

Do health behaviours cluster in a working population in New Zealand?

Micalla Williden, Scott Duncan and Grant Schofield

Introduction

Maintaining a healthy weight, being physically active and regularly eating fruit and vegetables are three of the most important health behaviours for reducing the risk of many chronic disorders. These behaviours often exist in conjunction with one another, and while the presence of one behaviour can promote adherence to another,¹ research suggests that very few individuals abide by multiple health behaviours.^{2,3} The reduced quality of life as a result of poor lifestyle choices is not isolated to the individual. While employers in New Zealand and Australia do not directly meet the medical costs associated with poor employee health as they do in the United States (for example), there is convincing evidence of the link between increased absenteeism and increased presenteeism (where employees are present at work yet not functioning to their full capacity) as two consequences of poor employee health.⁴⁻⁸

As the workplace is increasingly being utilised in New Zealand as a setting for health promotion, identifying if health behaviours cluster would be a useful first step for initiating employer-driven health promotion efforts to target multiple behaviours. The clustering of behaviours has been investigated in Australia⁹ and in the US,¹⁰ and while Tobias and colleagues investigated the clustering of five health behaviours in the New Zealand population,¹¹ maintaining a healthy weight was not included. As excess weight is an underlying risk factor for many chronic diseases, the aim of this study was to report the prevalence of individuals adhering to three health behaviours and the degree to which these behaviours cluster within this working population.

Methods

Study participants

Participants were employees of nine professional organisations invited to participate in an online health risk assessment (HRA). These organisations were both public and private sector companies, and included companies from engineering, insurance, IT and advertising, and a law firm. The organisations were recruited due to the nature of their core business requiring their employees to spend most of their work day at a computer, thus having easy access to the HRA. Organisation size ranged from 72 to 994 employees, and the number of worksites within each ranged from a single worksite to 23 different locations across New Zealand. E-mail invitations were sent to 3,438 employees to complete the HRA within work time. Two follow-up e-mails were sent out over a two-week period. Ethical approval was obtained from the New Zealand Northern Regional Ethics Committee, and data were collected from December 2009 to March 2010.

Measures

The HRA asked participants to report on nine health risk behaviours, which were included due to their established links to health and productivity in the workforce.¹² However, the focus of this analysis was on just three health behaviours that are the target of public health recommendations: fruit and vegetable consumption, physical inactivity and having a BMI over 25 kg/m². Although being overweight is not a behaviour, it is the consequence of a number of

Abstract

Issue addressed: This study examines whether adhering to healthy weight, physical activity and fruit and vegetable recommendations lead to a cluster in a working population.

Methods: An online Health Risk Assessment (HRA) was administered to 1,296 (36%) employees in nine organisations across New Zealand. Clustering was defined as the co-prevalence of behaviours above that which was expected by the laws of probability.

Results: Less than half the participants met physical activity guidelines (44.5%) or maintained a healthy weight (46.7%), and 29.4% consumed five or more servings of fruit and vegetables per day. Just 3.8% of participants met all three recommendations, compared to an expected prevalence of 7.6%. There was no clustering of health behaviours, with no difference between expected and observed prevalence (with an observed/expected (O/E) ratio between 0.68-0.93).

Conclusion: Few people adhere to two or more simple public health messages recommended to reduce risk of chronic disease.

Key words: fruit, vegetables, body mass index, clustering, health behaviour, employees

Health Promotion Journal of Australia 2012; 23: 234-6

So what?

Identifying co-existing health behaviours could help with a more targeted approach to health promotion messages.

Table 1: Observed and expected prevalence of healthy behaviours.

Behaviour			Observed % (n)	Expected (%)	Ratio O/E (95% CI)
Fruit and vegetable intake ^a	Physical activity ^a	Healthy weight ^a			
yes			29.4 (381)		
	yes		44.5 (577)		
		yes	46.7 (605)		
yes	yes	–	7.6 (99)	13.0	0.58 (0.32-1.14)
	yes	yes	14.3 (185)	20.8	0.69 (0.43-1.19)
yes	–	yes	12.7 (165)	13.7	0.93 (0.78-1.34)
yes	yes	yes	3.8 (49)	6.1	0.63 (0.48-1.54)
no	no	–	23.5 (305)	39.2	0.60 (0.47-1.19)
–	no	no	31.0 (402)	29.6	1.05 (0.93-1.09)
no	–	no	35.0 (454)	37.6	0.93 (0.82-1.08)
no	no	no	20.6 (267)	20.9	0.99 (0.84-1.12)

a. met recommended level

Yes denotes the presence of behaviour(s)

No denotes the absence of behaviour(s), i.e. for the group that has 'no' in both the fruit and vegetable and physical activity columns and '–' in healthy weight column, this denotes they do not meet the recommendations for fruit and vegetable consumption or physical activity guidelines, regardless of weight status.

