

Review Article

State of the science: a focus on physical activityAndrew P Hills PhD^{1,2} and Nuala M Byrne PhD^{1,2}¹*Institute of Health and Biomedical Innovation, Queensland University of Technology, Australia*²*ATN Centre for Metabolic Fitness*

Diet, exercise, behavioural support and for some obese individuals, pharmacotherapy, represent the set of lifestyle factors necessary for effective management of obesity. An on-going challenge in the prevention, treatment and management of obesity is to arm health professionals in particular, with the necessary knowledge and understanding and time to engage in meaningful weight management counseling. Despite the many barriers to effective management such as lack of relevant education in nutrition and physical activity, perceived patient non-compliance, perceived inability to change patient behaviours, and the cost of specialist behavioural support, there is increasing evidence of the value of behaviour modification techniques to both dietary and exercise counseling, particularly when focusing on current behaviour. Behavioural counseling addresses the barriers to compliance with diet and physical activity goals and also equips the individual with practical strategies and motivation to be more self-responsible. Commonly employed behavioural interventions include stimulus control, reinforcement techniques, self-monitoring, behavioural contracting, and social support programs. This paper addresses one of the key behavioural components in the treatment and management of obesity - physical activity. Higher levels of energy expenditure through increased physical activity are central to successful weight loss and long-term weight maintenance. The specific value derived from physical activity in the context of weight management for the overweight and obese is in large part associated with an appreciation of the role of both physical activity promotion and exercise prescription.

Key Words: behavioural, exercise, obesity, overweight, lifestyle factors, physical activity, prescription, promotion

Introduction

Obesity is a complex, multi-dimensional chronic condition therefore effective treatment and management should ideally be the responsibility of a multi-disciplinary team of health professionals. In the management of obese children and adolescents, teachers, parents and other responsible adults have a central role. A team of health professionals may include general practitioner and/or specialist physician(s), dietitian or nutritionist, exercise physiologist and clinical psychologist. A team of professionals is consistent with the widely held belief that diet, exercise, behavioural support and for some obese individuals, pharmacotherapy, represent the set of lifestyle factors necessary for effective management of obesity. Hill and colleagues¹ have described lifestyle and behavioural factors as the cornerstones of prevention and treatment of obesity.

Despite the benefits of a team approach to weight management many obese individuals may only be provided limited support by a sole practitioner. If the practitioner lacks the necessary knowledge, understanding and time to engage in meaningful weight management counseling, a poor outcome is likely. Additional barriers to effective management include lack of relevant education in nutrition and physical activity, perceived patient non-compliance, perceived inability to change patient behaviours, and the cost of specialist behavioural support.²⁻⁵ Despite the many barriers there is increasing evidence of the value of behaviour modification techniques to both dietary and exercise counseling,⁶ particularly when focusing on current beha-

viour.⁷ The successful management of obesity must include patient education, support, counseling and behaviour modification.⁸ Behavioural counseling addresses the barriers to compliance with diet and physical activity goals and also equips the individual with practical strategies and motivation to be more self-responsible.^{7,9} Commonly employed behavioural interventions include stimulus control, reinforcement techniques, self-monitoring, behavioural contracting, and social support programs.¹⁰⁻¹²

This paper addresses one of the key behavioural components in the treatment and management of obesity, physical activity.^{1,12,13} Modification of dietary intake and higher levels of energy expenditure through increased physical activity are central to successful weight loss. Regular physical activity is also a crucial component of the long-term maintenance of weight loss. To be effective, lifestyle approaches to weight management must also be cognizant of the environmental setting in which the obese operate including behavioural determinants, barriers to physical activity and triggers to over-consumption of energy.^{5,7,14} A further challenge is to appreciate the difference between

Correspondence address: Professor Andrew P. Hills, Institute of Health and Biomedical Innovation, Queensland University of Technology, Corner of Blamey and Musk Ave., Kelvin Grove, Queensland, Australia 4059

Tel: +61 7 3138 6087, Fax: +61 7 3864 3980

Email: a.hills@qut.edu.au

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physical activity promotion and exercise prescription in the context of weight management for the overweight and obese.

