

Research article

Attitudes of medical students, clinicians and sports scientists towards exercise counselling

Abbyrhamy Gnanendran¹, David B. Pyne^{1,2}✉, Kieran E. Fallon^{1,2} and Peter A. Fricker^{1,2}

¹Medical School, The Australian National University, Canberra, ²Australian Institute of Sport, Canberra, Australia

Abstract

We compared the amount of exercise undertaken by medical students, clinicians, and sport scientists with the National Australian Physical Activity (NAPA) Guidelines. A second aim was to compare attitudes to exercise counselling as preventive medicine between university- and clinic-based professionals. The research setting was a university medical school and a sports science sports medicine centre. A 20-item questionnaire was completed by 216 individuals (131 medical students, 43 clinicians and 37 sports scientists). Self-reported physical activity habits, exercise counselling practices and attitudes towards preventive medicine were assessed. The physical activity undertaken by most respondents (70%) met NAPA Guidelines. General practitioners had significantly lower compliance rates with NAPA Guidelines than other professionals. More than half of clinicians and medical students (54%) were less active now compared with levels of activity undertaken prior to graduate training. Most physicians (68%) reported they sometimes discuss physical activity with patients. In contrast, the majority of non-medically qualified respondents (60%) said they never discuss physical activity with their doctor. Most respondents (70%) had positive attitudes to exercise counselling. Sports scientists and respondents who were highly active in childhood had more positive attitudes to exercise counselling than others. Health professionals in this study were more active than the general population, however healthy exercise habits tend to deteriorate after the commencement of medical training. Despite the important role of doctors in health promotion, the degree of exercise counselling to patients is low.

Key words: Physical activity, exercise, counselling, university, medical school, attitudes.

Introduction

The vital role of an active lifestyle in the prevention and management of chronic diseases is widely recognized (Blair et al., 1995; 2001; Kriska et al., 1994; Wheat et al., 1996). Physical activity is associated with greater longevity and reduced risk of coronary heart disease, diabetes mellitus, hypertension, arthritis, depression, stroke and colon cancer. The National Australian Physical Activity (NAPA) Guidelines for adults recommend at least 30 minutes of moderate-intensity physical activity (including brisk walking) on most days of the week with each session lasting at least 10 minutes (DOHA, 2009). Despite the known health benefits of exercise, The Australian National Health Survey conducted in 2004-2005 indicated that only 30% of those aged 15 years and above satisfied these guidelines, and 70% of Australians did not participate in enough physical activity (ABS, 2005). These find-

ings highlight the increasing need for effective health promotion of physical activity within the Australian population.

Despite the well-recognised health benefits of physical activity, studies show that doctors often do not counsel patients enough about exercise (Lawlor et al., 1999; Walsh et al., 1999). At the individual level, clinicians are well-positioned to provide patients with effective health advice and counselling about exercise (Lobelo et al., 2009). Patients view clinicians as a trusted and respected source of health advice. Many patients regularly meet their doctor, allowing for continual and progressive health counselling opportunities (Cherry et al., 2005). A recent study conducted on Australian general practitioners (GPs) found the proportion with high knowledge and confidence in giving physical activity advice has failed to increase over the last seven years, despite several education initiatives conducted during this period (Buffart et al., 2009). Another study found that the majority of GPs provide general advice on physical activity, but only 46% of doctors provide specific physical activity counselling to patients (Bull et al., 1995). This shortfall means that doctors often mention to patients the need to do more exercise, but do not specify or discuss the types of exercise, frequency of exercise, or how the patient can improve their exercise regime (Bull et al., 1995). Detailed exercise prescription is more effective than strong general encouragement alone to increase the amount of exercise (Jones and Eaton, 1995; Pinto and Marcus, 1998). Improving the quality of exercise counselling by health professionals is an important avenue of increasing physical activity levels in the general population.

