walker, 2009 [25] *53* Walker, 2010 [26] *2040*	USA	Women [225] (50-69) recruited from the general population	**C** Generic HE **EXP1** CT advice	Yes	Modified 7-day PAR 1 mile walk test Modified sit-and-reach test Repeated timed chair stands	MVPA (min/day) Kilocalories expended per kilogram/day Time engaged in strengthening and stretching exercise (min/wk) Aerobic fitness (VO2max in ml/kg/min) Lower body muscular strength (timed chair stands in sec)	**MT** Significant effect on lower body muscular strength ES: -0.36 **LT** (12 months) Significant effect on lower body muscular strength ES: -0.41 **LT** (18 months) Significant effect on lower body muscular strength ES: -0.51
Wanner, 2009 [77] *551*	Switzerland	Participants [1531] recruited from the general population	**C** Generic HE **EXP1** CT advice	?	4-item derived from official PA monitoring in Swiss population Accelerometer	MPA/VPA (min/wk)	**ST/LT** No significant effect on MPA and VPA.
Werkman, 2010 [63] *13*	NL	Recent retirees [415] (55-65) recruited from pre-retirement workshops	**C** Generic HE **EXP1** CT advice	Yes	Dutch version of the PA Scale for the Elderly (PASE)[72]	Daily routine PA (min/wk) Recreation/sports PA (min/wk) Σ household activities (0-6) PASE-score (0-400)	**LT** No significant effect (12- and 24-months) on daily routine PA, recreation/sports PA, Σ household activities (0-6) and PASE-score
Winett, 2007 [40] *120*	USA	Participants [1071] recruited from churches	**C** No intervention **EXP1** CT advice **EXP2** CT advice + church support	?	Pedometer	Daily step counts	**LT (7 and 16 months)** Significant effect on PA in EXP2 compared to C ES (7 months): 0.23 ES (16 months): 0.27
B. FAT CONSUMPTION							
Blair Irvine, 2004 [85] *1018*	USA	Participants [517] recruited from a large hospital	**C** No intervention **EXP1** CT advice	Yes	21-item Diet Habits Questionnaire	Fat eating habits/behavior score	**ST** Significant effects on fat eating habits/behavior ES (1-month): -0.49 ES (2-months): -0.18
Dutton, 2008 [37] *95*	USA	Sedentary women [280] recruited from the general population	**C** Generic HE **EXP1** Self-help booklet **EXP2** CT advice	Yes	National Cancer Institute Screeners	Fat intake (en%)	**MT/LT** No significant effects on fat intake
Elder, 2005 [45] *1653* Elder, 2006 [46] *1598*	USA	Latinas [357] recruited from the general population	**C** Generic HE **EXP1** CT advice **EXP2** CT advice + Promotoras	Yes	Nutrition data system: 24 h dietary recall interview	% calories from fat Total and saturated fat intake (g)	**ST** Significant effects on total and saturated fat intake in EXP2 compared to EXP1 **LT** No sustained significant effects

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
B. FAT CONSUMPTION (cont)							
Fries, 2005 [84] *469*	USA	Participants [754] (18-72) recruited from physician practices	**C** No intervention **EXP1** CT advice	?	Fat and fiber behavior-related questionnaire	Score from 0-3	**ST** Significant effect on dietary fat behavior ES: -0.41 **MT** Significant effect on dietary fat behavior ES: -0.29 **LT** Significant effect on dietary fat behavior ES: -0.23
Gans, 2009 [88] *261*	USA	Participants [1841] with low income, recruited from waiting rooms of public health clinics	**C** Generic HE **EXP1** CT advice (at once) **EXP2** CT advice (in 4 installments) **EXP3** EXP2 with retailoring	Yes	Adapted Food Habits Questionnaire (FHQ)	Fat intake (FHQ-score: low score=high prevalence fat-lowering behavior, thus lower fat intake)	**MT** Significant effect on fat intake in EXP2 and EXP3 compared to C ES (EXP2-C): -0.31 ES (EXP3-C): -0.31
Jacobs, 2004 [68] *884*	USA	Women [511] (50-64) recruited from nutrition and PA program (WISEWOMAN)	**C** Generic HE **EXP1** CT advice	Yes	54-item Dietary risk assessment	Score from 54-item scale: 0-108 not very atherogenic (0) to very atherogenic diet (108)	**LT** No significant effect on saturated fat and cholesterol intake
Kroeze, 2008 [86] *320*	NL	Participants [442] (18-65) recruited from companies and general population	**C** Generic HE **EXP1** CT advice (interactive CD-ROM) **EXP2** CT advice (print)	Yes	104-item FFQ	Total fat intake (g/day, en%) Saturated fat intake (g/day, %en)	**ST** Significant effects on total fat and saturated fat intake in EXP1 compared to C ES (total fat): -0.31 ES (saturated fat): -0.22 **ST** Significant effects on total fat intake among risk consumers in EXP1 compared to C ES: -0.41 **ST** Significant effects on total fat in EXP2 compared to C ES: -0.23 **ST** Significant effects on total fat and saturated fat intake among risk consumers in EXP2 compared to C ES (total fat): -0.49 ES (saturated fat): -0.42 **MT** Significant effect on total fat and saturated fat intake among risk consumers in EXP2 compared to C ES (total fat): -0.53 ES (saturated fat): -0.54

