Does counseling help patients get active?

Systematic review of the literature

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ABSTRACT

OBJECTIVE To determine the effect of counseling patients to become more physically active.

DATA SOURCES PubMed was searched for articles during the past 30 years on physicians promoting physical activity. Identified studies were cross-referenced, and experts were consulted for additional articles.

STUDY SELECTION Thirteen articles described primary care counseling on exercise. Six studies were randomized controlled trials (RCTs); seven were quasi-experimental designs. Three of the four RCTs and three of the five quasi-experimental studies were short term (4 weeks to 2 months); the remaining three trials lasted longer than 6 months. Most studies used strategies to address stage of change.

SYNTHESIS Outcome measures included adoption of physical activity, stage of change, and change in physical activity level. Most studies found positive relationships between counseling and these outcomes. No reliable evaluation instruments were found, nor was the long-term effect of interventions established.

CONCLUSION Interventions that included written materials for patients, considered behaviour change strategies, and provided training and materials for physicians were effective at increasing levels of physical activity. New strategies that involve measuring and prescribing specific amounts of exercise might also improve fitness levels and hence improve outcomes of chronic disease. Shortcomings of these studies include lack of long-term data, lack of sustaining activities for family physicians, and scant cost-efficacy analysis.

RÉSUMÉ

OBJECTIF Déterminer l'influence du counselling aux patients en vue d'accroître leur activité physique.

SOURCES DES DONNÉES Une recension d'articles dans PubMed portant sur les 30 dernières années a été réalisée concernant la promotion de l'activité physique par les médecins. On a effectué des recoupements à partir d'articles et on a consulté des experts pour obtenir des articles additionnels.

SÉLECTION DES ÉTUDES Treize articles portaient sur le counselling de première ligne concernant l'exercice physique. Six études étaient des essais aléatoires contrôlés; sept se classaient comme des devis quasi-expérimentaux. Trois des quatre essais aléatoires contrôlés et trois des cinq études quasi-expérimentales s'étaient déroulés à court terme (de quatre semaines à deux mois); les trois autres enquêtes avaient duré plus de six mois. La plupart des études comportaient des stratégies pour déterminer le stade du changement.

SYNTHÈSE Les mesures des résultats incluaient l'adoption de l'activité physique, le stade du changement et la modification du degré d'activité physique. La plupart des études faisaient valoir des relations positives entre le counselling et les résultats obtenus. Aucun instrument fiable d'évaluation n'a été trouvé et l'effet à long terme des interventions n'a pas été établi.

CONCLUSION Les interventions qui s'accompagnaient de documents remis aux patients, envisageaient des stratégies de changement comportemental et offraient de la formation et des documents aux médecins se sont révélées efficaces pour augmenter le degré d'activité physique. De nouvelles stratégies qui prévoient la mesure et l'ordonnance de quantités précises d'exercices pourraient aussi améliorer la qualité de la condition physique et, par conséquent, se traduire par de meilleures issues au chapitre des maladies chroniques. Les lacunes dans ces études se situaient dans l'absence de données à long terme, le manque d'activité d'encadrement durable des médecins de famille et la rareté des analyses de la rentabilité.

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Family physicians' role in disease prevention and health promotion has been well described.[1] In general, family physicians are in favour of many prevention-oriented behaviours, such as exercise and physical activity. Despite this attitude and their unique position for delivering clear health-promoting messages at teachable moments to a large population of patients,[2] most family physicians do not routinely counsel their patients on physical activity and exercise.[2-4]

To add to the dilemma, patients frequently identify family physicians as a preferred source of encouragement for physical activity and exercise.[2,5,6] Barriers, either real or perceived, to physicians' counseling patients to exercise include their lack of confidence, training, and instruments and materials; inadequate reimbursement; and lack of time.[3,7,8]

Several important documents (eg, from the Centres for Disease Control and Prevention and the American College of Sports Medicine[9] and from Health Canada and the Canadian Society of Exercise Physiology who published *Canada's Guide for Physical Activity* [guide][10]) have identified the importance of physical activity counseling and exercise prescription in family practice. The College of Family Physicians of Canada has realized the opportunity to engage family physicians and serve as a catalyst for their members and partner groups to promote physical activity by forming a standing committee, the Physical Activity and Health Strategy Coordinating Committee (PAHS). To date, PAHS' activities have included launching the guide at the College's Annual General Meeting in 1999,[10] publishing articles and resource materials in *Canadian Family Physician*,[6,11,12] and designing two practice-based small-group learning modules on exercise counseling and promotion.