Many GPs attribute low rates of exercise counselling to lack of time, confidence or skills to deliver personalised physical activity advice (Lawlor et al., 1999; Walsh et al., 1999). This shortcoming highlights the importance of developing competent skills in exercise counselling during medical school, as well as gaining knowledge of preventive medicine and promotion of physical activity. Recent trends in medical school curricula indicate that health promotion, disease prevention, and effective patient-physician communication are the most important topics in physician training (Graber et al., 1997). Another study reported that 78% of practising physicians identified a need for an exercise-related course in medical school (Williford et al., 1992). The counselling attitudes of medical students are vital because they form the basis of their future patient counselling practices as physicians.

A study conducted on junior doctors in the UK found that only 21% met accepted exercise recommenda-

tions, much lower than the national average (Gupta and Fan, 2009). This means that 21% of the group undertook at least 30 minutes of moderate exercise (3–6 metabolic equivalents (METs) at least 5 times/ week. This observation is important, as increasing a physicians' personal participation in physical activity enhances their exercise counselling practices (Abramson et al., 2000; Frank et al., 2000; 2008). A clinician's participation in physical activity not only benefits their own health, but also makes their endorsement of an active lifestyle more credible. A health professional's exercise counselling and personal physical activity habits are largely influenced by their attitudes and beliefs about health promotion and preventive medicine.

More research into the attitudes and beliefs of health professionals is required in relation to the effectiveness of current health promotion strategies. Medical students exposed to interventions to promote health behaviours are more likely to provide extensive counselling on exercise than other students (Frank et al., 2008). Health professionals who are involved in and exposed to more exercise are more likely to have strong, positive attitudes about physical activity and, thus, more likely to counsel patients on physical activity effectively (Abramson et al., 2000; Frank et al., 2000; Frank et al., 2008). Sports scientists are involved in physical activity research, and may provide exercise advice and education to high level athletes and coaches. Sports scientists are typically exposed to more sport facilities, exercise and an activity-oriented environment.

The primary aim of this study was to evaluate the amount of exercise undertaken by medical students and clinicians, and compare this with the NAPA Guidelines. A secondary aim was to compare attitudes to counselling on exercise as preventive medicine between medical students and teaching staff (clinicians) at a medical school, and staff and students of a specialist sports science and sports medicine center. We hypothesised that sports scientists exposed to a more exercise-promoting environment are more proactive in counselling on exercise as preventive medicine than medical students and clinicians.

Methods

Subjects

A total of 216 individuals were surveyed in this investigation, with a response rate of 51%. At the Australian National University (ANU) Medical School, 131 medical students and 43 clinicians were surveyed. At the Australian Institute of Sport (AIS), 37 sports physicians, sports scientists and sports science students were surveyed. There were 92 males and 124 females. Most participants were in the 18 to 25 year (39%) and 26 to 30 year (20%) age groups.

Recruitment

All medical students and clinicians from the Australian National University and sports physicians, scientists and students from the Australian Institute of Sport were contacted by email and invited to participate voluntarily in the investigation. The aims and details of the project and the web-based questionnaire were explained to each participant through a respondent information sheet. Informed consent was obtained from each participant. The study was approved by the Ethics Committee of the Australian Institute of Sport and The Australian National University Human Experimentation Committee.

Questionnaire

We developed a 20 item questionnaire to investigate personal physical activity habits and attitudes to counselling on exercise. For all groups, we sought general information on age, gender, current or intended field of professional practice, tobacco use, and alcohol intake. In the section on personal exercise habits, participants were asked about frequency and duration of episodes of strenuous, moderate and mild physical activity during a typical week. The questionnaire sought information on how the physical activity behavior of participants evolved from childhood, prior to graduate training, to the time of this study. Participants were also asked how often they discuss their exercise regimen with their doctor, or how often they discussed physical activity with their patients. Other information sought in the questionnaire included attitude towards preventive medicine and physical activity counselling (Table 1). Medical students and clinicians were asked to complete an additional section where they assessed the medical school curriculum coverage of preventive medicine and clinical training in exercise counselling.

Statistical analysis

Descriptive statistics were used to describe the mean and central tendency of the responses to each of the questions. Contingency tables for small cell counts and exact Chi-square tests were used to analyse the differences between groups. Precision of estimation was indicated with 90% confidence limits. Significance was accepted at $p < 0.05$.