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
B. FAT CONSUMPTION (cont)							
Kroeze, 2008 [87] *346*	NL	Participants [574] (18-65) recruited from large companies and the general population	**C** Generic HE **EXP1** CT advice (personal) **EXP2** CT advice (personal–normative) **EXP3** CT advice (personal–normative–action)	Yes	104-item FFQ 1-item	Total fat intake (g/day) Saturated fat intake (g/day) Self-rated fat intake (awareness) (-2 to +2)	**ST** Significant effect on awareness of fat intake in EXP1 and EXP3 compared to C ES (EXP1): 0.30 ES (EXP3): 0.41 **ST** Significant effect on fat intake and saturated fat intake in EXP3 compared to C ES (fat intake): -0.52 ES (saturated fat intake): -0.46 **MT** Significant effect on fat intake in EXP1, EXP2 and EXP3 compared to C ES (EXP1): 0.34 ES (EXP2): 0.55 ES (EXP3): 0.53 **MT** Significant effect on saturated fat intake in EXP3 compared to C ES: -0.51 **MT** Significant effect on fat and saturated fat intake among underestimators in EXP3 compared to C ES (fat intake): -0.64 ES (saturated fat intake): -0.63
Ni Mhurchu, 2010 [60] *219*	NWZ	Participants [1104] recruited from rom a selection of customers registred to use the Shop 'N Go System and in-store and community-based recruitment.	**C** No intervention **EXP1** CT advice **EXP2** CT advice + discount **EXP3** Discount	?	Electronic scanner (Shop 'N Go system)	% of energy from saturated fats in purchases	**MT** No significant effect on saturated fat purchases
Oenema, 2008 [76] *86*	NL	Participants [2159] (> 30) recruited from online research panel	**C** No intervention **EXP1** CT advice	Yes	35-item FFQ 1-item	Saturated fat intake (fat points/day from 0-80) Self-rated intake (scale from −2 to +2)	**ST** Significant effect on saturated fat intake ES: -0.16 **ST** Significant effect on saturated fat intake in at-risk group (those who did not comply with the recommended level of saturated fat intake at baseline) ES: -0.23

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
B. FAT CONSUMPTION (cont)							
Prochaska, 2005 [32] *458* Prochaska, 2004 [31] *486*	USA	Sedentary primary care patients [5407] at risk for at least one of the target behaviors recruited from primary care practices (Prochaska, 2005-458). Parents of teenagers [2460] at risk for at least one of the target behaviors recruited from schools (Prochaska, 2005-486)	**C** No intervention **EXP1** CT advice	Yes	22-item Dietary Behavior Questionnaire	Score on subscales: Avoidance Substitution Modification	<u>Among sedentary primary care patients</u> **LT (12 months)** Significant effects on avoidance, modification and substitution ES (avoidance) :0.24 ES (modification) :0.18 ES (substitution) :0.22 **LT (24 months)** Significant effects on avoidance ES (avoidance) :0.27 ES (substitution) :0.20 <u>Among parents of teenagers</u> **LT (12 months)** Significant effects on avoidance and substitution ES (avoidance): 0.16 ES (substitution): 0.19 **LT (24 months)** Significant effects on avoidance and substitution ES (avoidance): 0.18 ES (substitution): 0.23
Smeets, 2007 [39] *126* De Vries, 2008 [38] *72*	NL	Participants [2827] (18-65) recruited from companies and the general population	**C** Generic HE **EXP1** CT advice (once delivered in 3 months (Smeets, 2007l)) **EXP2** CT advice (3 times delivered in 9 months (De Vries, 2008))	Yes	FFQ	Fat intake (g) Saturated fat intake (g) % compliant to guidelines for saturated fat intake	**MT** Significant effect on fat intake in EXP1 compared to C ES: -0.12 **LT** Significant effect on % compliant to guideline on saturated fat intake in EXP2 compared to C ES: -0.18
Sternfeld, 2009 [42] *45*	USA	Participants [787] recruited from administration offices of a large healthcare organization	**C** No intervention **EXP1** CT advice	Yes	Diet questionnaire based on Block Food Questionnaire	Saturated fats (g/day) Trans fats (g/day)	**ST** Significant effect on saturated and trans fat intake **ST** Significant effect on saturated and trans fat intake among those who chose the fats/sugar path of the intervention **MT** Significant effect on saturated and trans fat intake ES: N/A

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
B. FAT CONSUMPTION (cont)							
De Bourdeaudhuij, 2007 [33] *380*	BEL	Participants [539] recruited from companies	**C** No intervention **EXP1** CT advice on PA and fat intake sequentially delivery **EXP2** CT advice on PA and fat intake simultaneously delivered **EXP3** CT advice only on fat intake	Yes	48-item FFQ	Total fat intake (g/day) Energy from fat (%) Fat intake (seperate food groups) (g/day)	**MT** Significant effect on energy from fat and total fat intake in EXP1 compared to C1 and C2 EXP1 compared to C1 ES (energy from fat): -0.37 ES (total fat intake): -0.32 EXP1 compared to C2 ES (energy from fat): -0.13 ES (total fat intake): 0.09 **MT** Significant difference in energy from fat between C1 and C2 ES: -0.24 **MT** Significant effect on energy from fat and total fat intake among participants who meet/do not meet fat intake recommendations in EXP1 compared to C1 and C2 ES: N/A
Walker, 2009 [25] *53* Walker, 2010 [26] *2040*	USA	Women [225] (50-69) recruited from the general population	**C** Generic HE **EXP1** CT advice	Yes	Web-based Block98 FFQ	% calories from fat % calories from saturated fat	**LT (6 months)** Significant effect on % calories from saturated fat ES: -0.30 **LT (12 months)** Significant effect on % calories from saturated fat ES: - 0.49 **LT (18 months)** Significant effect on % calories from saturated fat ES: -0.56
Werkman, 2010 [63] *13*	NL	Recent retirees [415] (55-65) recruited from pre-retirement workshops	**C** Generic HE **EXP1** CT advice	Yes	Semi quantitative FFQ	Fat intake (en%)	**LT** No significant effects on fat intake
Winett, 2007 [40] *120*	USA	Participants [1071] recruited from churches	**C** No intervention **EXP1** CT advice **EXP2** CT advice + church support	Yes	Block98 FFQ Food shopping receipts	% kcal from fat	**LT** No significant effects on fat intake
Alexander, 2010 [90] *222*	USA	Participants [2540] (21-65) recruited from health plans	**C** Generic HE **EXP1** CT advice **EXP2** CT advice + personal counseling	Yes	16-item FFQ by National Cancer Institute 2-item	Fruit and vegetables intake (servings in past month) Fruit and vegetables intake (servings on a typical day)	**LT** Significant effect on fruit and vegetables intake in the past month in EXP2 compared to C ES: 0.10 **LT** Significant effect on fruit and vegetables intake on a typical day in EXP1 and EXP2 compared to C ES (EXP1): 0.08 ES (EXP2): 0.13