As an important parallel activity to providing family physicians with the skills and tools to include counseling about exercise in their practices, we have studied the current state of research and examples of physical activity counseling and exercise prescription interventions in the family practice literature. Our objectives were:

- to establish what studies have been completed on physical activity counseling or exercise prescription in family practice;
- to determine whether these studies found counseling improved physical activity levels, fitness, or other health outcomes;
- to identify the strengths and weaknesses of these trials in terms of use in family practice;
- to identify the intervention strategies, instruments, and outcome measures used in the studies; and
- to identify areas for future study.

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Data sources

PubMed and PsychINFO computerized databases were searched for the past 30 years for studies on physical activity counseling or exercise prescription using the MeSH terms family practice OR primary care OR physician AND physical activity OR exercise AND counseling AND behavioural change (**Table 1**). Physical activity was defined as a behavioural attribute comprising energy expenditure from volitional and nonvolitional activities throughout the day. Aerobic fitness is a measure of the body's ability to transport and use oxygen and is dependent on regular volitional activities of reasonably high energy expenditure (ie, exercise training). Levels of activity and fitness could be genetically determined to some extent and be either unique or dependent on one another.

Table 1. **Systematic breakdown of literature search**

SEARCH METHOD	MESH TERM	NO. OF TRIALS
	Family practice	
OR	Primary care	
OR	Physician	
AND	Physical activity	10 896
OR	Exercise	1251
AND	Counseling	218
AND	Behavioural change	13

We used the following criteria for selection of trials. First we looked for randomized controlled trials, or controlled studies with systematic assignment of individual participants with at least one control and one intervention group; and for quasi-experimental studies in which subjects were compared but could not be randomly assigned to intervention or control groups. Second we sought reports of interventions to promote physical activity to patients by physicians, by primary care clinics or offices, and in secondary or tertiary care

settings. Finally we looked for outcome measures of physical activity or cardiorespiratory fitness in intervention and control groups at follow up.

Following the search, we reviewed the bibliographies of identified articles to obtain further references and consulted with experts in physical activity counseling to identify unique databases and references. These latter two strategies failed to produce any more studies meeting our selection criteria. Once the search was completed, studies were scrutinized for design; type, frequency, duration, and intensity of exercise; intervention type and length; measurement methods; and outcome data reported.

Synthesis

We identified 13 trials[2-5,7,13-20] in which physical activity counseling in family practice was evaluated among adults (**Table 2**[2-5,7,13-18]). Eight studies were conducted in the United States,[2,3,13,14,16,18-20] two in Australia,[4,15] one in New Zealand,[5] one in the United Kingdom,[18] and one in Canada.[7] Sample sizes ranged from 63 to > 4000, and three trials included only older patients.[3,7,16] All studies included both men and women. Six of the studies used a randomized controlled design[5,7,15,16,18,20]; five were quasi-experimental.[2-4,13,14] Behavioural theories that were the basis for the interventions were described in six studies[2-4,15,18,19]; Social Cognitive Theory[21] and the Transtheoretical Model[22] were used most often. Only one study[7] used an exercise training instrument to prescribe physical activity.

Five studies were short term (ie, 4 weeks to 2 months)[2,3,5,7,14]; the remaining eight were longer term (ie, >6 months). Because the outcome measures in these trials were many and varied, comparison of results was limited (**Table 3**[2-5,7,13,15,16,18]). Only three trials[5,7,19] measured effects on physicians (time required to conduct the intervention, confidence in counseling, and perceived change in knowledge).