The context of weight management

Weight management may be considered from a number of overlapping perspectives, each requiring different emphases in a lifestyle approach.¹⁶ Weight loss is commonly the expected outcome in weight management and therefore the approach that is often given the greatest attention. In contrast, less attention is paid to the prevention of weight gain (and the maintenance of a desirable body composition). Weight management has also traditionally focused on dietary approaches to control body weight (often without exercise).¹⁷ The inability of most obese individuals to sustain long-term weight loss with diet-only approaches supports the contention that less emphasis should be placed on weight loss per se in favour of the management of co-morbid conditions and weight maintenance. In short, greater attention should be given to lifestyle approaches to maintain weight or prevent further weight gain in the obese and the never-obese, and weight regain after weight loss.¹⁸

Table 1. The spectrum of weight management (modified from Gill, 1997¹⁶)

- Prevention of weight gain (*should receive greatest attention*)
- Weight maintenance
- Management of obesity co-morbidities
- Weight loss (*should receive less attention*)

Lifestyle approaches and physical activity

Recognition of the importance of physical activity to health (including weight management) is not a new phenomenon but many would have us believe this is the case. For example, Aristotle (300 B.C.) suggested that '*a man falls into ill health as a result of not caring for exercise,*' and Maimonides (1199) said that '*anyone who lives a sedentary life and does not exercise... even if he eats good foods and takes care of himself according to proper medical principles - all his days will be painful ones and his strength shall wane.*' Unfortunately, in today's society physical activity is misinterpreted as abnormal with much of the general population and the scientific community considering that the sedentary state represents normal physiological function.¹⁹ The extension of this position is that physical activity is considered as a tool to cure as opposed to representing the norm. If physical activity is recognized as normal and necessary for a healthy lifestyle, the notion that a reduction in physical activity is the cause of chronic diseases such as obesity is easy to support.

The level of understanding of physical activity and exercise is a significant potential impediment or advantage in the provision of optimal physical activity lifestyle approaches for weight management. If an individual considers exercise is an 'inconvenience rather than a required physiological stimulus to maintain normal physiological function',¹⁹ this is a major shortcoming.

In recent decades physical activity has been 'engineered' out of the typical lifestyle behaviours of many

individuals. With significant reductions in habitual physical activity it should be no surprise that activity is 'foreign' to so many today, particularly the overweight and obese. Brownson *et al.*,²⁰ have recently summarized the population-wide declines in physical activity, consistent with reduced or declining activity in most settings and concomitant increases in sedentary activities (Table 2).

Table 2. Population-wide declines in physical activity (modified from Brownson *et al.*, 2005²⁰)

- Leisure-time physical activity: level or slightly increasing
- Work-related activity: declining
- Transportation activity: declining
- Activity in the home: declining; and
- Sedentary activity: increasing; therefore, total physical activity is declining

Specific examples of environmental factors limiting physical activity participation are outlined in Table 3. For many bigger individuals, musculoskeletal soreness, pain, injury or disability associated with weight-bearing activity may encourage sedentary behaviours. Special care needs to be taken with the design of activities that encourage rather than exacerbate the condition. Readers are referred to a number of recent reviews in the area by the authors and colleagues.

The disparate knowledge and understanding of the area and the many barriers to activity participation are paralleled by an increased substantiation in the scientific literature of the importance of physical activity to health, including for weight management. Unfortunately, physical activity guidelines and recommendations for the general public have been simplified to the extent that as a society we pay lip-service to activity. The oversimplification of public health physical activity messages and recommendations, traditionally designed for cardiovascular health, plus the employment of a 'one-size-fits-all' approach, are counterproductive given the extent of the obesity epidemic. The result is that the promotion of physical activity and in particular, the prescription of exercise for weight management, is very commonly poorly understood and managed. Particular challenges for behaviour change include the ability to recognise and address barriers to physical activity in each of the settings in which physical activity has declined. Crawford and Ball¹⁴ contend that failing to understand 'the key behaviours that contribute to weight gain, and the influences on these behaviours, it will remain difficult to identify where to intervene in the environment and be confident that action will prevent obesity.'

