Physical activity and Exercise across the Lifespan: Implications for Obesity Prevention

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Levels of obesity have increased dramatically
Life course approach

Life course

- Characterise phenotype
- Define markers of risk
- Nutrition & lifestyle interventions

CHRONIC DISEASE

- Adult diet, activity, other risk factors
- Childhood diet, activity, adiposity
- Infant feeding, activity, adiposity
- Fetal growth & development
- Health of adolescent, mother's diet and body composition
Physical activity and health

- Humans are designed to be active!
- Thus, optimal health and fitness can only be achieved by people who are habitually active.
- Being active is normal and natural - modern environments have ‘engineered’ activity out of our lives.
PHYSICAL ACTIVITY
Critical in the formative years – do not restrict!
The Case Against Over-Parenting

Why Mom and Dad need to cut the strings
BY NANCY GIBBS
Australian children lack the basic movement skills to be active and healthy

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Benefits of physical activity in the obese

- Decreased loss of FFM in weight loss
- Assists with weight maintenance
- Improves cardiovascular and metabolic health, independent of weight loss
Weight maintenance

- High physical activity & Low weight gain
- High endurance & ease of physical activity
  - Increased muscle strength
  - Increased VO₂max
  - Increased muscle metabolic economy
  - Increased anaerobic metabolism
  - Increased muscle size

(Hunter & Byrne 2005 JSC)
Physical activity and metabolic health

Weight loss induced by increased daily physical activity without caloric restriction substantially reduced **abdominal obesity** and **insulin resistance**

(Ross et al. 2000)
Life course approach: muscle mass and strength

(Sayer et al. 2008 J Nutr Health Aging)
Age-related loss of muscle (sarcopenia), strength & functional ability

A ‘poverty of flesh’ including decrease in FFM. Often associated with an increase in FM, and body weight may not change.
‘Sarcobesity’: A metabolic conundrum

Evelyn B. Parr, Vernon G. Coffey, John A. Hawley*

Obesity
- Glucose regulation
- Depression
- Cardiovascular disease
- Hypertension

Sarcopenia
- Mobility/frailty
- Joint disorders
- Strength/power
- Functional capacity

Deterioration of muscle quality & quantity

↑ lifestyle-related chronic diseases
- ↓ protein synthesis
- ↑ fat accumulation
- ↓ basal metabolic rate
- ↑ insulin resistance

↓ functional capacity

Inappropriate level of physical activity

Maturitas 74 (2013) 109–113
Exercise and the preservation of muscle
Resistance training for obese, type 2 diabetic adults: a review of the evidence

A. P. Hills, S. P. Shultz, M. J. Soares, N. M. Byrne, G. R. Hunter, N. A. King and A. Misra

Summary
In both developed and developing countries, increased prevalence of obesity has been strongly associated with increased incidence of type 2 diabetes mellitus (T2DM) in the adult population. Previous research has emphasized the importance of physical activity in the prevention and management of obesity and T2DM, and generic exercise guidelines originally developed for the wider population have been adapted for these specific populations. However, the guidelines traditionally focus on aerobic training without due consideration to other exercise modalities. Recent reviews on resistance training in the T2DM population have not compared this modality with others including aerobic training, or considered the implications of resistance training for individuals suffering from both obesity and T2DM. In short, the optimal mix of exercise modalities in the prescription of exercise has not been identified for it benefits to the metabolic, body composition and muscular health markers common in obesity and T2DM. Similarly, the underlying physical, social and psychological barriers to adopting and maintaining exercise, with the potential to undermine the efficacy of exercise interventions, have not been addressed in earlier reviews. Because it is well established that aerobic exercise has profound effects on obesity and T2DM risk, the purpose of this review was to address the importance of resistance training to obese adults with T2DM.

Keywords: Aerobic exercise, body weight, resistance training, type 2 diabetes mellitus.

obesity reviews (2009)
What is needed to tackle the epidemic?

- A focus on obesity prevention
- Evidence-based practice – Translation – Implementation Science
- Multi-level, multi-sectoral approaches – including complex interventions
- Sustainable changes in all areas e.g. education, transport, health etc.
- Program evaluation
- Learning from ‘Positive Deviants.’
WHERE TO NEXT?

Best Bets

Healthy Schools: Alternate approaches
Healthy Workplaces: Health & wellness
Healthy Aging: Addressing sarcopenic obesity

Multi-disciplinary, inter-disciplinary and inter-professional opportunities.
More than a ‘nudge’ is required to activate many people!!!
Think BIG!
Aim high, be bold, be persistent

‘Sometimes a problem reaches a point of acuity where there are just 2 choices left: bold action or permanent crisis.’