Results

Physical activity profile

The majority of respondents (88%) reported they participate in some form of exercise. The median amount of time spent exercising was four hours per week. The respondents' exercise activities were assessed against the current NAPA Guidelines; that is at least 30 minutes of exercise a day, most days of the week. A total of 85% of those who met the NAPA guidelines ($n = 126$) either agreed or strongly agreed that clinicians who exercise more are more likely to encourage this behaviour in their

Table 1. Questionnaire for all study participants investigating the attitudes to physical activity counselling

I consider that prevention of conditions related to physical inactivity is as important as treatment.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Exercise counselling is important in my intended (or current) field of professional practice	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Good physical activity habits of the medical practitioner can encourage their patients to exercise and maintain good health.	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Table 2. Respondents' personal characteristics and compliance with exercise recommendations.

Group	Compliant n (%)	Non-Compliant n (%)	P-value
Age (y)	33.0 ± 11.6	32.9 ± 11.9	.93
Gender			.94 ^a
Male	65 (70%)	27 (29%)	
Female	87 (70%)	37 (30%)	
Medical speciality (intended or current)			.049 ^b
General Practitioner	12 (48%)	13 (52%)	
Surgeon	16 (80%)	4 (20%)	
Physician + Other	47 (75%)	16 (25%)	
Undecided	53 (74%)	19 (26%)	
Alcohol use (within recommended limits) ^c	80 (64%)	56 (62%)	.86
Tobacco use (never smoked)	109 (87%)	80 (89%)	.88

^a p value: Chi Square for male vs. female differences. ^b p value: Chi square for GPs vs. Surgeons vs. Physicians vs. Undecided differences. ^c % of total respondents (n=46 or 21% were non-drinkers, n=34 or 16% consumed alcohol outside recommended limits).

patients, but only about half (54%) of those who failed to meet the guidelines (n = 89) did so. Age, gender, qualification, tobacco use, alcohol intake and childhood activity status were not associated with compliance to exercise recommendations (Table 2). However, general practitioners had significantly lower compliance rates with exercise guidelines compared with other groups.

In response to the statement, 'I do more exercise now compared to before graduate training' a majority disagreed - 22% strongly disagreed, 33% disagreed, 22% were neutral, 17% agreed and 7% strongly agreed. In terms of childhood activity status, 5% of respondents said they were sedentary, 43% moderately active, 32% highly active and 20% trained for competitive sport. The majority (60%) of respondents were happy with their level of physical activity. The remaining respondents attributed their lack of exercise to inadequate time (4%), unable to pay for gym (2%) or considered exercise not that important (34%).

Counselling practices

The majority of physicians said they sometimes or often discuss physical activity with patients. In contrast, the majority of non-medically qualified respondents (which includes medical students and sports scientists) said they never discuss physical activity with their doctor (Table 3).

Attitudes to exercise counselling

Almost all respondents had positive attitudes to exercise counselling (Table 4). There was no significant association between attitudes to exercise counselling and age, gender and compliance with exercise recommendations.

Respondents who were highly active in childhood had substantially more positive attitudes to exercise counselling compared with others. When asked about current levels of exercise and physical activity, those respondents with a positive attitude to exercise and counselling (n = 174) reported 66 ± 33% (mean ± 90% confidence

limits) higher amount of exercise per week (5.2 ± 4.4 h; mean ± SD) than those with a neutral or negative attitude (n = 42, 3.2 ± 4.4 h). Sports scientists had substantially more positive attitudes to exercise and counselling than medical students and clinicians (Table 4).

Medical school curriculum evaluation

The majority of medical students said they had a good understanding of the health benefits of physical activity and were confident in exercise counselling. Despite this, a significant proportion of students said they were not happy with medical school training in exercise counselling. Almost all students (78%) agreed that the medical school has a responsibility to encourage its students to maintain physical fitness and health (Table 5).

Discussion

This study found that 70% of doctors and medical students satisfy the National Physical Activity Guidelines, a proportion substantially higher than 30% seen in the general Australian population. A recent study of physical therapists in the United States also showed that qualified therapists, therapy assistants and student therapists are more physically active than the US adult population (Chevan and Haskvitz, 2010). Surgeons and other medical specialists surveyed in our Australian setting were more likely to meet guidelines compared with general practitioners. This difference in commitment to regular physical activity could relate to the long work hours of general practice, leading to a lack of time and motivation to exercise.