Table 3. Environmental factors contributing to low levels of physical activity (adapted from Peters, 2002¹⁵)

- Declining need for physical activity in the home, work place and community
- Lack of physical education in schools, reduced time for play, active transport uncommon
- Physical activity 'unfriendly' community design
- 'Drive through' convenience stores
- Transport system dominated by motor vehicles
- Use of elevators and escalators and inaccessible stairs
- Television, computer games, internet, sedentary entertainment
- Household appliances and labour-saving devices.

A minimalist approach to energy expenditure, the reinforcement of inactive behaviours plus a dampening down of activity recommendations is the unfortunate outcome for many inactive overweight and obese individuals. If low levels of physical activity are promoted as sufficient for health it may be easier for many people to justify that they are achieving the guidelines by accepting these minimal standards. The acceptance and reinforcement of relatively low levels of energy expenditure consistent with public health guidelines and the promotion of health in inactive individuals (including the obese), may have inadvertently undermined the health of the population.

Physical activity and metabolic fitness

Encouragement of relevant and achievable exercise behaviours such as modest levels of regular physical activity during adolescence can have significant benefits including the prevention of obesity and related chronic diseases in adulthood. The well documented steep decline in physical activity levels seen in many adolescents requires urgent attention including programs to moderate or prevent this decline.²¹ The early establishment of appropriate eating and activity behaviours in young people is an admirable goal and important target.

Some of the more compelling health reasons for avoiding overweight and obesity are that an estimated 70% of type 2 diabetes cases and 25% of coronary heart disease (CHD) cases are attributable to excess weight.²² Each kilogram of weight gained during mid-adulthood increases the risk of diabetes by 4.5% and CHD by 3.1%.²³⁻²⁵

There is increasing knowledge and understanding of the dose-response relationships between physical activity and health.²⁶ For example, physically active individuals have a 30-50% lower risk of developing type 2 diabetes than sedentary individuals and activity confers a similar

risk reduction for coronary heart disease.^{22,27} Most importantly, risk may decrease with as little as 30 minutes of moderate-intensity physical activity per day for those who are physically inactive.

The prevention of a number of health risks associated with overweight and obesity such as impaired glucose intolerance, hypertension, and dyslipidaemia (also referred to as metabolic fitness) can be achieved with less activity than needed to attain a high level of cardio-respiratory (or physiological) fitness.²⁸ Importantly, Bassuk and Manson²² contend that public health initiatives to promote moderate increases in physical activity may offer the best balance between efficacy and feasibility to improve metabolic and cardiovascular health in sedentary populations including the obese. Health benefits may also be expected with exercise training at higher levels of intensity than low to moderate exercise. Further, the dose of exercise required for weight management should not be assumed to be the same as for either metabolic fitness or cardio-respiratory fitness.²⁹ In summary, the volume and nature of exercise needed to derive health-related benefits may differ from that recommended for fitness benefits, hence the need to individualize the support provided to an obese patient.³⁰

Physical activity and weight management

The simplest prescription for weight management in the obese is to reduce energy intake and increase physical activity (or decrease sedentary behaviours). However, given the prevalence of overweight and obesity many individuals appear to either not understand the energy balance concept or choose not to make the necessary lifestyle changes consistent with weight management. Long-term success in weight management depends on sensible dietary modification (rather than the common diet-only

