

Table 1. Characteristics of PCP-led physical activity prescriptions for patients with chronic disease

Author, Year, Location	Study Design	Length of Intervention	Follow up; with whom	Sample Size, Chronic Condition and Sex/Gender	Brief Study Description – PCP Role	Personalized or Generic Intervention	Primary Health Outcome	Main Health Outcome Findings
Avram et al., 2011, Romania	RCT	18 months with outcomes measured at study end.	Every 6 months in person and once a month over the phone; PCP	253 (133 IG, 120 UC), high cardiometabolic risk Age: IG-55.6; UC-56.5 IG-62% male, 38% female; UC-64% male, 36% female	PCP provided lifestyle counselling and a monthly follow up call for 18 months. PCPs also received counselling training from a team including a cardiologist, diabetologist, and PT.	Personalized: PCP provided 3 90-minute visits to discuss lifestyle habits (diet, PA, weight control).	Weight	Positive Change: Significant decrease in risk profile (decreased waist circumference and weight) in IG.
Boveda-Fontan et al., 2015, Spain	RCT	1 year with assessments at 2, 4, 8 and 12 months.	2, 4, 8 and 12 months; PCP	277 (107 IG, 120 UC), uncontrolled dyslipidemia Age: IG-52.83; UC-52.84 IG-42% male, 58% female; UC-35% male, 65% female	PCPs delivered MI or general recommendations to reduce unhealthy habits into their already scheduled appointments.	Personalized: Patients in the IG received general recommendations (same as UC), as well as an MI approach to increase daily PA.	Lipid levels	Positive Change: After 12 months, total cholesterol levels, LDL-cholesterol, and triglycerides improved from baseline in IG. More patients achieved target lipid control in IG than UC.
Bolognesi et al., 2006, Italy	RCT	5-6 months with assessments at study end.	5-6 months by mail or by phone; Counsellor.	96 (48 IG, 48 UC), obesity IG-46% male; 44% female; UC-37% male, 53% female	PCP assessed BMI, recruited participants., provided brief counselling and PA recommendations using PACE protocol.	Personalized: PCP determined stage of change using PACE assessment tool and provided PA recommendations.	BMI and abdominal girth	Positive Change: After 6 months, BMI and abdominal girth significantly decreased in IG.
De Greef et al., 2011, Belgium	RCT	12 weeks with outcomes measured at study end.	12 weeks; PCP.	67 (24 UC, CBT 22, CBT+PCP counselling 21), type 2 diabetes Age: 67.4 61% male, 29% female	PCPs delivered 3 15-minute PA counselling sessions, plus 3 90-minute CBT sessions to increase activity.	Personalized: PCP helped set PA goals using pedometer. Participants assigned to group counselling discussed behaviour change strategies with a clinical psychologist	Cholesterol, waist circumference, HbA1c	Positive Change: Participants who received PCP counselling had a decrease in waist circumference and HbA1c, and lower increase in total cholesterol.