More than half (54%) of clinicians and students admitted that they did more exercise before commencing graduate training. When asked to identify the most significant reason for lack of exercise, 34% of respondents attributed this to their attitude that exercise was not that important. The reduction in exercise could also reflect the

Table 3. Counselling practices of doctors; number (percentage of respondents).

Question	Never n (%)	Rarely n (%)	Sometimes n (%)	Often n (%)
If you are not a clinician, how often do you discuss with your doctor about exercise?	79 (43%)	35 (19%)	23 (12%)	49 (26%)
If you are a clinician, how often do you discuss physical activity with patients?	15 (23%)	7 (10%)	12 (17%)	35 (51%)

Table 4. Qualification and attitudes to physical exercise counselling

Group	Strongly Disagree (%)	Disagree n (%)	Neutral n (%)	Agree n (%)	Strongly Agree n (%)	P value
I consider that prevention of conditions related to physical activity is as important as treatment						
Medical Student	1 (1)	0	1 (1)	43 (33)	86 (66)	.028
Clinician	0	1 (2)	1 (2)	16 (37)	25 (58)	
Sports scientists, Physicians, Students	1 (3)	0	0	3 (8)	33 (89)	
Exercise counselling is important in my intended or current field of practice						
Medical Student	3 (2)	9 (7)	17 (14)	63 (50)	34 (27)	.021
Clinician	0	2 (5)	7 (18)	18 (45)	13 (34)	
Sports scientists, Physicians, Students	0	1 (3)	5 (16)	6 (19)	20 (63)	
Good physical activity habits of the medical practitioner can encourage their patients to exercise and maintain good health						
Medical Student	2 (2)	8 (6)	11 (8)	73 (56)	37 (28)	.037
Clinician	2 (5)	3 (7)	10 (23)	20 (47)	8 (19)	
Sports scientists, Physicians, Students	0	0	6 (16)	15 (41)	16 (43)	

Note p-value: chi square for medical students vs. clinicians vs. sports scientists, physicians and students differences.

time-demanding and stressful nature of medical training and practice, leading to inadequate time and motivation to exercise and in maintaining a healthy lifestyle. Another possible explanation for the reduction is the increase in family responsibilities with most practitioners. However, if preventive medicine is taught in an effective manner in medical school, the knowledge and understanding students gain through the curriculum could increase the motivation of clinicians to maintain their own physical fitness.

There were some interesting findings about the exercise counselling practices of clinicians. One-third (32%) of the clinicians surveyed said that they never or rarely speak with patients about physical activity. Moreover, 60% of respondents said that they never or rarely speak with their own doctor about physical activity. There is a significant difference between clinician and patient-reported exercise counselling rates. Doctors may feel that asking about physical activity can be considered as exercise counselling, but patients are more likely to perceive exercise counselling as a specific enquiry, assessment and advice on their physical activity habits. During a clinical consultation, exercise advice must be successful from the point of view of the patient (Jennings, 2010). Given the subjective nature of the questionnaire employed in this study, it is possible that clinicians were predisposed to overstate the importance of their counselling practices, which is a limitation. The low-rate of exercise counselling found in this investigation is consistent with several other

studies that show the majority of clinicians do not counsel their patients about exercise (Abramson et al., 2000; Bull et al., 1995; Lawlor et al., 1999). Evidently, there is a need to increase the rate and quality of exercise counselling among the medical profession.

Clinicians' attitudes towards exercise promotion directly influence their counselling practices (Frank et al., 2003). Most respondents had a positive attitude towards exercise counselling, and strongly agreed with the proposition that prevention of conditions related to physical inactivity is as important as treatment. In general, exercise counselling was seen as important for the current or intended field of practice. These findings indicate that the health professionals in this study support the promotion of physical activity.