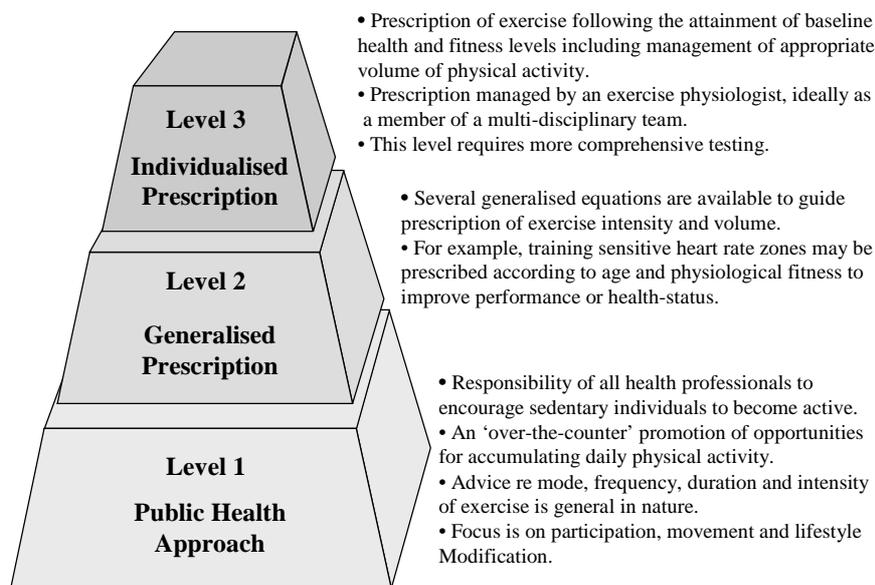


Figure 1. Physical activity promotion and exercise prescription

approach) and also increased energy expenditure.^{31,32} One of the most important roles of exercise in weight management is to optimize body composition by minimizing the loss of fat-free mass (FFM) by maximizing the proportion of fat mass (FM) loss in any weight lost.³³ Secondly, regular physical activity in previously inactive individuals enhances metabolic fitness, independent of weight loss.^{34,35}

We have previously suggested³⁵ that the basic lifestyle approach in activity promotion is ‘to advise and encourage the ideal exercise, physical activity as part of ones’ daily lifestyle across the lifespan.’ There is consistent research evidence to support the role of physical activity in long-term weight control.^{36,37} Consequently, the focus of exercise prescription in the treatment and management of obesity should be to optimize energy expenditure, maintain metabolically-active skeletal muscle tissue, and prevent musculo-skeletal injuries.

The role of health professionals in physical activity and weight management

All health professionals have an important role to play in weight management however this varies according to training and expertise. Figure 1 depicts three stages or levels of involvement and responsibility for physical activity promotion and exercise prescription. The model highlights the requirement of progressively more individualized support for the obese at successive levels from baseline activity promotion.

Initial exposure to physical activity and the establishment of baseline fitness should be followed by regular adjustment to the training volume (load) for sustained benefit (both metabolic and physiologic). This may include the untrained obese individual extending their involvement in light or moderate activity or an increase in exercise intensity for a shorter duration. Improvement in exercise capacity and consequent physiological adaptation is based on the principle of progressive overload which requires the monitoring of intensity, duration and frequency of physical activity and exercise. Individualised exercise prescription for weight management (Level 3) should be provided by an exercise physiologist who can assist individuals to safely progress from light through moderate to more intense exercise. The rationale for monitoring exercise intensity in particular is addressed in more detail in the following section. In short, total energy expenditure is the central issue in lifestyle approaches to weight management – irrespective of the mixture of levels of exercise intensity that contribute to this total.^{12,37,38}

Beyond activity promotion - physical activity and exercise recommendations for weight management

We have earlier described exercise prescription as an art and a science.³⁵ The art of exercise prescription refers to the challenge of designing an exercise program to meet the specific needs of an obese individual. This requires a comprehensive assessment of current physical capacity, resources and opportunities to adopt the necessary lifestyle changes and an understanding of the goals and objectives of the patient and barriers or roadblocks to participation in activity (Table 4). Goal setting should be realistic and match the medical, emotional, and functional

requirements of the exerciser and in the context of limitations of time, interest, motivation and physical ability.³⁹

Predictors of weight loss success include long-term treatment, social support, the use of more physical activity, and self-efficacy. Motivation can also play an important role if individuals are persuaded that physical activity provides the best opportunity for long-term weight maintenance and physical fitness.³⁷ Poston and Foreyt⁷ highlight that the key features of behavioural approaches for the overweight and obese include self-monitoring, goal-setting, nutrition, exercise, stimulus control, problem solving, cognitive restructuring, and relapse prevention.