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated questionnaire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
C. FRUIT AND VEGETABLE CONSUMPTION							
Blair Irvine, 2004 [77] *1018*	USA	Participants [517] recruited from a large hospital	**C** No intervention **EXP1** CT advice	Yes	5-A-Day Screener	Fruit and vegetables consumption score	**ST** Significant effects on fruit and vegetables consumption ES (1-month): 0.21 ES (2-months): 0.04
Dutton, 2008 [85] *95*	USA	Sedentary women [280] recruited from the general population	**C** Generic HE **EXP1** Self-help booklet **EXP2** CT advice	Yes	National Cancer Institute Screeners	Fruit and vegetables intake (daily servings)	**MT/LT** No significant effects on fruit and vegetables intake
Gans, 2009 [88] *261*	USA	Participants [1841] with low income, recruited from waiting rooms of public health clinics	**C** Generic HE **EXP1** CT advice (at once) **EXP2** CT advice (in 4 installments) **EXP3** EXP2 with retailoring	?	7-item NCI fruit and vegetables screener assessment tool	Fruit and vegetables intake (servings/day)	**MT** Significant effect on fruit and vegetables intake in EXP1 and EXP2 compared to C and EXP3 ES (EXP1-C): 0.18 ES (EXP1-EXP3): 0.20 ES (EXP2-C): 0.12 ES (EXP2-EXP3): 0.14 **LT** Significant effect on fruit and vegetables intake in EXP2 compared to C ES: 0.17
Heimendinger, 2005 [91] *1629*	USA	Participants [3402] (18+) recruited through Cancer Information Service offices (callers)	**C** Generic HE (1 booklet) **EXP1** CT advice (1 booklet) **EXP2** CT advice (4 booklets) **EXP3** CT advice (4 booklets + retailoring)	Yes	1-item 7-item FFQ	Fruit and vegetables intake (daily servings)	**LT** Significant effect on fruit and vegetables intake in EXP2 and EXP3 compared to C ES: N/A
Kreuter, 2005 [89] *457*	USA	Lower-income African-American women [1227] (18-65) from 10 urban public health centers.	**C** No intervention **EXP1** CT advice tailored on behavioural constructs **EXP2** CT advice tailored on cultural factors **EXP3** EXP1 + EXP2	Yes	13-item FFQ	Fruit and vegetables intake (servings/day)	**MT** No significant effects on fruit and vegetables intake **LT** Significant effect on fruit and vegetables intake in EXP3 compared to other groups **LT** Significant effect among lower motivated women on fruit and vegetables intake in EXP3 compared to other groups ES: N/A

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated questionnaire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
C. FRUIT AND VEGETABLE CONSUMPTION (cont)							
Nitzke, 2007 [35] *352* Do, 2008 [34] *291*	USA	Participants [2024] (18-24) recruited from non-college venues	**C** No intervention **EXP1** CT advice	Yes	5 A Day Screener 2-item 26-item FFQ	Fruit and vegetables intake (servings) Perceived daily intake Variety in fruit and vegetables intake (number of different items consumed at least once a month, regardless of amount)	**MT** Significant effects on fruit and fruit and vegetables intake and perceived vegetables intake ES (fruit intake): 0.12 ES (fruit and vegetables intake): 0.14 ES (perceived vegetables intake): 0.08 **LT** Significant effects on fruit and fruit and vegetables intake and perceived intake of vegetables and fruit and vegetables ES (fruit intake): 0.15 ES (fruit and vegetables intake): 0.13 ES (perceived vegetables intake): 0.11 ES (perceived intake fruit and vegetables): 0.12 **LT** Significant effects on variety in fruit and vegetables consumption, consumption of seasonal fruits, juices and high beta-carotene vegetables ES (variety fruit) >1.00 ES (variety vegetables) >1.00 ES (seasonal fruits consumption) >1.00 ES (juices consumption) >1.00 ES (high beta-carotene vegetables consumption)>1.00
Prochaska, 2005 [32] *458* Prochaska, 2004 [31] *486*	USA	Sedentary primary care patients [5407] at risk for at least one of the target behaviors recruited from primary care practices Parents of teenagers [2460] at risk for at least one of the target behaviors recruited from schools	**C** No intervention **EXP1** CT advice	Yes	22-item Dietary Behavior Questionnaire	Score on subscale fruit and vegetables	**LT** No significant effect on fruit and vegetables in both study samples