This study also revealed that doctors and students more physically active during childhood were more likely to have positive attitudes toward exercise counselling as a professional. A total of 86% of respondents who played competitive sport in childhood or adolescence agreed that prevention of conditions related to physical inactivity was as important as treatment. In contrast, only 54% of respondents who were sedentary during childhood had the same opinion. Collectively these data show that attitudes towards physical activity and healthy living are influenced substantially by personal childhood experiences. Positive attitudes to exercise developed during childhood and adolescence tend to track into adulthood and professional practice. There have been other studies

Table 5. Medical students' evaluation of training in exercise counselling (% of respondents).

Question	Strongly Disagree (%)	Disagree (%)	Neither agree no disagree (%)	Agree (%)	Strongly Disagree (%)
Through my medical school curriculum, I have a good understanding of relationships between physical inactivity, disease prevention and management	2	7	16	46	29
I am confident in counselling patients on physical activity and healthy lifestyle habits	1	12	25	55	19
I am happy with my professional training in exercise counselling (for example, clinical training in exercise counselling)	4	26	44	21	5
The medical school should play a role in encouraging staff and students to be physically active	2	8	12	46	32

showing that personal health practices of physicians, including physical activity, are brought to medical school rather than established during medical training (Konen and Fromm, 1992). Hence, a clinician's childhood physical activity status plays an important role in establishing attitudes later in life towards exercise counselling.

Somewhat disturbingly one-third (34%) of clinicians and students said that they did not undertake enough exercise because they consider exercise is not that important. This finding indicates that a significant proportion of health professionals may not fully appreciate the consequences of physical inactivity on health. A negative attitude toward physical activity may eventually compromise personal health and wellbeing, and impact negatively on a clinician's counselling practices.

There were significant differences in attitudes towards exercise counselling between medical professionals and sports scientists. A total of 89% of sports physicians and sports scientists but only 60% of clinicians and medical students believe that prevention is as important as treatment. About half (45%) of sports professionals felt strongly that good physical activity habits of medical practitioners can encourage their patients to exercise and maintain good health, whereas only 19% of clinicians and medical students agreed with this statement. Sports professionals, more exposed to sports facilities and an exercise-oriented environment, have a more positive attitude towards exercise counselling compared with medical professionals and students. Several studies have shown that exposure to a health-promoting environment has a strong positive effect on attitudes towards preventive medicine and improves clinicians' physical activity as well as counselling practices (Frank et al., 2008; Gupta and Fan, 2009). Promoting medical student health efficiently improves patient counselling (Frank et al., 2008), and medical students exposed to health interventions had more positive attitudes towards physical inactivity prevention. Effective health promotion strategies include curricular encouragement of physical activity, emphasis on preventive medicine, and provision of extracurricular activities like physical activity classes (Frank et al., 2008). Importantly, the students exposed to health promotion strategies were more likely to provide extensive exercise counselling to patients compared with other students (Frank et al., 2008). Our study found that 64% of medical students considered that the medical school has a responsibility to encourage students to exercise and stay physically active. These results are consistent with earlier research where junior doctors cited health promotion in the workplace as the most effective means to improve concordance with physical activity guidelines among medical professionals (Gupta and Fan, 2009). Suggested initiatives to promote physical activity include organised exercise classes, involvement in team sports within the hospital environment, or more on-site facilities (Gupta and Fan, 2009). Clearly, health promotion in the workplace can have a positive influence on preventive medicine-related attitudes of medical students and clinicians and, in turn, enhance their exercise counselling practices (Allman-Farinelli et al., 2010; Jorgensen et al., 2010).

In terms of curricular coverage of preventive medicine and clinical training in exercise counselling, a

majority (65%) of clinicians and students indicated a good understanding of exercise counselling and prescription. This implies, of course, that a substantial proportion (35%) of medical students and clinicians do not have a sufficient understanding of exercise counselling. Moreover, 30% of medical students and clinicians think that medical school training in exercise counselling is inadequate. These findings are consistent with several other studies where general practitioners have cited lack of confidence and skill in exercise counselling as a major barrier to effective health promotion (Lawlor et al., 1999; Walsh et al., 1999). At a global level, public health medicine has been mandated as a prominent feature for the medical curriculum. However it would appear that few medical schools have succeeded in implementing an effective strategy in relation to advice about the benefits of exercise and its prescription. It is vital that medical students develop sound skills in exercise counselling throughout their training to ensure they become competent clinicians.