Exercise prescriptions in family practice do effect behaviour change in terms of initiating exercise and physical activity. Most interventions were part of larger programs of risk-factor reduction. Long-term results of increasing physical activity are not available. Interventions were primarily directed at behaviour change; only one study included an exercise prescription using physiologic data to define "dose."[7]

One of the first studies of general preventive services by primary care physicians, the INSURE project (Industry-wide Network for Social, Urban and Rural Efforts)[13] had a multisite, multibehavioural intervention and enrolled >2000 patients (29% 65 years and older). Primary care physicians (ie, family practitioners, internists, obstetrician-gynecologists, and pediatricians) were randomized to provide preventive health services relevant to eight issues (high blood pressure, smoking, lack of exercise, excessive dietary fat intake, excess body weight, alcohol misuse, irregular breast self-examination, and non-use of seat belts) or to a control group. After 12 months, 33.8% of patients in the intervention group, but only 24.1% in the control group, had begun exercising ($P < .05$) (comparisons adjusted for age, sex, and state by group status interaction). These results were observed despite the fact that physicians received very limited training (four workshops) in the complex intervention and had limited support during the intervention.

Lewis and Lynch[14] examined the short-term effectiveness among 24 family practice residents of a three-part intervention to encourage physical activity. The intervention consisted of a brief encounter with a physician who promoted exercise, distribution of patient education materials, and the promise of a telephone follow up 1 month later from a staff person. Residents were given 15 minutes of exercise training and a pocket-sized card with the protocol on one side and a supportive rationale on the other. At the 1-month follow up, residents who had received the intervention were exercising more frequently, more intensely, and for longer times (by 108.6 minutes) than controls (who had received no advice). Results of this study were limited because they were based on patient report and not on assignment to intervention or control group). More importantly, follow up lasted only 1 month. The study, therefore, suggests that providing advice might have a positive effect on motivation to change behaviour in the short term, but could not indicate whether the behaviour change would be sustained long enough to have health benefits.

Graham-Clarke and Oldenburg's[15] "Fresh Start" was a multiple risk-factor intervention for cardiovascular disease that tested the effectiveness of adding self-help educational materials to lifestyle counseling using videos. A significant increase in total energy expenditure (kJ/kg/h) over 12 months was observed in both groups, but there was no significant difference between study groups or in behaviour. Hence, providing positive messages through various media seems to improve patients' activity levels in a general way.

Burton et al[16] studied the effect of physician visits as a method of encouraging healthy behaviour among community-dwelling elderly people. Physicians' training was not described, and no difference in activity patterns or behaviour was observed between intervention and control groups.

Table 2. **Summary of literature review**

STUDY	COUNTRY	PHYSICIANS	PATIENTS N (AGE IN YEARS)	TYPE OF TRIAL	INTERVENTION	DURATION
Calfas et al, 1996 (PACE)[2]	United States	16 MDs	255	Quasi	Social, cognitive stages of change	
			212* (mean 39)		PACE assessment (11-item) Walking for exercise (NHIS) Total Paffenbarger Physical Activity Questionnaire Walking for exercise (Paffenbarger) 7-day PAR Accelerometer Processes of change Self-efficacy Social support	Baseline 2 wk (telephone) 4 wk 6 wk
Marcus et al, 1997 (PAL)[3]	United States	Not given	63	Quasi	Social, cognitive stages of change	
			44* (≥ 50, mean 67)		PASE 7-day PAR	Baseline 1 wk 6 wk
Bull and Jamrozik, 1998[4]	Australia	Not given	763	Quasi	Transtheoretical model	
			443* (18 - >60)		Health questionnaire Exercise questionnaire	Baseline
Swinburn et al, 1998 (Green prescription)[5]	New Zealand (two sites)	37 GPs	491	RCT	No theory	
			456* (mean 49)		Questionnaire: 2 weeks' physical activity	Baseline 6 wks (telephone)
Petrella and Wight, 2000 (STEP)[7]	Canada (three sites)	400 FPs	4000 (≥65, mean 67)	RCT	No theory	
					Questionnaires STEP test instrument ACSM guidelines	Baseline 4 mo
Logsdon et al, 1989 (INSURE)[13]	United States (three regions, five sites)	72 MDs	2218	Quasi	No theory	
			1774* (18 - >75)		Questionnaire: Health habits and risk behaviour Perceived health status Psychological variables	Baseline 12 mo
Lewis and Lynch, 1993[14]	United States	24 FP residents	383 (≥18)	Quasi	No theory	
					Exercise habit and attitude	1 mo
Graham-Clarke and Oldenburg, 1994 (Fresh Start)[15]	Australia	80 GPs	758 382* (18-69, mean ~52)	RCT	Stage of change, cognitive-behavioural	4 mo 12 mo
Burton et al, 1995[16]	United States	≥122 MDs	4195	RCT	No theory stated	
			3097* (65-85)		Quality of Well-Being Scale Self-rated health	Baseline 2 year

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Table 2 continued...