(David Rothkopf)
A Proposal to Speed Translation of Healthcare Research Into Practice
Dramatic Change Is Needed

Rodger Kessler, PhD, Russell E. Glasgow, PhD

Abstract: Efficacy trials have generated interventions to improve health behaviors and biomarkers. However, these efforts have had limited impact on practice and policy. It is suggested that key methodologic and contextual issues have contributed to this state of affairs. Current research paradigms generally have not provided the answers needed for more probable and more rapid translation. A major shift is proposed to produce research with more rapid clinical, public health, and policy impact.


‘You cannot solve problems by continuing to use the same solutions that created the problem in the first place.’  

(Albert Einstein)
‘The definition of insanity is doing the same thing over and over again and expecting a different result.’ (Albert Einstein)

We propose a 10-year moratorium on efficacy RCTs in health and health services research. This would provide the necessary time for researchers, practitioners, policymakers, and citizens to collaboratively identify and evaluate innovations that have real potential for translation.

Translation pathway: discovery to health impact

Discovery (e.g. genetic risk factor)

Promising application

Evidence-based guideline/policy

Practice & control programs

Reducing the burden of obesity

Modified from Khoury et al. 2010
‘If we want more evidence-based practice, we need more practice-based evidence.’

(Larry W. Green, 2004)
The behaviour change wheel: A new method for characterising and designing behaviour change interventions

Susan Michie¹, Maartje M van Stralen² and Robert West³
Proposing a conceptual framework for integrated local public health policy, applied to childhood obesity - the behavior change ball

Anna-Marie Hendriks¹, Maria WJ Jansen¹,³, Jessica S Gubbels⁴, Nanne K De Vries²,⁴, Theo Paulussen⁵ and Stef PJ Kremers⁴
Hendriks et al.
Implementation Science (2013)
Sequential phases of developing complex interventions

- **Pre-phase**: Explore relevant theory
- **Phase I**: Identify and develop the components
- **Phase II**: Further development of intervention components and delivery system
- **Phase III**: Compare a fully defined intervention
- **Phase IV**: Definitive (randomised controlled) trial
- **Long term implementation**: Replicate your intervention & translation

**Continuum of increasing evidence**
What can we learn from Positive Deviance?

http://www.positivedeviance.org
Positive Deviance

‘Solutions before our eyes.’
‘Best bets’ for health improvement.

• In every community there are individuals whose uncommon practices/behaviours enable them to find better solutions than others who have access to the same resources.

• Identifying solutions to community issues within the community!
Positive Deviance: Outliers matter!
Exercise and the preservation of muscle

From: http://ettaclarkphotography.com
Traditional vs. Positive Deviance approach

**TRADITIONAL**

Deficit-based:
‘What’s wrong here?’

Analysis of underlying causes of problem

Externally driven (by experts or authorities)

Top-down, outside in

**POSITIVE DEVIANCE**

Asset-based:
‘What’s right here?’

Analysis of successful solutions

Internally driven (by external ‘people like us,’ same culture)

Bottom-up, inside-out
Positive Deviance and Obesity Prevention

Look at the following successes

**Individual**
- Leaner people living in the same obesogenic environment
- Women with good pregnancy outcomes
- Women who breastfeed ≥ 6 months
- Children who watch ≤ 2 h screen time per day

**Interpersonal**
- Families who are active together

**Local communities**
- With walkways, bike paths etc.
- Local champions

**Nations**
- Nutrition and physical activity policies etc.
- Willingness to make the harder decisions
- ‘Whole-of-government’ approaches
Self-efficacy and physical activity/exercise

‘One’s confidence in the ability to take action and persist in action.’

Self-efficacy expectations are important determinants of:

• **Choice of activities people engage in;**
• **How much energy they expend on these;**
• **Degree of persistence in the face of failure/adversity.**
Physical activity and nutrition behavioural outcomes of a home-based intervention program for seniors: a randomized controlled trial

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Abstract

**Background:** This intervention aimed to ascertain whether a low-cost, accessible, physical activity and nutrition program could improve physical activity and nutrition behaviours of insufficiently active 60–70 year olds residing in Perth, Australia.

**Methods:** A 6-month home-based randomised controlled trial was conducted on 478 older adults (intervention, n = 248; control, n = 230) of low to medium socioeconomic status. Both intervention and control groups completed postal questionnaires at baseline and post-program, but only the intervention participants received project materials. A modified fat and fibre questionnaire measured nutritional behaviours, whereas physical activity was measured using the International Physical Activity Questionnaire. Generalised estimating equation models were used to assess the repeated outcomes over both time points.