Although this study revealed that the majority of clinicians and medical student have a positive attitude towards exercise counselling, there is a possibility that the reported attitudes to counselling are more favourable than the actual attitudes, given the subjective nature of the questionnaire. Another limitation is the relatively narrow age spectrum of respondents. Assessing older respondents may have resulted in a less desirable outcome; that is, far less older practitioners provide exercise counselling in their practices than that of 26 to 30 year old participants.

Conclusion

In conclusion, health professionals within a medical school and a national sports science and sports medicine facility were significantly more active than the general population; however healthy habits tend to deteriorate after starting medical school. Despite the important role of doctors in effective health promotion, the rate of exercise counselling to patients is low. Sports physicians and scientists in the national sports facility, exposed to a more exercise-promoting environment, had substantially more positive attitudes to exercise counselling than clinicians and medical students. Attitudes towards exercise counselling should be enhanced by exposure to health and exercise promotion in the workplace environment. A positive attitude towards exercise counselling promotes healthy behaviour of clinicians and enhances their exercise counselling to patients. A substantial proportion of medical students in this study believed that they have insufficient understanding and training in exercise counselling. Medical schools have a responsibility to promote physical activity of students and improve training in exercise counselling.

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References

- Abramson, S., Stein, J., Schaefele, M., Frates, E. and Rogan, S. (2000)

- Personal exercise habits and counselling practices of primary care physicians: a national survey. *Clinical Journal of Sports Medicine* **10**, 40-48.
- ABS. (2005) National Health Survey 2004-2005: Summary of Results, Australian Bureau of Statistics. Canberra.
- Allman-Farinelli, M.A., Chey, T., Merom, D. and Bauman, A.E. (2010) Occupational risk of overweight and obesity: an analysis of the Australian Health Survey. *Journal of Occupational Medicine and Toxicology* **5(1)**, 14.
- Blair, S.N., Cheng, Y. and Holder, J.S. (2001) Is physical activity or physical fitness more important in defining health benefits? *Medicine and Science in Sports and Exercise* **33(Suppl. 6)**, S379-399.
- Blair, S.N., Kohl, H.W., Barlow, C.E., Paffenberger, R.S., Gibbons, L.W. and Macera, C.A. (1995) Changes in physical fitness and all-cause mortality: a prospective study of healthy and unhealthy men. *Journal of the American Medical Association* **273**, 1093-1098.
- Buffart, L.M., van Der Poley, H.P., Smith, B.J., Kurko, J., King, L. and Bauman, A.E. (2009) General practitioners' perceptions and practices of physical activity counselling: changes over the past 10 years. *British Journal of Sports Medicine* **43**, 1149-1153.
- Bull, F.C., Schipper, E.C., Jamrozik, K. and Blanksby, B.A. (1995) Beliefs and behaviour of general practitioners regarding promotion of physical activity. *American Journal of Public Health* **19**, 300-304.
- Cherry, D.K., Woodwell, D.A. and Rechtsteiner, E.A. (2005) National Ambulatory Medical Care Survey Summary. *Advance Data* **29**, 1-39.
- Chevan, J., and Haskovitz, E.M. (2010) Do as I do: exercise habits of physical therapists, physical therapist assistants, and student physical therapists. *Physical Therapy* **90**, 76-94.
- DOHA (2009) Physical Activity Guidelines for Adults, Department of Health and Aging, Canberra, Commonwealth of Australia.
- Frank, E., Bhat Schelbert, K. and Elon, L. (2003) Exercise counselling and personal exercise habits of US women physicians. *Journal of American Medical Women Association* **58**: 178-84.
- Frank, E., Breyon, J. and Elon, L. (2000) Physician disclosure of healthy personal behaviours improves credibility and ability to motivate. *Archives of Family Medicine* **9**, 287-290.
- Frank, E., Tong, E., Lobelo, F., Carrera, J. and Duperly, J. (2008) Physical activity levels and counselling practices of U.S. Medical students. *Medicine and Science in Sports and Exercise* **40**, 413-421.
- Graber, D.R., Bellack, J.P., Musham, C. and O'Neil, E.H. (1997) Academic deans' views on curriculum content in medical schools. *Academic Medicine* **72**, 901-907.
- Gupta, K. and Fan, L. (2009) Doctors: fighting fit or couch potatoes? *British Journal of Sports Medicine* **43**, 153-154.
- Jennings, G. (2010) Practical tips for physicians prescribing physical activity programs as therapy for hypertension a sticky matter! *British Journal of Sports Medicine* **44(14)**, 994-997.
- Jones, T.F. and Eaton, C.B. (1995). Exercise prescription. *American Family Physician* **52**, 543-550.
- Jorgensen, M.B., Rasmussen, C.D., Ekner, D. and Sogaard, K. (2010) Successful Reach and Adoption of workplace health promotion RCT targeting a group of high-risk workers *BMC Medical Research Methodology* **10(1)**, 56.
- Konen, J.C. and Fromm, B.S. (1992). Changes in personal health behaviours of medical students. *Medical Teacher* **14**, 321-325.
- Kriska, A.M., Blair, S.N. and Periera, M.A. (1994) The potential role of physical activity in the prevention of non insulin-dependent diabetes mellitus: the epidemiological evidence. *Exercise and Sports Sciences Reviews* **22**, 121-143.
- Lawlor, D.A., Keen, S. and Neal, R.D. (1999) Increasing population levels of physical activity through primary care: GP's knowledge, attitudes and self-reported practice. *Family Practice* **16**, 250-254.
- Lobelo, F., Duperly, J. and Frank, E. (2009) Physical activity habits of doctors and medical students influence their counselling practices. *British Journal of Sports Medicine* **43**, 89-92.
- Pinto, B.M. and Marcus, B.H. (1998) Activity counseling by primary care physicians. *Preventative Medicine* **27**, 506-513.
- Walsh, J.M., Swarngard, D.M., Davis, T. and McPhee, S.J. (1999). Exercise counseling by primary care physicians in the era of managed care. *American Journal of Preventative Medicine* **16**, 307-313.