STUDY	COUNTRY	PHYSICIANS	PATIENTS N (AGE IN YEARS)	TYPE OF TRIAL	INTERVENTION	DURATION
King et al, 1998 (ACT)[17]	United States (3 regions, 8 sites)	54	874 (35-75)	RCT	Social cognitive theory and transtheoretical model Physical activity and fitness (7-day PAR and treadmill) Risk factors Psychosocial factors Cost effectiveness	 Baseline 6 mo 24 mo
Stevens et al, 1998[18]	United Kingdom (two sites)	Two practices	714 (45-74)	RCT	No theory 10-wk supervised gym and home program ACSM guidelines Physical activity level (sedentary, low, high) Cost	 Baseline 8 mo

*ACSM—American College of Sports Medicine, ACT—Activity Counseling Trial, FP—family physician, GP—general practitioner, NHIS—National Health Indicator System, PACE—Provider-based Assessment and Counseling for Exercise, PAL—physical activity for life, PAR—physical activity recall, PASE—physical activity scale for the elderly, Quasi—quasi-randomized controlled trial, RCT—randomized controlled trial, STEP—step test exercise prescription. *No. followed up.*

Table 3. **Results of exercise advice trials (at maximum follow up)**

STUDY	TIME TO DELIVER INTERVENTION (MIN)	ENERGY EXPENDITURE	PROGRESSION THROUGH STAGE OF CHANGE	EXERCISE PER SESSION	INTERVENTION GROUP VS CONTROL GROUP		
					EXERCISE PER WEEK	NO. OF SESSIONS PER WEEK	DIFFERENCE IN EXERCISING
Calfas et al, 1996 (PACE)[2]	5-10	Significant increase ($P < .005$)	53% vs 12% contemplators moved to active phase ($P < .05$)	Not assessed	Significant increase ($P < .05$) 40 vs 10 min	Nonsignificant increase at 7-day recall	52% vs 12% began exercising
Marcus et al, 1997 (PAL)[3]	5	Not given	Not assessed	Not assessed	Not assessed	Not assessed	17-point difference
Bull and Jamrozik, 1998[4]	Not given	Not given	Not assessed	Not given	Not given	38% vs 35.8% did more than five per week at 12 mo	Significant ($P < .05$) at 1 and 6 mo
Swinburn et al, 1998 (Green prescription)[5]	5	Not given	Not assessed	Not assessed	Nonsignificant difference 148-272 min vs 153-314 min	Not assessed	Significant ($P < .02$)
Petrella and Wight, 2000 (STEP)[7]	12	VO_{2max} increased 8% ($P < .05$)	Not assessed	Not assessed	Not assessed	Not assessed	Significant 10% increase ($P < .05$)
Logsdon et al, 1989 (INSURE)[13]	Not given	Not given	Not assessed	Not assessed	Not assessed	Not assessed	Significant ($P < .02$)
Graham-Clarke and Oldenburg, 1994 (Fresh Start)[15]	Not given	Not significant	Not significant	Not assessed	Not assessed	Not assessed	Not assessed
Burton et al, 1995[16]	Not given	Not given	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed
Stevens et al, 1998[18]	Not given	Not given	10% moved from sedentary to low active	At least 10 min	Not given	Extra 1.5	Significant 10.6% increase ($P < .05$)

INSURE—*Industry-wide Network for Social, Urban, and Rural Efforts,*
PACE—*provider-based assessment and counseling for exercise, PAL—physical activity for life, STEP—step test exercise prescription, VO_{2max}—measure of cardiorespiratory fitness.*

In Project PACE (Provider-based Assessment and Counseling for Exercise), Calfas and associates[2] tailored counseling to patients' level of activity and readiness to become active. Twelve primary care physicians were trained to provide 3 to 5 minutes of physical activity counseling to their patients, and 10 physicians were trained in hepatitis B detection for the control group; 225 patients were randomized to the two groups. Physical activity data were collected at baseline and again 4 to 6 weeks later. Patients received "booster" telephone calls to reinforce the counseling at 2 weeks. At 6-week follow up, 52% of patients in the intervention group but only 12% in the control group reported regular physical activity. Intervention patients significantly increased their duration of walking compared with controls (+37 min/wk vs +7 min/wk) and showed greater readiness to become active than control patients.

