

Supplementary File_ Appendix 4: RCTs data analysis

Author & year of publication	Country	Type of study	Population	Intervention	Type of technology	What is the tech for?	Who the technology is for?	Characteristics of goal setting	Primary outcome	Secondary outcome	Results
(Demeyer et al., 2017)	Europe	RCT	N= 343 people with COPD were randomized. N=171 Intervention group – Fitbug app and pedometer; N=172 Control group – treatment as usual	During the 12 weeks intervention, patients in the intervention group received usual care plus the tele coaching intervention. This included an exercise booklet and a step counter providing goals and feedback directly and via the Fitbug app. Patients’ targets were automatically revised once per week, based on performance in the preceding week. The clinician could control the goal selection process as they could ‘alter’ or ‘lock’ the goals if needed, based on interaction with the patient. The patient received text messages and occasional telephone contacts with investigators. Control group participants continues with usual medical treatment.	Fitbug smartphone app and Fitbug air step counter.	It is specifically designed for tele-coaching physical activity.	The app is for People with COPD across the whole disease spectrum, partly for selfmanagement, but it requires a therapist to monitor.	The smartphone app provides “automated coaching” by displaying an activity goal (number of steps) and feedback daily. The feedback included a graphical representation of the day’s performance and an educational tip. This smartphone app provides an individualised daily activity goal (steps) revised weekly and a text message as well as occasional contact with the therapist. Goals can automatically get harder if the user improves the step count.	Number of steps per day over 3 months.	Time in at least moderate intense Physical Activity, measured by accelerometer; walking time; movement intensity during walking; post bronchodilator spirometry; 6 minute walk test; isometric quadriceps force; health status, measured by the CAT, COPD Assessment Test; Clinical COPD Questionnaire (CCQ); and breathlessness, measured by the modified Medical Research Council questionnaire.	The app resulted in improvements in step count (MD 1469 steps/day; 95% CI 971 to 1965); min/day in moderate physical activity (MD 10.4 mins; 95% CI 6.1 to 14.7); and the 6 min walk test (MD 13.4 m; 95% CI 3.4 to 23.5m). Other health status outcome did not differ.
(Devi, Powell, & Singh, 2014)	UK	RCT	N= 95 people with angina were randomized. N= 48 intervention group – Activate Your Hearth. N= 47 control group- treatment as usual.	The intervention group participants wore the monitor on the right upper arm for 2 weekdays (12 hours per day) at baseline and at the 6-week and 6month follow-ups. They were told to log in to the program daily to record their daily physical activity. Control participants in the control group continued with treatment as usual from their GP and received no further contact from the researcher until the 6-week follow-up.	Secure and passwordprotected website “ActivateYour Heart” connected to accelerometer - Sensewear Pro 3 accelerometer technology.	It aims to improve health behaviours.	It is designed for people with CHD (coronary heart disease) for self-management to use at home.	Baseline information are used to set individualized tailored goals focused on exercise (e.g. being physically active for 30 minutes 5 times a week), diet (e.g., eating more fruit/vegetables and reducing salt intake), emotions (e.g., managing stress and other negative emotions), and smoking (e.g., reduce cigarette smoking if relevant). Throughout the program, goals can be reset/modified depending on previous performance. As the user progressed through the program, goals can be increasingly difficult.	Daily average step count change at 6-week follow-up, measured using Sensewear Pro 3 accelerometer technology.	Energy expenditure (EE), duration of sedentary activity (DSA), and duration of moderate activity (DMA) measured using Sensewear Pro 3 accelerometer. Weight, diastolic (DBP) and systolic blood pressure (SBP), and body fat percentage measured using conventional instruments. Fat and fibre intake (measured using the Dietary Instrument for Nutritional Evaluation); anxiety and depression (assessed using the Hospital Anxiety and Depression Scale); selfefficacy and health-related quality of life (QOL) measured using The General Self-Efficacy Scale. In the intervention group, we also monitored the number of logins to the online program.	Change in daily steps walked was +497 (SD 2171) in the intervention group and -861 (SD 2534) in the control group (95% CI 263-2451, P=.02). Significant intervention effects were observed in EE (+43.94 kcal, 95% CI 43.93 309.98, P=.01), DSA (7.79 min, 95% CI -55.01 to -7.01, P=.01), DMA (+6.31 min, 95% CI 6.01 51.20, P=.01), weight (0.56 kg, 95% CI -1.78 to 0.15, P=.02), self-efficacy (95% CI 0.30-4.79, P=.03), emotional QOL score (95% CI 0.01-0.54, P=.04), and angina frequency (95% CI 8.57 35.05, P=.002). Significant benefits in angina frequency (95% CI 1.89-29.41, P=.02) and social QOL score (95% CI 0.05-0.54, P=.02) were also observed at the 6month follow-up.