behaviours that result in an energy imbalance leading to weight gain. The questions were derived from previously validated questionnaires and population surveys after consultation with health professionals and experts in the respective fields.¹³⁻¹⁶ Weight status was assessed by asking participants to report their height and weight, from which body mass index (BMI; kg/m²) was calculated. Those recording a BMI 25 kg/m² or greater were categorised as overweight.¹⁴

Participants were asked to recall the time spent in physical activities over the last week using the New Zealand Physical Activity Questionnaire Short Form (NZ PAQ-SF), a modified version of the International Physical Activity Questionnaire (I-PAQ) that has been validated in the New Zealand population.¹³ Activities were categorised as walking or as moderate or vigorous physical activities, and participants were categorised as either active or inactive according to the New Zealand Physical Activity Guidelines (which state that 'active' people are those who participate for at least 30 minutes per day five days per week).¹⁵ Finally, fruit and vegetable consumption was assessed using questions from the New Zealand Nutrition Survey.¹⁷ Participants were asked how many serves of vegetables and fruits they consumed per day over the past seven days.¹⁷ Those who reported meeting the recommendation of three servings of vegetables and two servings of fruit per day were categorised as meeting the recommendations for a healthy diet.¹⁸ Once developed, the questionnaire was pilot-tested in a convenience sample to assess for comprehension and length.

Analysis

Student t-tests were conducted to determine whether there were differences in BMI, physical activity levels or fruit and vegetable consumption by age, gender or ethnicity. The three risk factors (physical inactivity, insufficient fruit and vegetable consumption, and overweight) were then coded dichotomously based on whether participants met the recommendations for physical activity, fruit and vegetable consumption and a healthy weight. Groups were formed based on all possible combinations of behaviour. In all, eight groups (ranging from presence of all three behaviours to absence of all three

behaviours) are presented. Clustering is determined by calculating the expected prevalence rate (multiplying together the individual behaviour prevalence rates).¹⁹ A lower than expected prevalence indicates the behaviours exist independent of each other and there is no clustering; a higher than expected prevalence suggests that the behaviours do cluster.¹¹ Chi-squared analyses were performed to establish if there were differences between observed and expected prevalence rates, with significance determined at $p < 0.05$.

Results

The HRA was completed by 1,296 participants (447 male, 849 female, an overall response rate of 36%) aged 18-65 years with the response rate of each organisation ranging from 13-90%. The majority were of New Zealand European descent (81.5%) with a mean BMI of 25.7 kg/m², and more than half (53.3%) categorised as overweight. Forty-five per cent met the physical activity guidelines, and those meeting the recommendations for fruit and vegetable consumption were 45.1% and 38.5% respectively. Less than one-third (29.4%) consumed five or more servings of fruit and vegetables per day. Just 3.8% of participants met all three recommendations, compared to an expected prevalence of 6.1%. No health behaviour clusters were observed in this study, as shown by similar expected and observed prevalence rates (Table 1).

Discussion

In the present study, almost 80% of people claimed to be either physically active, of a healthy weight or ate five or more serves of fruit and vegetables daily. While individuals who adhere to one health behaviour may be motivated to adopt another¹ we did not find that among the participants in this study. Just 3.8% of the participants met the recommendations for all three behaviours, similar to prevalence rates of between 3-8% previously reported.^{9,20-22} Lack of knowledge is unlikely to be an explanation,²³ particularly in the present study of professional working adults, which suggests social and environmental factors that influence behaviour may be more

salient.^{24,25} The workplace is a recognised setting that can address some of these factors and has the potential to provide support necessary for behaviour change and maintenance.

Environmental changes do not require substantial financial investment from the company; providing healthy food options, promoting stair use through posters, the creation of organisational sports teams and encouraging active commute where possible are all examples of low-cost health promotion initiatives that target both the physical and the social environment of the workplace and encourage adherence to public health recommendations.²⁰ Investigating the opportunities available to these employees would establish if the workplace would benefit from positive changes to the physical work environment, or if it is the wider social landscape that needs to be addressed.

Limitations in this research include the self-reported information, such as weight, which research suggests Caucasian people, women, and those with a higher education may underestimate more than other sub-groups.²⁶ Further, the low response rate, the cross-sectional nature of the study and the self-selection of the companies and the participants make these findings unlikely to be representative of the wider population. However, this first investigation in a sample of professional working adults in New Zealand illustrates a lack of adherence to more than one health behaviour. Utilising the workplace as a vehicle for health promotion that targets public health recommendations may reduce the impact of poor employee health over time.