Evaluations of the PACE program by these trained physicians indicated that 75% would recommend PACE to other physicians.[20] The PACE was limited by the non-random assignment of physicians to intervention and control groups. Behavioural counseling in primary care, however, seems to encourage patients at least contemplating becoming active to engage in physical activity. The efficacy of this intervention among "precontemplators" and those already active (and needing maintenance) has not been evaluated. Also, the long-term efficacy of this intervention has not yet been established.

The Physically Active for Life "PAL" study[3,19] tested the feasibility and efficacy of a brief physician-delivered physical activity counseling intervention somewhat different from PACE. The pilot study, conducted by Marcus and colleagues,[3] enrolled 63 patients (mean age 67 years) and used a similar stage-of-change intervention. After 6 weeks, physicians found the intervention feasible and found it produced a significant increase in physical activity (although no different from the increase among controls). Limitations of this study include the small volunteer sample, short-term follow up, use of a sequential design, and delivery of the intervention at a single visit.

Pinto et al[19] studied the PAL intervention in older adults in 12 family practices and compared patients with those in 12 practices randomized to standard care (controls). Physicians endorsed the training and support materials and reported adhering to the intervention protocol. Patients reported satisfaction with the exercise counseling and support materials and increased satisfaction with their medical care at office visits. Again, as with PACE, the PAL study demonstrated that, at least in the short term (ie, 6 weeks), an effective, brief counseling intervention tailored to patient readiness to change can improve activity patterns and is acceptable to both providers and patients.

Not all interventions based on behaviour change have worked. Bull and Jamrozik[4] assessed the effectiveness of a simple, brief intervention to increase participation in physical activity among sedentary patients seen in routine consultations in primary care settings. This large-scale intervention studied >400 patients over 12 months. At follow up, there was no significant difference between intervention and control groups in proportion of people participating in physical activity or people's stage of change.

In the "Green Prescription," Swinburn et al[5] compared the effect of written and oral advice about physical activity on 37 general practitioners and 491 of their sedentary patients over 6 weeks. Increase in participation in physical activity and amount of physical activity from baseline to follow up were significantly greater among those who had received written prescriptions. Although the Green Prescription was more effective than verbal advice alone, the study did not describe patients' stage of readiness to change, physicians' training, or details of how the exercise prescription dose was determined. Activity level changes were assessed over only 2 weeks, and follow up was simply a telephone call with no further interaction with the prescriber. Written (prescription) supplements to physical activity counseling should be studied further, especially the actual prescription dose.

Petrella and Wight[7] evaluated the exercise counseling habits of 400 family physicians from three regions of Canada and determined acceptance and use of an exercise prescription instrument and counseling delivered in the office. Their habits were compared with those of 192 controls caring for 3000 randomly selected patients. The intervention included counseling based on guidelines using the American College of Sport Medicine's (ACSM)[9] principles of frequency, intensity, and duration, and an office-based step test[23] to determine fitness level and an appropriate exercise training heart rate (Step Test Exercise Prescription [STEP]). The control group used ACSM guidelines[9] alone.

The STEP group took significantly longer to administer (16.4 min vs 12.9 min), but the extra time resulted in more confidence and greater perceived knowledge among STEP physicians compared with controls.[7] Also, VO_{2max} (measure of cardiorespiratory fitness) was significantly increased in the STEP group but unchanged among controls. A current

study is evaluating the STEP test with the addition of behaviour-change–enabling strategies.

Another work in progress is the Activity Counseling Trial (ACT) in which primary care physicians will be trained to integrate advice on activity levels into routine office visits.[17] These types of interventions are important because they could have an effect on larger numbers of patients, but they might be limited by whether they and other primary care interventions are cost effective.