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(Foster et al., 2015)	UK	RCT	N= 163 people with CRF (cancer related	Participants in the RESTORE intervention group were limited to 6 weeks access to RESTORE and presented with sessions at weekly	Web-based intervention called RESTORE.	It aims to enhance selfefficacy. It provides self-	It is intended as a standalone, self-management	The website includes training in the concept of goal setting encouraging setting weekly SMART goals (specific,	Physical function status measured by the Perceived Self-Efficacy for fatigue selfmanagement; Self-efficacy measured by the Cancer Survivors' Self-Efficacy Scale; Health-	There were no statistically significant differences in any of the scores at any time points.
			fatigue) were randomized. N= 85 intervention group - RESTORE. N= 78 control group - "Coping with Fatigue" Leaflet.	intervals. Sessions 1 and 2 were mandatory and introduced CRF and goal setting. For the following 3 weeks, participant's accessed session 3 and started setting goals and engaging with other activities. Participants had to choose from (i) diet, sleep, exercise, home and work life; (ii) thoughts and feelings; and (iii) talking to others. Participants could choose to complete all available sessions or spend more time on the area/s most important to them. Participants were also encouraged to download and complete a fatigue diary. Participants in the Leaflet group had only access to the sessions informed by Macmillan Cancer Backup's leaflet, "Coping with Fatigue".		management strategies in addition to education and information.	app for people with cancer related fatigue.	measurable, attainable, relevant, and time bound). Goal setting embeds within a broad self-management intervention. Goal setting emphasises setting and achieving small realistic goals, and stepwise progress towards a higher level of activity. The website allows revision of goals on a weekly basis and provides automatic feedback on goal achievement/nonachievement. The website facilitates identification of life areas related to fatigue that could be the subject of goals, and strategies to support goal pursuit. The website supports selfmonitoring of fatigue scores.	related quality of life measured by the Functional Assessment of Cancer Therapy General; Satisfaction measured by the Personal Wellbeing Index; Depression and mental health measured by the Patient Health Questionnaire; Severity and impact of cancer-related fatigue measure by the Brief Fatigue Inventory and intervention adherence was examined by usage data.	