References

- Hung HC, Joshipura KJ, Jiang R, Hu FB, Hunter D, Smith-Warner SA, et al. Fruit and vegetable intake and risk of major chronic disease. *J Natl Cancer Inst.* 2004;96(21):1577-84.
- Ford ES, Ford MA, Will JC, Galuska DA, Ballew C. Achieving a healthy lifestyle among United States adults: a long way to go. *Ethn Disabil.* 2001;11(2):224-31.
- Pronk NP, Anderson LH, Crain AL, Martinson BC, O'Connor PJ, Sherwood NE, et al. Meeting recommendations for multiple healthy lifestyle factors. Prevalence, clustering, and predictors among adolescent, adult, and senior health plan members. *Am J Prev Med.* 2004;27 Suppl 2:25-33.
- Burton WN, Chen CY, Conti DJ, Schultz AB, Pransky G, Edington DW. The association of health risks with on-the-job productivity. *J Occup Environ Med.* 2005;47(8):769-77.
- Finkelstein EA, DiBonaventura M, Burgess SM, Hale BC. The costs of obesity in the workplace. *J Occup Environ Med.* 2010;52(10):971-6.
- Colagiuri S, Lee CM, Colagiuri R, Magliano D, Shaw JE, Zimmet PZ, et al. The cost of overweight and obesity in Australia. *Med J Aust.* 2010;192(5):260-4.
- Medibank. *The Health of Australia's Workforce.* Melbourne (AUST): Medibank Private Limited; 2005.
- Medibank. *Sick at Work: The Cost of Presenteeism to Your Business, Employees and the Economy.* Melbourne (AUST): Medibank Private Limited; 2007.
- French S, Rosenberg M, Knuijan M. The clustering of health risk behaviours in a Western Australian adult population. *Health Promot J Austr.* 2008;19:203-9.
- Berrigan D, Dodd K, Troiano RP, Krebs-Smith SM, Barbash RB. Patterns of health behavior in U.S. adults. *Prev Med.* 2003;36(5):615-23.
- Tobias M, Jackson G, Yeh LC, Huang K. Do healthy and unhealthy behaviours cluster in New Zealand? *Aust N Z J Public Health.* 2007;31(2):155-63.
- Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *J Occup Environ Med.* 2004;46:398-412.
- McLean G, Tobias M. *The New Zealand Physical Activity Questionnaires.* Report on the Validation and Use of the NZPAQ-LF and NZPAC-SF Self Report Physical Activity Survey Instruments. Wellington (NZ): SPARC (Sport and Recreation New Zealand); 2004.
- World Health Organisation. *Global Burden of Disease and Risk Factors.* Washington (DC): Oxford University Press; 2006.
- Sport and Recreation New Zealand. *Sport, Recreation and Physical Activity Participation Among New Zealand Adults: Key Results of the 2007/08 Active New Zealand Survey.* Wellington (NZ): SPARC (Sport and Recreation New Zealand); 2008.
- Ministry of Health. *A Portrait of Health. Key Results of the 2006/07 New Zealand Health Survey.* Wellington (NZ): Government of New Zealand; 2008.
- Ministry of Health. *N Z Food: NZ People. Key Results from the 1997 National Nutrition Survey.* Wellington (NZ): Government of New Zealand; 1999.
- Ministry of Health. *The New Zealand Health Strategy.* Wellington (NZ): Government of New Zealand; 2000.
- Ebrahim S, Montaner D, Lawlor DA. Clustering of risk factors and social class in childhood and adulthood in British women's heart and health study: cross sectional analysis. *BMJ.* 2004;328(7444):861.
- Poortinga W. The prevalence and clustering of four major lifestyle risk factors in an English adult population. *Prev Med.* 2007;44(2):124-8.
- Hu FB, Manson JE, Stampfer MJ, Colditz G, Liu S, Solomon CG, et al. Diet, lifestyle, and the risk of type 2 diabetes mellitus in women. *N Engl J Med.* 2001;345(11):790-7.
- Ford ES, Li C, Zhao G, Pearson WS, Tsai J, Greenlund KJ. Trends in low-risk lifestyle factors among adults in the United States: Findings from the Behavioral Risk Factor Surveillance System 1996-2007. *Prev Med.* 2010;51(5):403-7.
- Sport and Recreation New Zealand. *Sport and Physical Activity Survey.* Wellington (NZ): SPARC; 2003.
- Golaszewski T, Allen J, Edington D. Working together to create supportive environments in worksite health promotion. *Am J Health Promot.* 2008;22(4):1-10.
- French SA, Story M, Jeffery RW. Environmental influences on eating and physical activity. *Annu Rev Public Health.* 2001;22:309-35.
- Wen M, Kowaleski-Jones L. Sex and ethnic differences in validity of self-reported adult height, weight and body mass index. *Ethn Dis.* 2012;22(1):72-8.

Authors

Micalla Williden, Scott Duncan and Grant Schofield, Human Potential Centre, Auckland University of Technology, New Zealand.

Correspondence

Micalla Williden, Human Potential Centre, Auckland University of Technology, Private Bag 92006, Auckland 1142, New Zealand; e-mail: mikki.williden@aut.ac.nz