Table 4. Barriers (‘roadblocks’) to physical activity in the obese (*adapted from Hills and Byrne, 2004*³⁸)

- Perceived lack of time for activity
- Failure of health professionals to provide appropriate care and attention
- Poor experiences of physical activity
- Lack of self-efficacy
- Low self-esteem
- Low self-confidence
- Embarrassment
- Incorrect assumptions about how much physical activity to complete
- Lack of immediate rewards such as failure to lose weight that was expected
- Soreness, discomfort or pain as a result of exercise
- Low tolerance of exercise due to low fitness levels
- Excess weight leading to immobility
- Lack of motivation and boredom with physical activity.

Physical activity guidelines for health recommend the accumulation of 30 minutes of moderate intensity physical activity on most, preferably all, days of the week.⁴⁰ Similarly, the American College of Sports Medicine⁴¹ suggested that health benefits are possible with a minimum of 150min (2.5hr) of moderate intensity exercise per week. Gradual progression to higher doses of energy expenditure can result in further health improvements, including weight loss.^{42,43} More recent consensus statements^{36,44} have reinforced the adequacy of such recommendations for general health promotion and disease prevention; however have highlighted that this quantum of activity is not sufficient to prevent unhealthy weight (re)gain.

Used in the context of weight management the minimum activity recommendations of 30min/day may be a sound baseline goal for the obese as they accommodate to a higher volume of activity and progress to 60min/day or more of moderate physical activity.^{41,45,46} Some concerns have been raised regarding these figures including the likelihood that they may be perceived as too high, unachievable and therefore actively discourage participation.^{47,48}

Weight loss studies have reported a dose-response relationship between reductions in weight and body fat and walking more than 195min/wk⁴⁹ and 220min/wk,⁵⁰ and the advantages of a staged progression through the range of 200-300min/wk (3.3-3.5hr or ≥ 2000 kcal/wk) and higher for weight loss and long-term maintenance of weight-loss. Saris *et al.*,⁴⁴ suggested that approximately

45-60min/day of moderate intensity activity may be the dose necessary to prevent the transition to overweight or obesity.

The evidence for the exercise dose to prevent weight regain in formerly obese individuals comes from two landmark studies.^{18,51} In short, this may equate to approximately 60-90min/day of moderate intensity activity or smaller amounts of higher intensity exercise. Schoeller *et al.*,⁵¹ suggested that approximately 80min/day of moderate physical activity or 35min/day of vigorous activity added to a sedentary lifestyle is necessary to prevent weight gain or regain. Similarly, Weinsier *et al.*,¹⁸ found that for weight 'maintainers' (as opposed to 'gainers'), 77min/day of moderate intensity activity daily or approximately 2.5 times more than the US Surgeon General's recommendation⁴⁰ was necessary to optimise energy balance and to maintain a chosen body weight.

Due to the longer duration of moderate intensity activity required to attain an adequate dose, bouts of higher intensity activity are warranted if the individual is capable of such workloads.³⁶ An alternate viewpoint is that activity of lower intensity may be easier to incorporate into one's daily routine and be sustained over a longer period.⁵² A well-planned exercise prescription also has the potential to make the total package of energy expenditure more interesting and palatable for the obese individual. However some studies suggest that the overweight display better adherence to unsupervised and self-determined physical activity compared with supervised and prescribed contexts.^{29,53} One might contend that the level of training of the responsible health professional(s) and their personal skills with obese patients may be highly relevant. It may also be worth noting that as the length of time spent at a reduced weight increases, there may be a shift from the effort to the pleasure of weight maintenance and this also impact on the likelihood of continued success.⁵⁴

A simple outline of the main considerations in both the promotion of physical activity and the prescription of exercise are summarised in Table 5 and the text to follow. Readers are also encouraged to access the following reviews for additional information.^{35,36,44,55}

Table 5. Components of exercise prescription (*adapted from Hills and Byrne, 2004*³⁸)

- *Intensity* (how hard?), *duration* (how long?), *frequency* (how often?) - the exercise dose;
- *Mode* (type of exercise), and enjoyment;
- Methods of assessing exercise intensity (heart rate monitoring, rating of perceived exertion);
- Monitoring progress (regular assessment and feedback provided);
- On-going evaluation of goals and patient outcomes (consistent with behavioural approaches).