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(Glasgow et al., 2011)	USA	RCT	<p>N= 270 people with Type 2 Diabetes mellitus were randomized. N= 137 intervention group - website only N= 133 intervention group - website plus human support.</p> <p>(The “usual care” group was not reported in this paper)</p>	<p>All participants were tutored in website log-in, navigation, and usage. Participants were then asked to select initial, easily achievable goals to enhance self-efficacy in each of 3 areas: medication adherence, exercise and food choice. Participants weekly recorded their progress using the website dedicated section or via the interactive voice response phone system. Participates received “immediate feedback” on success or struggles in tracking and meeting their goals over last 7 days via both web and IVR (interactive voice response) modalities. After 6 weeks participants were instructed to further tailor their 3 self-management goals by creating action plans. Participants, randomized to the website plus social support group, received all aspects of the website intervention with the addition of follow-up calls and group meetings.</p>	<p>Internet-based website called “My Path to Healthy Life” (“My Path,” for short) or My Path/Mi Camino website</p>	<p>It is a website that provides self-management strategies.</p>	<p>The website is for adults with diabetes, intended to be for selfmanagement. The therapist could help but it is not necessary.</p>	<p>The website involves goal setting, action planning, and self-monitoring as well as offering features such as “Ask an Expert” to enhance healthy eating, physical activity, and medication adherence. The website allows the user to choose one goal in each of: 1. Medication adherence - “the right way everyday” or 2. Exercise – steps or minutes walked each day using a pedometer or 3. Dietary – eliminate fast food, fried food or sugarsweetened beverages. The “Track my progress” section allows to keep track and record of the weekly progress. The “Action plan” section allows the user to write a personal message for each goal, by selecting motivating factors from a list or writing individual ones. The website shows graphs comparing personal PA levels with national recommendations.</p>	<p>Health literacy measured by Short Test of Functional Health Literacy (STOFHL); eating patterns measured by the National Cancer Institute Percent Energy from Fat Screener (PFAT); physical activity measured with the Community Healthy Activities Programme for Seniors (CHAMPS); medication adherence measured by the HillBone compliance scale; Biological outcomes included: BMI, Hba1C, total cholesterol, LDL, HDL, systolic BP, smoking status, diabetes medication regime; Website usage measured by mean number of visits, median number or visits, percentage of people visiting each section and number of actions planned.</p>		<p>Participants demonstrated a large variability in website usage over the 4 months period. Although, usage decreased over time, from 70% weekly visits during the first 6 weeks to 47% during the lasts. Exercise action plan pages were visited more often than medication taking and healthy eating pages (mean of 4.3 visits vs 2.8 and 2.0 respectively, P<.001). Engagement, especially in selfmonitoring, was related to improvement in healthy eating (r=.20, P=.04), reduction of dietary fat (r=-.31, P=.001) and improvement in exercise (r=.20, P=.033). There were no significant differences between website alone and website plus human support conditions on most of the engagement variables and on any of the overall use variables.</p>
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(Moy et al., 2015)	USA	RCT	<p>N= 239 veterans with COPD were</p>	<p>Participants in the intervention group wore the pedometer every day, reminded to upload stepcount data at least weekly and</p>	<p>Automated. Internetmediated, pedometer-</p>	<p>The aim of the website is to encourage user to</p>	<p>The website is for people with COPD</p>	<p>The website has a page called “Your Progress” were the user can upload step-counts from the pedometer and use</p>	<p>Health-related quality of life (HRQL) assessed by the St.</p>	<p>Daily step count assessed with the Omron HJ-720 ITC pedometer.</p>	<p>There was no significant between-group difference in SGRQ-TS (2.3 units, P=.14) at 4 months. For</p>