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
C. FRUIT AND VEGETABLE CONSUMPTION (cont)							
Smeets, 2007 [39] *126* De Vries, 2008 [38] *72*	NL	Participants [2827] (18-65) recruited from companies and the general population	**C** Generic HE **EXP1** CT advice (once delivered in 3 months (Smeets et al)) **EXP2** CT advice (3 times delivered in 9 months (De Vries et al))	Yes	FFQ	Fruit intake (pieces/day) Vegetables intake (g/day) % compliant to guidelines for fruit intake (at least 2 pieces of fruit for 7 days/week) Vegetables intake % compliant to guidelines for vegetables intake (at least 200 g of vegetables/day for 7 days/week)	**MT** Significant effect on fruit intake among participants who did not meet recommendations for any behavior in EXP1 compared to C ES: 0.30 **MT** Significant effect on vegetables intake in EXP1 compared to C ES: 0.10 **LT** Significant effect on fruit intake and % compliant to fruit guidelines in EXP2 compared to C ES: 0.35 ES: 0.24 **LT** Significant effect on vegetable intake and % compliant to vegetables guidelines in EXP2 compared to C ES: 0.32 ES: 0.08
Sternfeld, 2009 [42] *45*	USA	Participants [787] recruited from administration offices of a large healthcare organization	**C** No intervention **EXP1** CT advice	Yes	Diet questionnaire based on Block Food Questionnaire	Fruit and vegetables intake (cup-equivalents/day)	**ST** Significant effect on fruit and vegetables intake **ST** Significant effect on fruit and vegetables intake among those who chose the fruit and vegetables path of the intervention **MT** Significant effect on fruit and vegetables intake ES: N/A

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated questionnaire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
C. FRUIT AND VEGETABLE CONSUMPTION (cont)							
Van Keulen, 2011 [80] *2038*	NL	Participants [1629] (45-70) recruited from general practices	**C1** No intervention **C2** Coaching **C3** C2 + EXP1 **EXP1** TC advice	Yes	16-item short questionnaire	Fruit intake (servings/day) Vegetables (g/day)	**MT** Significant effect on fruit intake of EXP1 compared to C1 and C3 ES (EXP1-C1): 0.19 ES (EXP1-C3): 0.18 **MT** Significant effect on vegetables intake of EXP1 compared to C1 and C3 ES (EXP1-C1): 0.10 ES (EXP1-C3): 0.12 **LT** (~11 months) Significant effect on fruit intake of EXP1 compared to C1 ES: 0.32 **LT** (~11 months) Significant effect on vegetables intake of EXP1 compared to C1, C2 and C3 ES (EXP1-C1): 0.33 ES (EXP1-C2): 0.24 ES (EXP1-C3): 0.19 **LT** (~18 months) Significant effect on fruit intake of EXP1 compared to C1, C2 and C3 ES (EXP1-C1): 0.35 ES (EXP1-C2): 0.22 ES (EXP1-C3): 0.24 **LT** (~18 months) Significant effect on vegetables intake of EXP1 compared to C1 ES: 0.27
Walker, 2009 [25] 53 Walker, 2010 [26] 2040	USA	Women [225] (50-69) recruited from the general population	**C Generic HE** **EXP1 CT advice**	Yes	Web-based Block98 FFQ	Fruit and vegetables intake (daily servings)	**LT** (6 months) Significant effect on fruit and vegetables intake ES: 0.22 **LT** (12 months) Significant effect on fruit and vegetables intake ES: 0.41 **LT** (18 months) Significant effect on fruit and vegetables intake ES: 0.40
Werkman, 2010 [63] *13*	NL	Recent retirees [415] (55-65) recruited from pre-retirement workshops	**C** Generic HE **EXP1** CT advice	Yes	Semi quantitative FFQ	Fruit and vegetables intake (g/MJ)	**LT** No significant effect on fruit and vegetables intake

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated questionnaire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
C. FRUIT AND VEGETABLE CONSUMPTION (cont)							
Winett, 2007 [40] *120*	USA	Participants [1071] recruited from churches	**C** No intervention **EXP1** CT advice **EXP2** CT advice + church support	Yes	Block98 FFQ Food shopping receipts	Fruit and vegetables intake (g/1000kcal)	**LT (7 months)** Significant effect on fruit and vegetables intake in EXP1 compared to C ES: 0.44 Significant effect on fruit and vegetables intake in EXP2 compared to C ES: 0.57 **LT (16 months)** Significant effect on fruit and vegetables intake in EXP1 compared to C ES: 0.12 Significant effect on fruit and vegetables intake in EXP2 compared to C ES: 0.32
D. OTHER DIETARY TOPICS							
Adachi, 2007 [30] *154* Tanaka, 2010 [29] *369*	JAP	Overweight Japanese women [205] recruited from the general population (Adachi, 2007) Overweight Japanese men [51] recruited from the general population (Tanaka, 2010)	**C1** Self-help booklet **C2** C + self-monitoring of weight and walking **EXP1** CT advice **EXP2**[6] CT advice + self- monitoring of weight and walking	?	Weight parameters	BMI (kg/m^2)	**ST** Significant effect on BMI in EXP1 & EXP2 compared to C1 & C2 among overweigh Japanese *women* BMI ES EXP1-C1: -0.60 ES EXP1-C2: -0.48 ES EXP2-C1: -0.77 ES EXP2-C2: -0.66 **ST** Significant effect on BMI in EXP2 compared to C1 among overweigh Japanese *men* BMI ES EXP2-C1: -0.69 **MT** Significant effect on BMI in EXP2 compared to C1 & C2 among overweight Japanese *women* BMI ES EXP2-C1: -0.70 ES EXP2-C2: -0.58 **LT** Significant effect on BMI in EXP2 compared to C1 & C2 among overweight Japanese *women* BMI ES EXP2-C1: -0.59 ES EXP2-C2: -0.55 **LT** No significant effect on BMI in EXP2 compared to C1among overweigh Japanese *men*