Stevens et al[18] examined use of an allied health provider with skills in physical activity training in two busy practices in the United Kingdom. They found that it cost less to help sedentary patients to become more active than to motivate patients to recommended levels of activity for improved health. Achieving ideal activity levels for improved health outcomes will cost more in time and resources; savings in health care expenditures in the long term have not yet been determined.

DISCUSSION

From a national perspective, lack of physical activity is an important public health issue. According to Health Canada, less than 33% of Canadians aged 45 to 64 years and less than 25% of Canadians 65 years were active in 1995; 54% of those aged 18 to 24 years were active.[24] The effects of physical activity on health and disease include lower total mortality rates and reduced risk of cardiovascular mortality, colon cancer, diabetes, and hypertension.[25-27] A meta-analysis relating physical activity to prevention of coronary artery disease concluded that the relative risk that the least active people would develop cardiac disease compared with the most active people was 1.9—similar to that of other risk factors (ie, smoking, hypertension).[28]

One study[18] in the United Kingdom found that moving a person from being sedentary to being more active cost ~£650 while moving that person to recommended activity levels[9] cost almost four times as much. Cost was primarily for hiring a staff member to counsel and supervise the activity program. An editorial correctly pointed out that if a primary care physician conducted the counseling, the intervention might be cost saving.[29] As future studies[17,23] include more intensive prescription of physical activity in primary care, we need to determine whether the use of time and resources for these interventions is cost effective.

Is it worth the effort?

Certainly evidence supports the role of physical activity in healthy lifestyles.[9,25] Evidence also indicates that promoting higher levels of physical activity is associated with greater health benefits. In the Runners' Health Study, Williams[30,31] reported a dose-response relationship. Runners who demonstrated higher levels of activity had fewer cardiovascular disease risk factors compared with those less regularly active.

A commentary by Simons-Morton[32] suggested that patients should not only be encouraged to be active but to be vigorously active to further improve their health. More recently, evidence shows that the dose of activity required to prevent and mitigate cardiovascular disease might be strongly dependent on an exercise prescription if higher levels of aerobic fitness are to be achieved. Dvorak et al[33] observed that, when older patients' aerobic fitness and habitual activity levels were compared, the very fit had significantly fewer cardiovascular risk factors than those who reported the most physical activity. Those with the highest physical activity levels but low aerobic fitness did not achieve risk protection.

Hence, the literature supports tailored exercise prescription. In response to this, two physical activity interventions[7,17] have investigated the effect of exercise prescription (ie, physiologic determinants of response to exercise training), including the effect on cardiorespiratory fitness and dose required. Both programs are currently in progress; preliminary reports are given here.

In the ACT training reported by King and colleagues,[17] primary care physicians will be trained to integrate 3 to 4 minutes of advice on increasing physical activity into routine visits. The effect of this advice along with a health educator's behavioural counseling on patients' physical activity levels will be assessed over a 2-year period. Effects will be determined by measuring cardiorespiratory fitness and VO_{2max} using a graded maximal treadmill test.[8] While the intervention will occur in primary care settings, physiologic determinants will be examined in the laboratory. The model also uses a health educator to assist in maintenance strategies, so it might be expensive to deliver. A cost-efficacy assessment would help ascertain generalizability and feasibility.

Petrella and Wight[7] described the effect of using an exercise prescription instrument in primary care offices on fitness levels of older sedentary patients. The STEP could be very useful in primary care because it measures fitness in the office. The STEP program is also currently being investigated using the addition of tailored behaviour-change messages similar to the ACT. The combination of dose and tailored messages might be the best way for physicians

to guide their patients toward the benefits of long-term physical activity.

The need for combined strategies has recently been made evident by reports that behaviour change counseling alone might improve physical activity but not physical fitness.[34] These findings do not discount the benefit of strategies promoting higher levels of physical activity, but family physicians should also consider prescribing exercise (ie, determining exercise dose) to improve fitness.