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			randomized. N = 155 Intervention group – website plus pedometer. N= 84 wait-list control group - pedometer alone.	were provided access to the website. Each week's goal was the lowest of three numbers: (1) the average of the most recent seven days of step counts 1 600 steps, (2) the previous goal 1 600 steps, or (3) 10,000 steps per day. The website showed them: Iterative step-count feedback; weekly goal; education and motivational content; and an online community forum. The 12-month intervention was composed distinctly of an initial intensive 4-month phase followed by a maintenance 8month phase. Control subjects were instructed to wear the pedometer everyday upload stepcount data at least monthly and report adverse events. They received no instructions about exercise, were not assigned stepcount goals, and had access to a webpage that only showed a count of what week they were in the study.	based walking program named “Taking Healthy Steps” linked to a pedometer.	increase their walking/physical activity.	only for selfmanagement.	an interactive graph to review weekly goal, weekly step-counts and daily stepcounts. The user can also change the view from week to day view, by clicking on the graph. There is also a “current goal” shown on the top of the website page. The website has also four key components: 1. Iterative step-count feedback for self-monitoring of step counts; 2. Weekly individualized, dynamic, and concrete goal setting, based on uploaded step counts; 3. Education and motivational content for enhancing disease selfmanagement and selfefficacy, that provide a new educational tip every other day; 4. Online community forum for social support.	George's Respiratory Questionnaire (SGRQ) and composed of a summary total score (SGRQ-TS) and three domain scores: Symptoms, Activities, and Impact.		domain scores, the intervention group had a significantly lower mean (reflecting better HRQL) than the control group by 4.6 units (P=.046) for Symptoms and by 3.3 units (P=.049) for Impact. There was no significant difference in Activities score between the two groups. Compared with the control subjects, intervention participants walked 779 more steps per day at 4 months (P=.005). Taking Healthy Steps is safe and engaging, improves health-related quality of life and increases daily step count at 4 months.
(Moy et al., 2016)	USA	RCT	(As above) N= 239 veterans with COPD were randomized. N = 155 Intervention group – website plus pedometer. N= 84 wait-list control group - pedometer alone.	Participants randomized to “Taking Healthy Steps” completed an intensive 4-month intervention period, followed by 8-month maintenance phase. During the 8month maintenance phase, participants continued to wear the pedometer, upload daily step counts, receive weekly step-count goals and feedback, and had access to the online community forum. Participants randomized to the wait-list control group were instructed to wear the pedometer every day, reminded monthly to log in to the website to upload step-count data, and asked to report all adverse events. The website didn't have any of the 4 characteristics that the intervention group had.	(As above) Automated. Internetmediated, pedometerbased walking program named “Taking Healthy Steps” linked to a pedometer.	(As above) The aim of the website is to encourage user to increase their walking/physical activity.	(As above) The website is for people with COPD only for selfmanagement.	(As above) The website has a page called “Your Progress” were the user can upload step-counts from the pedometer and use an interactive graph to review weekly goal, weekly step-counts and daily stepcounts. The user can also change the view from week to day view, by clicking on the graph. There is also a “current goal” shown on the top of the website page. The website has also four key components: 1. Iterative step-count feedback for self-monitoring of step counts; 2. Weekly individualized, dynamic, and concrete goal setting, based on uploaded step counts; 3. Education and motivational content for enhancing disease selfmanagement and selfefficacy, that provide a new educational tip every other day; 4. Online community forum for social support.	(As above) Health-related quality of life (HRQL) assessed by the St. George's Respiratory Questionnaire (SGRQ) and composed of a summary total score (SGRQ-TS) and three domain scores: Symptoms, Activities, and Impact.	(As above) Daily step count assessed with the Omron HJ-720 ITC pedometer.	There was no significant between-group difference in the primary outcome of SGRQ-TS (mean 1.1 units, 95% CI –2.2 to 4.5; P=.50) and in the SGRQ domain scores of Symptoms (mean 0.5 unit, 95% CI –4.2 to 5.2; P=.84), Activities (mean 0.04 unit, 95% CI –4.2 to 4.2; P=.99), and Impact (mean 2.3 units, 95% CI –1.6 to 6.1; P=.25) at 12 months. There was no significant difference between groups of daily step count at 12 months (P=.73). Differences in daily step counts in the intervention group compared to controls were statistically significant at month 4, but almost zero in months 8 to 12. Between-group P values were <.001 at 4 months, .28 at 8 months, and .82 at 12 months.