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
D. OTHER DIETARY TOPICS (cont)							
Elder, 2005 [45] *1653* Elder, 2006 [46] *1598*	USA	Latinas [357] recruited from the general population	**C** Generic HE **EXP1** CT advice **EXP2** CT advice + promotoras	Yes	Nutrition data system (NDS): 24 h dietary recall interview	Total energy intake (kcal) Total carbohydrates intake (g)	**ST/LT** No significant effects
Fries, 2005 [84] *469*	USA	Participants [754] (18-72) recruited from physician practices	**C** No intervention **EXP1** CT advice	?	Fat and fiber behavior-related questionnaire	Score from 0-3	**ST** Significant effect on fiber behavior ES: -0.35 **MT** Significant effect on fiber behavior ES: -0.24
Haapala 2009 [62] *271*	FIN	Overweight participants [125] (25-44) from the general population	**C** Generic HE **EXP1** CT advice		Weight parameters	Body weight (kg) % Weight loss Waist circumference	**LT** Significant effect on weight loss and waist circumference ES (weight loss): -0.14 ES (waist circumference): -0.18
Kroeze, 2008 [86] *320*	NL	Participants [442] (18-65) recruited from companies and general population	**C** Generic HE **EXP1** CT advice (CD-ROM) **EXP2** CT advice (print)	Yes	104-item FFQ	Energy intake (MJ/day)	**ST** Significant effects on energy intake in EXP1 and EXP2 compared to C ES: -0.28 ES: -0.38 **ST** Significant effects on energy intake among risk consumers in EXP1 and EXP2 compared to C ES: -0.50 ES: -0.66 **MT** Significant effects on energy intake among risk consumers in EXP1 and EXP2 compared to C ES: -0.68 ES: -0.44 **MT** Significant effects on energy intake in EXP2 compared to C ES: -0.26
Poddar, 2010 [84] *312*	USA	College students [294] recruited from a land grant, research-intensive university	**C** No intervention **EXP1** CT advice	?	7 day food records	Average daily dairy servings	**MT** No significant effect
Prochaska, 2008 [92] *654*	USA	Participants [1400] at risk for at least one risk behavior (exercise, stress, BMI > 25 kg/m^2 and smoking) recruited from a major medical university	**C** Health Risk Assesment **EXP1** C + coaching **EXP2** C + TTM-based feedback	Yes	Self-report	% above/below BMI = 25 kg/m^2	**MT** No significant effect on BMI

First author(s)[1] *reference number(s)*	Country	Study population [N]	Intervention modes[2]	Validated question-naire	Outcome measurement instruments	Outcome measurement units	Results[3] and Effect Size[4] at short- (ST), medium- (MT) or long-term (LT)[5]
D. OTHER DIETARY TOPICS (cont)							
Rothert, 2006 [44] *161*	USA	Overweight and obese (BMI = 27 - 40 kg/m^2) participants [2862] recruited from health care delivery system	**C** Generic HE **EXP1** CT advice	?	Self-report	% of baseline weight lost	**MT/LT** Significant effect on % of baseline weight lost ES > 1.00
Sternfeld, 2009 [42] *45*	USA	Participants [787] recruited from administration offices of a large healthcare organization	**C** No intervention **EXP1** CT advice	Yes	Diet questionnaire based on Block Food Questionnaire	Added sugars (g/day)	**ST/MT** No significant effects on added sugars
Walker, 2009 [25] *53*	USA	Women [225] (50-69) recruited from the general population	**C** Generic HE **EXP1** CT advice	Yes	Web-based Block98 FFQ Bioelectrical impedance analysis Weight parameters	Whole-grain intake (daily servings) % Body fat BMI (kg/m^2)	**LT** No significant effects
Werkman, 2010 [63] *13*	NL	Recent retirees [415] (55-65) recruited from pre-retirement workshops	**C** Generic HE **EXP1** CT advice	Yes	Weight parameters Semi quantitative FFQ	Waist circumference (cm), BMI (kg/m^2) Energy intake (MJ/day)	**LT** Significant effect on waist circumference among men with low education
Winett, 2007 [40] *120* Fiber intakeWeight	USA	Participants [1071] recruited from churches	**C** No intervention **EXP1** CT advice **EXP2** CT advice + church support	Yes	Block98 FFQ Food shopping receipts Weight parameters	Fiber intake (g/1000kcal) Weight (lb)	**LT (7 months)** Significant effect on fruit and vegetables intake in EXP1 compared to C *ES:* 0.35 Significant effect on fruit and vegetables intake in EXP2 compared to C *ES:* 0.44 Significant effect on weight in EXP2 compared to C *ES: 0.21* **LT (16 months)** Significant effect on fruit and vegetables intake in EXP1 compared to C *ES:* 0.20 Significant effect on fruit and vegetables intake in EXP2 compared to C *ES:* 0.28

C=Control condition; EXP1=experimental condition 1; EXP2=experimental condition 2; EXP3=experimental condition 3; ES=effect size; [125]=125 participants; (50-69)=50 to 69 years old; JAP=Japan; USA=United States of America; UK=United Kingdom; NL=The Netherlands; BEL=Belgium; NWZ=New Zealand; [1]Some publications reported on the characteristics and effects of the same intervention, and are therefore clustered in one cell; [2] No intervention equals no info in the 2006-review, generic HE equals generic info in the 2006-review; [3]Significant effect = effect that reached statistical significance (p<0.05); [4]Effect sizes were calculated when mean and SD were available at posttest and a significant effect in favour of tailoring had been found. ES is interpreted according to Cohen's guidelines[73] based on an application in Dolan et al[74]; cut-off values of 0.2-0.5 = small, 0.5-0.8 = moderate and >0.8 = large effects; [5]Short-term (ST): < 3 months; medium-term (MT): 3-6 months; long-term (LT): > 6 months; [6]In the study of Tanaka et al 2010, only EXP2 versus the self-help booklet was tested.