Barriers to physical activity and exercise counseling

Time, skills, reimbursement, and evidence supporting outcomes remain barriers to physical activity and exercise counseling in family practice. To date, most interventions studied have used behaviour-change strategies that have differed in complexity and in skills and time required. Few studies have measured the time invested by doctors and patients. To use exercise prescriptions, doctors must acquire new skills and pay attention to time constraints and safety. Only 13 studies satisfying our criteria dealt with health outcomes; cost-efficacy and many questions remain to be answered. Only one study examined Canadian experience; most were conducted in the United States where the health system could influence delivery of intervention models not appropriate in other settings. There is no consensus on what measurements should be used, how, by whom, and how outcomes should be evaluated. We need an inventory of available models that use consistent interventions and validated measurement instruments.

Conclusion

Family physicians can facilitate improved physical activity levels and aerobic fitness among their patients. To date, interventions have primarily targeted behaviour-change strategies. Addition of written exercise prescriptions could further improve the effect of these interventions. More investigation is needed into the long-term effects of interventions and whether results can be generalized to patient subgroups. Barriers to interventions appear to be the time and skills required, the need for adequate reimbursement, and the lack of evidence supporting outcomes.

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Editor's key points

- This systematic review found evidence from RCTs and quasi-experimental studies that patients increase their levels of physical activity when they are counseled by primary care physicians.
- The evidence, however, must be taken with caution because the studies have varying counseling techniques and outcome measures, and long-term changes in behaviour have not been documented.
- Success of counseling appears to be associated with patients' readiness to change and with providing training for physicians in counseling techniques. Written exercise prescriptions might further improve outcomes.

Points de repère du rédacteur

- Cette étude systématique a relevé des données probantes tirées d'essais aléatoires contrôlés et d'études quasi-expérimentales à l'effet que les patients augmentaient leur degré d'activité physique à la suite du counselling dispensé par des médecins de première ligne.
- Par ailleurs, les données doivent être envisagées avec prudence en raison des variations dans les techniques de counselling et dans la mesure des résultats ainsi que du fait de l'absence de documentation des changements comportementaux à long terme.
- La réussite du counselling semble être associée à la disposition favorable des patients à l'endroit du changement ainsi qu'à la prestation de formation aux médecins en techniques de counselling. L'ordonnance par écrit de faire de l'activité physique pourrait améliorer davantage les résultats.

References

1. Ashenden R, Silagy C, Weller D. A systematic review of the effectiveness of promoting lifestyle change in general practice. *Fam Pract* 1997;14:160-76.
2. Calfas KJ, Long BJ, Sallis JF, Wooten WJ, Pratt M, Patrick K. A controlled trial of physician counseling to promote the adoption of physical activity. *Prev Med* 1996;25:225-33.
3. Marcus BH, Goldstein MG, Jette A, Simkin-Silverman L, Pinto BM, Milan F, et al. Training physicians to conduct physical activity counseling. *Prev Med* 1997;26:382-8.
4. Bull FC, Jamrozik K. Advice on exercise from a family physician can help sedentary patients to become active. *Am J Prev Med* 1998;15:85-94.
5. Swinburn BA, Walter LG, Arroll B, Tilyard MW, Russell DG. The green prescription study: a randomized controlled trial of written exercise advice provided by general practitioners. *Am J Public Health* 1998;88:288-91.
6. Petrella RJ. *Canada's guide to physical activity*: how can family physicians get the word out? *Can Fam Physician* 1999;45:827-9.
7. Petrella RJ, Wight D. An office-based instrument for exercise counseling and prescription in primary care: the Step Test Exercise Prescription (STEP). *Arch Fam Med* 2000;9:339-44.
8. Blair SN, Applegate WB, Dunn AL, Ettinger WH, Haskell WL, King AC, et al. Activity Counseling Trial (ACT): rationale, design, and methods. Activity Counseling Trial Research Group. *Med Sci Sports Exerc* 1998;30:1097-106.
9. Pate RR, Pratt M, Blair SN, Haskell WL, Macera CA, Bouchard C, et al. Physical activity and public health: a recommendation from the Centre for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;273:402-7.
10. Pipe A. Getting active about inactivity. The College begins to move. *Can Fam Physician* 1999;45:524-5.