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(Wan et al., 2017)	USA	RCT	N=114 subjects with COPD were randomized. N=60 people in the intervention group - website plus pedometer. N=54 people in the control group - pedometer alone.	Subjects in the website plus pedometer group were instructed to wear the pedometer daily during all waking hours, to upload step counts weekly, and were given access to a website which provided the four key components of individualized goal-setting, iterative step-count feedback for self-monitoring, educational and motivational content to enhance disease self-management and selfefficacy, and an online community forum for social support. Subjects received step-count goals every week based on their current recorded step count or previously set goal. The goals were the minimum value of three possible numbers: 1) the previous goal þ400 steps, 2) the average of the most recently uploaded seven days of step counts þ400 steps, or 3) 10,000 steps. Subjects randomized to the pedometer alone group were given a pedometer and written materials about exercise at study entry but were not assigned step-count goals. They were instructed to wear the pedometer daily while awake and to upload step counts at least monthly via the website; the website had no content except a display of the study week. Both groups uploaded step-count data to the same study server via the website.	Automated. Internetmediated, pedometerbased walking program named "Taking Healthy Steps" linked to a pedometer.	The aim of the website is to encourage user to increase their walking/physi cal activity.	The website is for people with COPD only for selfmanagement.	The website has a page called "Your Progress" where the user can upload step-counts from the pedometer and use an interactive graph to review weekly goal, weekly step-counts and daily stepcounts. The user can also change the view from week to day view, by clicking on the graph. There is also a "current goal" shown on the top of the website page. The website has also four key components: 1. Iterative step-count feedback for self-monitoring of step counts; 2. Weekly individualized, dynamic, and concrete goal setting, based on uploaded step counts; 3. Education and motivational content for enhancing disease selfmanagement and selfefficacy, that provide a new educational tip every other day; 4. Online community forum for social support.	Daily step count using the Omron pedometer	Spirometry, performed using an Eaglet spirometer; 6MWT distance; exercise adherence, measured using the number of website logins and the hours of wear time; HRQL; dyspnoea using the St. George's Respiratory Questionnaire (SGRQ); depression using the Beck Depression Inventory-II Bristol; COPD knowledge using the COPD Knowledge Questionnaire; exercise self-efficacy using the Exercise Self-Regulatory Efficacy Scale; social support, and motivation and confidence to exercise daily. All outcomes were measured at baseline and end of study (3 months).	At 13 weeks, subjects in the pedometer plus website group had significant increases daily step count from baseline relative to the pedometer alone group (804 ± 356.5 steps per day, p 1/4 0.02). No significant differences in secondary outcomes were noted between groups.
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(Schlosser et al., 2016)	USA	RCT	N= 43 people with schizophrenia were randomized. N=22 Intervention group - PRIME N= 21 Control group – treatment as usual/waitlist.	Participants in the intervention group created a PRIME app username, uploaded a profile picture, selected their interests, goals, and symptoms, and wrote a short bio. Once a user was registered to the app, an assigned motivation coach sent a welcome message and an offer to support on the achievement of the set goals. The coach was available to be contacted by message most day per week and in real time, on the phone or via FaceTime. Participants in the PRIME condition were encouraged to use the app daily, whether it be to message with coaches and/or peers or complete challenges. However, the minimum expectation was logging into PRIME at least 1×/wk over the 12week period. Subjects on the control group received usual treatment for their condition.	PRIME (personalized real-time intervention for motivational enhancement), is a mobile based digital health intervention (app).	The app is designed to improve motivational impairments and quality of life early in the course of schizophrenia.	The app is for self-management, but there are assigned motivation coaches (trained psychologist) and an online peer community platform.	With PRIME, the user can select and document progress towards small, selfreport goals in the domains of health/wellness, social relationships, creativity, and productivity. Goal setting is self-directed and occurs within a supportive online peer community and a cognitive behavioural therapy-based coach. Longterm goals can be select from a 36-item list, which included goals such as “deepen my relationship with my family”. Goals can also be modified or changed at any time. Each long-term goal contains more than 15 suggested brief challenges, such as “offer to help a family member with a chore”, and space for selfcustom challenges. Challenges for the same goal	Changes in components of motivated behaviour (reward learning, anticipated pleasure, and effort expenditure), measured using a modified version of the Trust Task.	Self-reported defeatist beliefs using the Motivation and PleasureSelf Report scale; realworld functioning in independent living using the Role Functioning Scale; quality of life in social and vocational domains using the abbreviated Quality of Life Scale; defeatist beliefs about successfully performing goal-directed behaviour using the Dysfunctional Attitudes Scale; depression symptom severity with the Beck Depression Inventory and self-efficacy with the Revised Self-Efficacy Scale; positive and negative symptoms using the Positive and Negative Syndrome Scale; patientreported acceptability of	Compared to the control group, people in the PRIME condition had significantly greater improvements from baseline to 12 weeks in self-reported depression, defeatist beliefs and selfefficacy that were maintained 3 months after the end of trial. People in the PRIME condition had significantly greater improvements in Anticipated pleasure (t (55) =-2.39, P=.02, d=0.64) and Effort expenditure (t (55) =-2.17, P=.03, d=0.58) compared with the control group. There were no group differences in changes in positive or negative symptoms, quality of life or functioning (Ps > .28). The
								becomes progressively more ambitious, as they are completed. PRIME sends automatic reminders of challenges, and encouragement to post an “accomplishment moment” to peers and coach on the online network.		features of the app (10point scales); app usage.	results suggest that PRIME has the potential to be an effective mobile-based intervention for improving aspects of mood and motivation in young people with SSDs.