Table 2: Study characteristics and effects of studies from the original (<2004) and updated review (>2004) compared

	Dietary behavior		**Physical activity**	
	Before 2004 N[1] = 26	**After 2004 N[1] = 34**	**Before 2004 N[1] = 10**	**After 2004 N[1] = 29**
	Reference number[2] N (%)	**Reference number N (%)**	**Reference number[2] N (%)**	**Reference number N (%)**
Comparison of computer-tailored intervention with a no intervention control group	35-39-43-47-53-54-56-33-42-46-50-51-52-55-60 34-44-48 **18 (69%)**	45-86-120-380-219-352-291-457-458-486-469-1018-312 - 2038 **14 (41%)**	33-34-35-38 **4 (40%)**	45-86-120-380-599-691-705-715-1212-2039-2038 **11 (38%)**
Comparison of computer-tailored intervention with a generic HE control group[5]	30-41-56-40-42-45-55-31-32-54 **10 (38%)**	13-53-2040-95-72-126-161-222-261-271-320- 346-884-1629-1653-1598 **16 (47%)**	28-29-30-32-37-38 **6 (60%)**	13-53-2040-72-126-488-529-550-551-679-690-720-724-768-884-176 **16 (55%)**
Objective measurements of effect indicators	39-50-51-52 **4 (15%)**	13-53-2040-120-219 **5 (15%)**	**0 (0%)**	53-120-154-369-550-551-679-690-691-720-768 **11 (38%)**
Inclusion of long-term (>= 6 months) follow up	32-33-36-43-46 **7 (27%)**	13-53-2040-72-95-120-154-369-161-222-261-271-291-352-457-458-486-469-884-1598-1653-1629-2038 **23 (68%)**	28-32-33-34-36-37 **6 (60%)**	13-72-120-154-369-550-551-679-690-724-95-884-2039-2038 **14 (48%)**
Significant effects of computer-tailored interventions found	30-35-39-41-43-47-49-53-56 **9 (35%)**	45-86-72-126-161-380-222-261-271-291-352-320-346-457-469-1018-1629-2038 **28 (82%)**	29-35 **2 (20%)**	45-53-2040-72-126-86-120-380-654-599-679-691-705-715-768-1212-2039-176-2038 **19 (66%)**
Printed intervention materials	30-31-32-33-34-40-41-42-43-44-45- 46-48-49-50-53-54-56 **18 (69%)**	53-72-95-126-154-219-261-346-352-457-458-486-884-1629-1653-1598 **15 (44%)**	28-29-30-31-32-33-34-37-38 **9 (90%)**	72-126-154-369-679-715-724-884-1212-2039 **10 (34%)**
Electronic intervention materials	35-36-39-44-47-51-52-55-60 **9 (35%)**	13-45-86-120-161-222-271-320-380-469-471-569-1018-1677 **14 (41%)**	35-36 **2 (20%)**	13-45-53-86-120-161-488-529-550-551-599-654-768-690-691-705-720-2040 **18 (62%)**

[1]N = number of studies; [2]Reference numbers are from the original review.[3] Reference numbers from the review update can be found in Table 1; [3]All studies; [4]Within one study both significant and non-significant results were found for either different subgroups or different outcome measures related to the target behavior; [5]In some studies a no-intervention and generic health education (=HE) control groups were both included

Appendix 1: Intervention characteristics

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
A: PHYSICAL ACTIVITY						
Adachi, 2007 *154* Tanaka, 2010 *369*	Exercise	Behavioral therapy	Print	Personal characteristics Physical activity Readiness to change behaviors Weight history Weight rebound experience Primary purpose of weight control Target weight Body image	2	Intervention primary focuses on weight control and secondary on exercise and dietary habits Booklet of behavioural weight control
Caroll, 2010 *488*	Physical activity		Email reports	Physical activity Stage of change Processes of change Self-efficacy Barriers Benefits	4	
Dunton, 2008 *599*	Physical activity	TTM HBM	On screen	Physical activity Stage of change Barriers Motivators	1	10 weekly newsletters supporting the tailored advice & encouraging further learning
Hageman, 2005 *768*	Physical activity	HPM	On screen newsletters	Physical activity Benefits Barriers Self-efficacy Goals	3	
Hurling, 2007 *691*	Physical Activity	Social comparison ELM Goal setting Decisional Balance Theory	On screen	Physical activity Barriers Solutions Goal setting	1	Email and/or telephone reminders Online schedule to plan weekly exercise sessions Message board
Jacobs, 2004 *884*	Physical activity	SCT TTM RPT	Print/telephone	Behavioral goals Stage of change Knowledge Social Support High risk situations for relapse Benefits Barriers	8	Intervention also focuses on dietary intake
Marcus, 2007 *679*	Physical activity	TTM SCT	Telephone/print	Physical activity Stage of change Processes of change Decisional balance	14	Stage-targeted booklets Tip sheets
Marcus, 2007 *690*	Physical activity	TTM SCT	On screen/print	Physical activity Stage of change Processes of change Decisional balance	16	Educational materials and tips