- Wheat, G., Carter, A., McAfee, T., Gayman, J. and Meuchel, K. (1996) Addressing a neglected coronary heart disease risk factor in an HMO: exercise counseling and fitness testing at Group Health Cooperative. *HMO Practice* **10**, 131-136.
- Williford, H.N., Barfield, B.R., Lazenby, R.B. and Olson, M.S. (1992). A survey of physicians' attitudes and practices related to exercise promotion. *Preventative Medicine* **21**, 630-36.

Key points

- The rate of exercise counselling by doctors to patients is low
- Sports physicians and scientists have substantially more positive attitudes to exercise counselling than clinicians and medical students
- Medical schools have a responsibility to promote physical activity of students and improve training in exercise counselling

AUTHORS BIOGRAPHY



Abbyrhamy GNANENDRAN

Employment

Medical Student, Medical School, The Australian National Univ., Canberra, Australia.

Degree

BSc

Research interest

Clinical practice, Medical training

E-mail: u4224729@anu.edu.au



David B. PYNE

Employment

Physiologist, Depart. of Physiology, Australian Inst. of Sport, Canberra, Australia.

Degree

PhD

Research interest

Exercise immunology, Swimming, Team sports

E-mail: david.pyne@ausport.gov.au



Kieran E. FALLON

Employment

Head of Sports Medicine, Australian Institute of Sport, Canberra, Australia.

Degree

MBBS MD

Research interest

Medical education, Haematological testing of athletes

E-mail: kieran.fallon@ausport.gov.au



Peter A. FRICKER

Employment

Director, Australian Institute of Sport, Canberra, Australia

Degree

MBBS FACSP

Research interest

Exercise immunology, Genetics and sports performance

E-mail: peter.fricker@ausport.gov.au

✉ David Pyne

Physiology, Australian Institute of Sport, Leverrier Street Bruce ACT 2617, Australia