Miura et al., 2004, Japan	RCT	24 weeks	Every 4 weeks; PCP and counselor.	57 (18 PA Prescription+PCP Counselling, 20 PA Prescription, 19 Matched-UC), hypertension Age: UC-64.0; PA Prescription – 61.0; Prescription+PCP Counselling – 60.0 7% male, 93% female	PCP provided counselling sessions via PACE+ protocol at baseline and follow up.	Personalized: PCPs assessed baseline lifestyle behaviours and provided a PA prescription. The Prescription+PCP GROUP also received 20-minute follow up sessions with their PCP throughout the intervention to review their action plan.	Blood pressure, percent body fat	Positive Change: Decrease in systolic blood pressure in the IGs. Body fat percentage and sodium were higher in the IGs.
Olsson et al., 2015, Sweden	RCT	6 months, with assessments at baseline and 6 months.	6 months; Physical activity counselor	101 (47 IG, 54 UC), obesity Age: 67.5 43% male, 57% female	UC received written PA advice. IG received the advice and a 30-minute counselling session with a PCP trained in MI who provided PA advice by using the FIIT framework to provide a prescription. Both groups received a letter from the PCP with their PA prescription.	Personalized: IG received personalized PA prescription during a MI session. At 1 month PCP also delivered a general group session to increase PA.	SF-36 scores and mental component summary scores	Positive Change: Significant improvement in general health (SF-36 scores) and mental health scores in the IG after 6 months.
Volger et al., 2013, USA	RCT	2 years	Every 3 months; PCP and medical assistants.	390 (131 Brief, 129 Enhanced, 130 UC), obesity and at risk for MS Age: 51.5 Sex/gender not reported	All participants received 7-minute brief lifestyle counselling from a PCP. IGs met monthly for 2 years with a medical assistant for further counselling. Enhanced group had options for meal replacements and medication.	Personalized: Generic brief counselling session was provided to all participants. The IG groups had auxiliary sessions with a medical assistant with personalized lifestyle support.	Weight loss	Positive Change: Both IGs lost more weight than the UC group, the enhanced group lost significantly more weight.
Aizawa et al., 2009, Canada	OBS	24 weeks with outcomes measured at 8 and 24 weeks.	Follow up at 8 weeks and 24 weeks; PCP and research staff	63 (29 without MS, 34 with MS), pre-hypertensive and/or pre-diabetes. Age: without MS-54.3; with MS-53.5	PCP provided individually customized lifestyle prescriptions for aerobic exercise and a Mediterranean-style diet. Prescriptions were	Personalized: PCP provided PA prescription via STEP. Intensity determined by heart rate. PCP recommended	Central artery stiffness	Positive Change: Carotid artery dispensability significantly increased, with improvements in MS components (BP,

				47% male, 53% female	provided by the Step Test Exercise Prescription, which uses stepping time (20 times stepping with 9.5cm step) and heart rate to predict maximal oxygen uptake and 75% or predicted VO ₂ max, and stage of change model. MS components and carotid artery stiffness was measured at baseline and after 24 weeks of intervention.	appropriate serving size and Mediterranean-style diet. Using the 'stage of change' model, PCP counseled patient to incorporate PA in daily lifestyle.		fasting glucose, waist circumference) in participants with MS.
Bertozi et al., 2004, Italy	OBS	7 months, with outcomes measured at study end	7 months (median); unclear if with PCP.	145, at risk for obesity Age: 51.6 38% male, 62% female	PCP provided brief counselling using PACE to increase PA.	Personalized: PCP assessed motivational level towards PA and then provided advice to increase PA.	Motivation to increase PA. Secondary outcomes: BMI, and abdominal circumference	Positive Change: After 7 months, BMI and abdominal circumference decreased.
Filippi et al., 2017, Italy	OBS	Approximately 54 months. Participants were randomly selected to be seen on 12 pre-determined working days.	After 12 months; PCP	810 (405 IG, 40 Matched-UC), high blood cholesterol Age: 55.5 43% male, 57% female	PCPs calculated and discussed cardiovascular risk, and provided a brief lifestyle counselling session to increase aerobic PA.	Personalized: Based on cardiovascular risk, PCPs provided a 5-10 minute session on healthy eating and PA, handed out dietary pamphlets, and prescriptions of statins if needed.	Total cholesterol and global cardiovascular risk	Positive Change: After 54 months, total cholesterol and global cardiovascular risk decreased in IG as compared to matched-UC.
Lohmann et al., 2010, Denmark	OBS	18 months with outcomes measured at 3, 6, 8, 12, 15, and 18 months.	Every 3 months; PCP	127, type 2 diabetes Age 67.5 58% male, 42% female	Two fitness consultations every 3 months. One consultation included a fitness assessment and the second was MI with a PCP to review the assessment results.	Personalized: The PCP assessed their stage of change, and then using MI to provide PA advice.	HDL-cholesterol, HbA1c	Positive Change: HDL cholesterol levels increased, and HbA1c levels were unchanged and low.