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
A: PHYSICAL ACTIVITY (cont)						
Napolitano, 2006 *724* Dutton, 2008 *95*[2]	Physical activity	TTM SCT	Print	Stage of change Processes of change Self-efficacy Decisional balance	4	
Oenema, 2008 *86*	Physical activity	PAPM	On screen and/or print	(Perceived) Physical activity Awareness Stage of change Attitude Self-efficacy Implementation intentions Demographics	At least 1 (more visits possible)	Intervention also focuses on dietary intake and smoking
Pekmezi, 2009 *529*	Physical activity	TTM SCT	Print	Stage of change Processes of change Self-efficacy Motivational readiness	6	PA logs with tip sheets
Prochaska, 2008 *654*	Exercise	TTM	On screen	Stage of change Self-efficacy Processes of change Benefits Barriers	3 (recommended)	Intervention also focuses on smoking, stress dietary intake
Quintiliani, 2010 *176*	Physical activity	TTM HBM Social learning theory	On screen	Physical activity Stage of change Perceived barriers	1	
Rothert, 2006 *161*	Physical activity		On screen	Physical activity Demographics Experiences on weight loss Personal/family health history Attitude Barriers Social support Goals Expectations Preferences Self-efficacy	4	Intervention primary focuses on weight control Encouraging email messages from buddy
Slootmaker, 2009 *550*	Physical activity		On screen	Physical activity Preferences Barriers	1 (more visits optional)	
Smeets, 2007 *126* De Vries, 2008 *72*	Physical activity	I-CHANGE	Print	Physical activity Stage of change Awareness Motivation Attitude Self-efficacy	1-3	Intervention also focuses on smoking and fruit and vegetables and fat intake Smeets at al evaluated the first computer-tailored letter at short-term, De Vries et al evaluated the effects of three letters with an action planning component randomly applied in 3th letter

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
A: PHYSICAL ACTIVITY (cont)						
Smeets, 2008 *715*	Physical activity	I-CHANGE model	Print	Physical activity Stage of change Social support Preferences Benefits Barriers	1	
Spittaels, 2007 *705*	Physical Activity	TPB TTM	On screen	Physical activity Social support Intention Stage of change Knowledge Self-efficacy Attitude Barriers Benefits	1/2	Non-tailored emails with invitation to revisit website
Spittaels, 2007 *720*	Physical Activity	TPB TTM	On screen	Physical activity Stages of change Social support Intention knowledge Attitude Self-efficacy Barriers Benefits	1	Stage of change targeted email tip sheets
Sternfeld, 2009 *45*	Physical activity		Email reports	Physical activity Stage of change Self-efficacy Individual lifestyle constraints Physical activity preferences	12	Intervention also focuses on saturated and trans fats intake, fruit and vegetables intake Personal homepage: tips on how to achieve goals Weekly health note Simulation tools Progress tracking tool Review of barriers Discussion board Links to additional resources Reminder messages
Van Keulen, 2011 *2038*	Physical activity	I-Change model Control Theory	Print	Physical activity Awareness Demographics Stage of change Attitude Self-efficacy Expectations Action plans	4	

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
A: PHYSICAL ACTIVITY (cont)						
Van Stralen, 2009 *1212* Van Stralen, 2011 *2039*	Physical activity	I-CHANGE model TTM HPA PAPM SRT SDT	Print	Basic tailored intervention: *Letter 1:* (self-estimated) Physical activity Stage of change Age Gender Attitude Self-efficacy Benefits Social support *Letter 2:* Attitude Self-efficacy Possibilities Social support *Letter 3:* Changes in physical activity and determinants Intervention Plus Additional: location	3	Access to forum and e-buddy system (Intervention Plus)
Walker, 2009 *53* Walker, 2010 *2040*	Physical activity	HPM	Email newsletter	Benefits Barriers Self-efficacy Habits Family Support	18	Instructional videotapes
Wanner, 2009 *551*	Physical activity	TTM	On screen	Physical activity Stage of change Decisional balance Processes of change Self-efficacy Attitude Knowledge	1 (3 invitations for re-visit)	Strength and stretching exercise sheets Organizational and motivational download forms
Werkman, 2010 *13*	Physical activity	Intervention mapping protocol	CD-ROM/print	CD-ROM I (module 2) BMI BMI-related health consequences Energy-balance behavior CD-ROM II (module 3) Physical activity Letter (module 5) Physical activity	3	Intervention (5 modules) also focuses on fat, fruit and vegetables intake and weight loss Encouraging/informative newsletters
Winett, 2007 *120*	Physical activity		On screen	Daily step counts Goal attainment Strategies Preferred reasons for using intervention (health/weight loss)	12	Intervention also focuses on fruit and vegetables intake, fat intake, fiber intake and weight loss Church-based supports

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
B. DIET						
Adachi, 2007 *154* Tanaka, 2010 *369*	Dietary habits	Behavioral therapy	Print	Personal characteristics Readiness to change behavior Weight history Weight rebound experience Primary purpose of weight control Target weight Body image Eating habits	2	Intervention primary focuses on weight control and secondary on exercise and dietary habits Booklet of behavioural weight control
Alexander, 2010 *222*	Fruit and vegetables intake	SCT TTM HBM	On screen	Needs Dietary preferences, Interests	4	Intervention also included optional short video/audio files of behavioral strategies and/or recipe preperations
Blair Irvine, 2004 *1018*	Fat intake, Fruit and vegetables intake	TTM TRA SCT HCT	On screen	Stage of change Attitude Intentions Self-efficacy Demographics Eating habits Environmental factors	1 (more visits optional)	Intervention also includes interactive multimedia combining audio, video, graphics and printout
Elder, 2005 *1653* Elder, 2006 *1598*	Calories from fat, Fiber intake, Energy intake, Total and saturated fat intake, Carbohydrates intake	Lay Health Advisor Model	Print	BMI Top 10 meals prepared at home Readiness to change Points of influence for change	12	Intervention also includes 12 weekly home visits and activity inserts in newsletters
Fries, 2005 *469*	Fat behavior, Fiber behavior	SCT TTM SMM	Email report	Fat behavior Fiber behavior	1	Counselling phone call and self-help booklets
Gans 2009 *261*	Fat intake, Fruit and vegetables intake	TTM SCT	Print	Fruit and vegetables intake, Fat-related behavior Demographics Self-efficacy Barriers Interests	1- 4	Intervention also includes motivational DVD
Haapala,2009 *271*	Weight loss		On screen (mobile phone text messages)	Weight Daily energy requirement	on demand	
Heimendinger , 2005 *1629*	Fruit and vegetables intake	TTM HBM SCT	Print	Fruit and vegetables intake Stage of change Outcome expectations Barriers Benefits Skills Environmental factors	1/2	