Intensity

For inactive overweight and obese individuals low to moderate intensity activity such as walking is ideal. Activity of moderate intensity (>30-40% VO_{2max}) may be optimal for metabolic health benefits and better tolerated, particularly for bigger and older individuals. High intensity exercise (>70% VO_{2max}) is more time-efficient (allowing a greater expenditure of energy in a shorter timeframe) and may provide additional metabolic health benefits.

Duration

The physical activity or exercise dose is commonly expressed in terms of energy expenditure and differs according to individual goals and health status, including fitness level. It should also be remembered that there is considerable individual variability in both the completion of prescribed activity and also improvement in physiological markers of health status.⁵⁶

Weight loss and prevention of weight gain

1500-1750 kcal/wk (or 250-300min brisk walking per week)

Prevention of weight regain after weight reduction

2000-2500 kcal/wk (or 400-500min brisk walking per week)

Frequency

Guidelines for moderate intensity physical activity such as walking consistently suggest that physical activity should be undertaken on all or most days of the week. Participation in more vigorous activity may be less frequent, for example every other day.

Mode

Exercise modality is an individual issue. Generally, aerobic weight bearing activity such as walking is the activity of choice for most people. However, other options include swimming and cycling. Walking requires minimal equipment, can be undertaken in most locations and does not require specific skills. Resistance weight (strength) training is an ideal adjunct to aerobic activity for the enhancement of both muscular strength and endurance. Another suitable activity for those who do not have major joint problems but to strengthen large muscles of the lower limb is stepping up and down from a step or bench. Stepping exercises, commencing at a modest height, may enable older and less stable individuals the chance to increase both muscular strength and endurance completing such a task in a controlled environment.

Enhancing physical activity: a behavioural perspective

The aim of behavioural approaches in the context of weight management is to modify factors influencing the energy balance equation (energy input and output).¹² However, consistent with the field more broadly, greater attention has been given to changes in eating compared with exercise behaviours.¹⁷ One of the more popular behavioural approaches in weight management to date, the LEARN program,⁵⁷ has been modified to include approaches such as cognitive-behaviour therapy (CBT) however physical activity and exercise have not commonly been significant elements.

Villanova *et al.*,³⁷ recently reported on the addition of a specific program to implement physical activity (described as a fitness program) on weight loss maintenance activity level and resting energy expenditure. The program (12 bi-monthly sessions, delivered by a psychologist) was introduced approximately nine months after the completion of a CBT program. The study confirmed significant improvements in the long-term control of obesity with the employment of the fitness program

after the behavioural program. This result is consistent with the earlier endorsement of long-term interaction between patient and health professional.⁵⁸

The strategy to increase physical activity in the Villanova *et al.*,³⁷ study was focused on motivation and self-efficacy with the initial goal being 'lifestyle walking' or 'walking for exercise' for at least 10-15min, 3-5 times per week. The aim was to achieve 30min/day of brisk walking by the end of the program, a 'prescription' consistent with current physical activity guidelines for the general population. We have also recently reported on the value of self-paced 'walking for pleasure' as an initial modality of exercise for the overweight and obese.⁵⁹ This study concluded that 'walking for pleasure' may provide significant health benefits for the obese but not normal weight individuals. The value of an exercise intensity that is tolerable should not be underestimated. Ekkekakis and Lind⁶⁰ found that increasing speed of walking and thereby exercise intensity by 10% above self-selected walking pace led to significant decreases in reported pleasure in overweight women. The expectation of sustained activity at such a level could diminish both enjoyment of physical activity and also motivation for activity.