11. Lemire F. Call to action. Message from Dr Francine Lemire, CFPC President. *Can Fam Physician* 1998;44:2587-8.
12. Dampier D, Adams R. Key to prolonging health and independence. Physical activity for older Canadians. *Can Fam Physician* 1999;45:996-8.
13. Logsdon DN, Lazaro CM, Meier RV. The feasibility of behavioral risk reduction in primary medical care. *Am J Prev Med* 1989;5:249-56.
14. Lewis BS, Lynch WD. The effect of physician advice on exercise behavior. *Prev Med* 1993;22:110-21.
15. Graham-Clarke P, Oldenburg B. The effectiveness of a general practice–based physical activity intervention on patient physical activity status. *Behav Change* 1994;11:132-44.
16. Burton LC, Paglia MJ, German PS, Shapiro S, Damiano AM. The effect among older persons of a general preventive visit on three health behaviors: smoking, excessive alcohol drinking, and sedentary lifestyle. The Medicare Preventive Services Research Team. *Prev Med* 1995;24:492-7.
17. King AC, Sallis JF, Dunn AL, Simons-Morton DG, Albright CA, Cohen S, et al. Overview of the Activity Counseling Trial (ACT) intervention for promoting physical activity in primary health care settings. Activity Counseling Trial Research Group. *Med Sci Sports Exerc* 1998;30:1086-96.
18. Stevens W, Hillsdon M, Thorogood M, McArdle D. Cost-effectiveness of a primary care based activity intervention in 45-74 year old men and women: a randomized controlled trial. *Br J Sports Med* 1998;32:236-41.
19. Pinto BM, Goldstein MG, DePue JD, Milan FB. Acceptability and feasibility of physician-based activity counseling. The PAL project. *Am J Prev Med* 1998;15:95-102.
20. Long BJ, Calfas KJ, Wooten W, Sallis JF, Patrick K, Goldstein M, et al. A multisite field test of the acceptability of physical activity counseling in primary care: project PACE. *Am J Prev Med* 1996;12:73-81.
21. Bandura A. *Social foundations of thought and action*. Englewood Cliffs, NJ: Prentice-Hall; 1986.
22. Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol* 1983;51:390-5.
23. Petrella RJ, Koval JJ, Cunningham DA, Paterson DH. Predicting VO_{2max} in community dwelling seniors using a self-paced step test. *Med Sci Sports Exerc* 1998;30(Suppl 76):S76, abstract 433.
24. Craig CL, Russell SJ, Cameron C. *Progress in Prevention Series: results from the 1995 and 1997 Physical Activity Monitor*. Ottawa, Ont: Canadian Fitness and Lifestyle Research Institute; 1998.
25. United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, and Presidents' Council on Physical Fitness and Sports. *Physical activity and health: a report of the Surgeon General*. Atlanta, Ga: US Department of Health and Human Services; 1996.
26. Risk Factor Prevalence Study Management Committee. *Risk factor prevalence study: survey no. 3, 1989*. Canberra, Aust: National Heart Foundation of Australia and Australian Institute of Health; 1991.
27. Division of Adult and Community Health and National Center for Chronic Disease Prevention and Health Promotion. *Behavioral Risk Factor Surveillance System survey*. Atlanta, Ga: Centers for Disease Control and Prevention; 1994.
28. Berlin JA, Colditz GA. A meta-analysis of physical activity in the prevention of coronary heart disease. *Am J Epidemiol* 1990;132:639-46.
29. Eaton CB. Commentary. *Br J Sports Med* 1998;32:241.
30. Williams PT. Relationships of distance run per week to coronary heart disease factors in 8283 male runners. National Runners' Health Study. *Arch Intern Med* 1997;157:191-8.
31. Williams PT. Coronary heart disease risk factors of vigorously active sexagenarians and septuagenarians. *J Am Geriatr Soc* 1998;46:134-42.
32. Simons-Morton DG. Dose-response relationship of physical activity and cardiovascular disease risk. *J Am Geriatr Soc* 1998;46:238-40.
33. Dvorak RV, Tchernof A, Starling RD, Ades PA, DiPietro L, Poehlman ET. Respiratory fitness, free living physical activity, and cardiovascular disease risk in older individuals: a doubly labeled water study. *J Clin Endocrinol Metab* 2000;85:957-63.
34. Norris SL, Grothaus LC, Buchner DM, Pratt M. Effectiveness of physician-based assessment and counseling for exercise in a staff model HMO. *Prev Med* 2000;30:513-23.