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
B. DIET (cont)						
Jacobs, 2004 *884*	Saturated fat intake, Cholesterol intake	SCT TTM RPT	Print/telephone	Behavioral goals Stage of change Knowledge Social Support High risk situations for relapse Benefits Barriers	8	
Kreuter, 2005 *457*	Fruit and vegetable intake		Print magazines	Demographics EXP1 Fruit and vegetables intake Knowledge Beliefs Perceived Barriers Stage of readiness Self-efficacy Exposure to and preference for different fruit and vegetables Having received a recommendation Interest in eating more fruit and vegetables Perceived importance Environmental factors EXP2 Religiosity Collectivism Racial pride Time orientation	6	Intervention also included promotion of mammography use (participants aged 40-65)
Kroeze, 2008 *320*	Fat intake	PAPM TPB	On screen/print	Perception of own fat intake (high-low) Attitude Self-efficacy Readiness to change Environmental factors Demographics	1	
Kroeze, 2008 *346*	Fat intake	PAPM TPB	Print	EXP1 + EXP2 Fat intake EXP3 Fat intake Self-efficacy Intention to change Attitude	1	
Mhurchu, 2010 *219*	Saturated fat purchases		Print	Usual food purchases	6	
Nitzke, 2007 *352* Do, 2008 *291*	Fruit and vegetable intake	TTM	Print	Fruit and vegetables intake Decisional balance Stage of change Processes Self-efficacy	6	Magazines 2 boostercalls at 4 wks and 4 months post-baseline

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
B. DIET (cont)						
Oenema, 2008 *86*	Saturated fat intake	PAPM	On screen and/or print	(perceived) Intake of saturated fats Awareness Stage of change Attitude Self-efficacy Implementation intentions Demographics	at least 1 (more visits possible)	Intervention also focuses on PA and smoking
Poddar, 2010 *312*	Dairy intake	SCT	On screen	Dairy intake	23	
Prochaska, 2005 *458* Prochaska, 2004 *486*	Fat intake, Fruit and vegetables intake		Print	Stage of change Readiness to change Decisional balance Change processes Self-efficacy	3	Intervention also focuses on smoking, skin cancer prevention regular mammography use Integrated multiple risk behavior stage-matched self-help manual
Rothert, 2006 *161*	Dietary behavior		On screen	Dietary behavior Demographics Experiences on weight loss Personal/family health history Attitude Barriers Social support Goals Expectations Preferences Self-efficacy	4	Intervention primary focuses on weight control Encouraging email messages from buddy
Smeets, 2007 *126* De Vries, 2008 *72*	Fat intake, Fruit and vegetables intake	I-CHANGE	Print	Fruit and vegetables intake Fat intake Awareness Motivation Stage of change Attitude Self-efficacy	1-3	Intervention also focuses on smoking and PA Smeets at al evaluated the first computer-tailored letter at short-term, De Vries et al evaluated the effects of three letters with an action planning component randomly applied in 3th letter
Sternfeld, 2009 *45*	Saturated and trans fat intake, Fruit & vegetables intake, Added sugars		Email reports	Dietary intake Stage of change Self-efficacy Individual lifestyle constraints	12	Intervention also focuses on PA Personal homepage: tips on how to achieve goals Weekly health note Simulation tools Progress tracking tool Review of barriers Discussion board Links to additional resources Reminder messages

1st author(s) *reference number(s)*[1]	Target behavior(s)	Theories	Tools	Tailoring variables	Feedback frequency	Additional strategies/notes
B. DIET (cont)						
Van Keulen, 2011 *2038*	Fruit and vegetables intake	I-Change model Control Theory	Print	Fruit/vegetables intake Awareness Demographics Stage of change Attitude Self-efficacy Expectations Action plans	4	
de Bourdeaudhuij, 2007 *380*	Fat intake	TPB TTM	On screen and/or print	Fat intake Intentions Attitude Self-efficacy Social support Knowledge Benefits Barriers Demographics	1/2	
Walker, 2009 *53* Walker, 2010 *2040*	Fat intake, Fruit and vegetables intake	HPM	Print	Benefits Barriers Self-efficacy Habits Family Support	18	Instructional videotapes Action planning
Werkman, 2010 *13*	Fat intake, Fruit and vegetables intake	Intervention mapping protocol	CD-ROM/print	<u>CD-ROM I (module 2)</u> BMI BMI-related health consequences Energy-balance behavior <u>CD-ROM II (module 3)</u> Fibre consumption Portion sizes of energy dense foods Fat consumption <u>Letter (module 5)</u> Body weight Dietary intake	3	Intervention (5 modules) also focuses on PA and weight loss. Modules 1 and 4 are not tailored Encouraging/informative newsletters
Winett, 2007 *120*	Fat intake, Fruit and vegetables intake		On screen	Nutrition Goal attainment Strategies Preferred reasons for using intervention (health/weight loss)	12	Intervention also focuses on fruit and vegetables intake, fat intake, fiber intake and weight loss Church-based supports

TPB = Theory of Planned Behavior; TTM = Transtheoretical Model; HBM = Health Belief Model; SCT = Social Cognitive Theory; ELM = Elaboration Likelihood Model; HPM = Health Promotion Model; PAPM = Precaution Adoption Process Model; SRT = Self-regulation Theory; SDT = Self-determination theory; RPT = Relapse Prevention Theory; [1]Some publications reported on the same intervention, and are therefore clustered in one cell; [2]Dutton, 2008 examined the effects of an intervention aimed at physical activity on dietary intake.