Chambers et al., 2000, UK	RCT	1 year with outcomes measured at study end.	No follow up	386 (UC 94, PA booklet 99, PA booklet+PT session 97, PA booklet+PT session+group fitness 96), One of the following: ischemic heart disease, stroke, hypertension or diabetes Age: 61.0 54% male, 46% female	UC received no PA-related information, PA booklet group received a booklet with information about the benefits of PA, PA booklet+PT session received the booklet about the benefits of PA and a fitness assessment with a PT, booklet+PT session+group fitness received the same benefits of PA booklet, a fitness assessment with a PT and access to 4 group fitness sessions. For all IGs, the booklet discussing PA benefits was sent with an accompanying letter encouraging PA from the PCP.	Generic: PCP mailed letters with PA-related information to all groups. Two groups also had one session with PT and access to group fitness.	SF-36	No change: Social functioning and bodily pain deterioration was reported in the UC group only, whereas no change of trends towards improved scores were observed in the IGs.
van Sluijs et al., 2005, Netherlands	RCT	1 year with outcomes measured at baseline, 8 weeks, 6 months and 12 months.	4 weeks; PCP	396 (IG 191, 205 UC), hypercholesterolemia, or NIDDM or hypertension Age: 55.5 50% male, 50% female	Using PACE, PCPs (or nurse) provided a 10-minute counselling session. IG received telephone counselling after 2 weeks (with a PA counsellor), a follow up with the PCP after 4 weeks, and a booster call after 8 weeks after the second visit.	Personalized: The IG had a follow up session with their PCP after 4 weeks since initial discussion. For the IG the PCP used the PACE protocol.	BMI and waist circumference.	No change: No change in BMI and waist circumference increased in the IG.
Serrano Ripoll et al., 2015, Spain	RCT	1 year, with outcomes measured at 6 and 12 months	6 and 12 months; PCP	273 (140 IG, 133 UC), mild-moderate depressive symptoms Age: 52 (median)	PCPs provided a written prescription to improve health behaviours, including going for daily walks. UC received a less	Generic: PCP completed initial screening for depression and reinforced the written	Beck Depression Inventory scores	Unclear/Mixed: At 12 month follow up, both groups had decreased depressive symptoms, with no differences between groups.

				18% male, 82% female	detailed lifestyle prescription.	prescription including going for daily walks.		
Lord & Green, 1995, UK	OBS	1 year	10 weeks, 6 and 10 months; Community health and fitness officer.	419, at risk for cardiovascular disease 25% male, 68% female, 7% unknown	Pilot included optional exercise classes (e.g., dance, swimming, walking, bowling) for 3 sessions per week for 10 weeks. PCPs provided referral and indicated on the referral if there are any exercises that were contraindicated for the patient.	Generic: PCP assessed whether patient would be eligible for scheme and provided referral to the program.	Primary outcome was adherence. Participants could indicate their main reason for wanting to join the program and outcomes were assessed accordingly. The most common goal was weight loss.	Unclear/Mixed: Adherence to the program was low with only 20% attending classes for 10 weeks. Adherence to follow up was low, of those who returned for follow up and adhered to the 10-week program (n=44) average weight loss was 1kg and there was a 4 beat or more decrease in resting heart rate. Clinical or statistical significance were not reported.

Mean age is presented. Sex/gender percentages are presented as reported by authors.

BMI – Body mass index; FIIT – Frequency, intensity, time, type; IG – Intervention group; MI – Motivational interviewing; MS – Metabolic syndrome; NIDDM - Non-insulin-dependent diabetes mellitus; PACE - patient-centered assessment and counseling for exercise; PCP - Primary care provider; PT – Physiotherapist; PA – Physical activity; SF-36 – 36-Item Short Form Survey; UC – Usual care