**Results:** The final sample consisted of 176 intervention participants and 199 controls (response rate 78.5%) with complete data. After controlling for demographic and other confounding factors, the intervention group demonstrated increased participation in strength exercise (p < 0.001), walking (p = 0.029) and vigorous activity (p = 0.015), together with significant reduction in mean sitting time (p < 0.001) relative to controls. Improvements in nutritional behaviours for the intervention group were also evident in terms of fat avoidance (p < 0.001), fat intake (p = 0.021) and prevalence of frequent fruit intake (p = 0.008).

**Conclusions:** A minimal contact, low-cost and home-based physical activity program can positively influence seniors’ physical activity and nutrition behaviours.

**Trial registration:** anzctr.org.au Identifier: ACTRN12609000735257

**Keywords:** Fat avoidance, Fibre intake, Fruit intake, Goal setting, Sitting, Strength exercise, Vegetable intake, Walking
Eat Healthy, Move More, Sit Less
The protocol of a randomized controlled trial for playgroup mothers: Reminder on Food, Relaxation, Exercise, and Support for Health (REFRESH) Program

Sarojini MDR Monteiro1,2*, Jonine Jancey1,2, Peter Howat1,2, Sharyn Burns1, Carle Jones1,2, Satwinder S Dhillon1,2, Alexandra McManus3, Andrew P.Hills4 and Annie S Anderson5

Abstract

Background: Mother’s physical activity levels are relatively low, while their energy consumption is generally high resulting in 58% of Australian women over the age of 18 years being overweight or obese. This study aims to confirm if a low-cost, accessible playgroup based intervention program can improve the dietary and physical activity behaviours of mothers with young children.

Methods/Design: The current study is a randomized controlled trial lifestyle (nutrition and physical activity) intervention for mothers with children aged between 0 to 5 years attending playgroups in Perth, Western Australia. Nine-hundred participants will be recruited and randomly assigned to the intervention (n = 450) and control (n = 450) groups. The study is based on the Social Cognitive Theory (SCT) and the Transtheoretical Model (TTM), and the Precede-Proceed Framework incorporating goal setting, motivational interviewing, social support and self-efficacy. The six month intervention will include multiple strategies and resources to ensure the engagement and retention of participants. The main strategy is home based and will include a specially designed booklet with dietary and physical activity information, a muscle strength and flexibility exercise chart, a nutrition label reading shopping list and menu planner. The home based strategy will be supported by face-to-face dietary and physical activity workshops in the playgroup setting, posted and emailed bi-monthly newsletters and monthly Short Message Service (SMS) reminders via mobile phones. Participants in the control group receive no intervention materials. Outcome measures will be assessed using data that will be collected at baseline, six months and 12 months from participants in the control and intervention groups.

Discussion: This study will add to the evidence base on the recruitment, retention and the impact of community based dietary and physical activity interventions for mothers with young children.

Trial Registration: Australian and New Zealand Clinical Trials Registry ACTRN12609000735257
Results of a randomized controlled trial to promote physical activity behaviours in mothers with young children

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ABSTRACT

Objective. Increasing levels of physical activity in mothers have long-term health benefits for the mother and family. The study aimed to evaluate the effect of a six-month, physical activity RCT for mothers of young children.

Methods. Women were recruited via playgroups and randomly assigned to intervention (n = 394) or control group (n = 322). The intervention group received a six-month multi-strategy programme delivered via playgroups in Perth, Australia, measures were mean minutes per week of moderate (M) and vigorous (V) intensity physical activity (PA), and number of days/week of muscle strength exercises.

Results. The intervention had a significant effect on mean time for vigorous (p = 0.008), moderate (p = 0.023) and total physical activity (p = 0.001) when compared to the control group. The intervention group increased their vigorous activity by a mean of 24 min/week, moderate activity by 23 min/week and total physical activity by 72 min/week.

Conclusions. A relatively minimum home based intervention was able to demonstrate modest but statistically significant improvements in physical activity in a hard to reach group. These changes if maintained over a longer period are likely to improve the health of mothers and have a positive impact on their partners and children.

Australian and New Zealand Clinical Trials Registry ACTRN12609000735257.
‘Small Changes’ to Diet and Physical Activity Behaviors for Weight Management

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Main points

• Eating and activity behaviours ‘cluster’, therefore we need to address both eating & physical activity in obesity prevention;

• Parents and the family environment, plus schools and workplaces, are critically important;

• ‘Positive Deviants’ may provide important signals for action;

• ‘Small changes’ can be effective and are likely to be tolerated by most;

• Self-efficacy is a critical ingredient!
Our goal is to translate knowledge into applications that benefit people

“To him who devotes his life to science, nothing can give more happiness than increasing the number of discoveries, but his cup of joy is full when the results of his studies immediately find practical applications.”

Louis Pasteur
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