Further behavioural research is necessary to assess different activity promotion and exercise prescription options for the overweight and obese and also understand psychosocial pre-treatment predictors of weight control.⁶¹ Villanova *et al.*,³⁷ concluded that successful weight loss maintenance (achieved through a long-term structured program of regular physical activity) may favour the adherence to exercise, a healthier lifestyle and improvement of psychological profile. Prospective randomized trials with long-term follow-up are needed to extend positive results from pilot work in the area. It is logical to suggest that more targeted and individualized prescription, for example provided by an exercise physiologist (or in combination with a psychologist) may result in further improvements than reported by Villanova *et al.*³⁷

Delahunty *et al.*,⁶² also recently reported on psychosocial predictors of physical activity in a representative sample of the Diabetes Prevention Program lifestyle participants. In this study, being a man, having a lower BMI, higher exercise self-efficacy, and lower perceived stress, depression and anxiety scores correlated with higher levels of baseline physical activity with similar patterns at 1 year and at the end of the study, 2 to 3 years later. The authors concluded that people in high-risk population groups (including the obese) may have different determinants of physical activity with implications for the successful promotion of physical activity (and need for individualized exercise prescription).

Another recent study has highlighted an efficacious short-term nutrition and physical activity lifestyle modification program.⁶³ The study reported on significant short-term improvements in health knowledge, nutrition, and physical activity behaviour, plus improvements in many chronic disease risk factors as a function of lifestyle change. Again, the challenge is to translate short-term gains into the adoption and maintenance of these healthful behaviours across the lifespan.

Tools to assist in the monitoring of physical activity participation and also motivation of obese individuals may play an important role in changing exercise behaviours. Potentially useful devices include pedometers^{37,63-65} accelerometers and heart rate monitors. Ironically, novel technologies may hold the answer to new behavioural approaches to weight management after other technologies including the many labour-saving devices have contributed to the concomitant declines in physical activity and increases in sedentary behaviours of the population. Novel, cost-effective and less traditional applications of behaviour modification such as e-mail, internet and telephone interventions may be warranted to assist with stimulus control and self-monitoring.⁵

In summary, the ability to provide appropriate support for the overweight and obese in the clinical setting, (including behavioural therapy), remains a major challenge, particularly for sole practitioners.⁶⁶ Shared-care chronic disease management models may provide an alternative multi-disciplinary approach for some obese patients who may not have access to a comprehensive weight management clinic. Every effort must be made to encourage the incorporation of appropriate and sufficient physical activity in one's lifestyle to achieve and maintain a healthy weight.¹⁷ A better understanding of the role of the physical activity stimulus in the motivational tendencies of the obese may assist in a better fit between the individual and the exercise prescribed.⁶⁰

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Review Article

State of the science: a focus on physical activity

Andrew P Hills PhD^{1,2} and Nuala M Byrne PhD^{1,2}

¹ *Institute of Health and Biomedical Innovation, Queensland University of Technology, Australia*

² *ATN Centre for Metabolic Fitness*

科學現況：體能活動為重點

飲食、運動、行為支持及對某些肥胖者的藥物療法，為整套有效肥胖管理的生活形態的必需因子。目前對肥胖預防、治療及管理上的持續挑戰，在於武裝健康專業人員，提供必要的知識及瞭解以及從事有意義的體重管理諮詢的時機。儘管有許多有效管理上的障礙，如：缺乏營養及體能活動的相關教育、感到病人不順從、感到無力改變病人的行為及專家行為支持的成本等，然而有更多評估飲食及運動計畫的行為改變技巧的證據出現，特別在當下行為改變的評估。行為諮詢可以對付施行飲食及體能活動目標時的遵醫囑性障礙，也可以賦予個案實用的策略及更加自我反應的動機。常用的行為介入包括刺激控制、強化技巧、自我監控、行為契約及社會支持計畫。本文著重於治療與管理肥胖的關鍵行為之一：體能活動。經由增加體能活動的能量消耗是成功的減重及長期體重維持的中心。對過重及肥胖者而言，體能活動在體重管理 ▪ 容中衍生出來的特殊價 ▪ 是對體能活動促進及運動處方兩者的角色有的正確評價有關。

關鍵詞：行為的、運動、肥胖、過重、生活型態因子、體能活動、處方、促進