References

Demeyer, H., Louvaris, Z., Frei, A., Rabinovich, R. A., de Jong, C., Gimeno-Santos, E., . . . the, P. c. (2017). Physical activity is increased by a 12-week semiautomated telecoaching programme in patients with COPD: a multicentre randomised controlled trial. *Thorax*, 72(5), 415-423.

Devi, R., Powell, J., & Singh, S. (2014). A web-based program improves physical activity outcomes in a primary care angina population: randomized controlled trial. *J Med Internet Res*, 16(9), e186. doi:10.2196/jmir.3340

Foster, C., Calman, L., Grimmett, C., Breckons, M., Cotterell, P., Yardley, L., . . . Richardson, A. (2015). Managing fatigue after cancer treatment: development of RESTORE, a web-based resource to support self-management. *Psychooncology*, 24(8), 940-949. doi:10.1002/pon.3747

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- Glasgow, R., Christiansen, S. M., Kurz, D., King, D. K., Woolley, T., Faber, A. J., . . . Dickman, J. (2011). Engagement in a diabetes self-management website: usage patterns and generalizability of program use. *J Med Internet Res*, *13*(1), e9. doi:10.2196/jmir.1391
- Moy, M., Collins, R. J., Martinez, C. H., Kadri, R., Roman, P., Holleman, R. G., . . . Richardson, C. R. (2015). An internet-mediated pedometer-based program improves health-related quality-of-life domains and daily step counts in copd: A randomized controlled trial. *Chest*, *148*(1), 128-137. doi:10.1378/chest.14-1466
- Moy, M., Martinez, C. H., Kadri, R., Roman, P., Holleman, R. G., Kim, H. M., . . . Richardson, C. R. (2016). Long-term effects of an internet-mediated pedometerbased walking program for chronic obstructive pulmonary disease: Randomized controlled trial. *J Med Internet Res*, *18*(8), e215. doi:10.2196/jmir.5622
- Schlosser, D., Campellone, T., Kim, D., Truong, B., Vergani, S., Ward, C., & Vinogradov, S. (2016). Feasibility of PRIME: A Cognitive Neuroscience-Informed Mobile App Intervention to Enhance Motivated Behavior and Improve Quality of Life in Recent Onset Schizophrenia. *JMIR Res Protoc*, *5*(2), e77. doi:10.2196/resprot.5450
- Wan, E., Kantorowski, A., Homsy, D., Teylan, M., Kadri, R., Richardson, C. R., . . . Moy, M. L. (2017). Promoting physical activity in COPD: Insights from a randomized trial of a web-based intervention and pedometer use. *Respir Med*, *130*, 102-110. doi:10.1016/j.rmed.2017.07.057