Journal of Science and Medicine in Sport (2006) 9, 151—156

ELSEVIER

Journal of Science and Medicine in Sport

www.elsevier.com/locate/jsams

ORIGINAL PAPER

Encouraging cycling through a pilot cycling proficiency training program among adults in central Sydney

B. Telfer[a,b], **C. Rissel**[b,*], **J. Bindon**[b], **T. Bosch**[b]

[a] *New South Wales (NSW) Public Health Officer Training Program, NSW Health Department, NSW, Australia*
[b] *Central Sydney Area Health Service Health Promotion Unit (CSAHS HPU), NSW, Australia*

Accepted 17 June 2005

KEYWORDS
Cycling proficiency training;
Cycling;
Physical activity;
Active transport

Summary In the face of declining population levels of physical activity, programs that encourage cycling represent an under-developed strategy in Australia. In 2003, we implemented a pilot cycling proficiency training (CPT) program for adults in central Sydney, New South Wales. To evaluate the program, participants completed pre- and post-course self-administered questionnaires and participated in a follow-up telephone interview 2 months after their course.

Between April and December 2003, 20 CPT courses were conducted. Of 113 people who started a course, 81 (72%) completed at least one course (beginner or intermediate) and 105 (93%) took part in the pre and follow-up interview. Participant satisfaction with all aspects of the course was high. At 2-month follow-up, the course had significantly increased participants' self-reported skills and confidence for cycling. More than half of the participants (56%) said they cycled more 2 months after the course. There was a 40% increase in participants having cycled in the previous week at follow-up among baseline non-cyclists, although this was not statistically significant. There was also a significant increase in weekly participation in other forms of moderate intensity physical activity.

Overall, the program was reasonably successful, particularly among those people not cycling at baseline. Cycling proficiency training for adults is one strategy that can supplement other active transport policies to encourage physical activity, although bicycle friendly urban planning and policies are still required to create more supportive environments for cyclists.

* Corresponding author at: Health Promotion Unit, Level 9 (north), King George V, Missenden Road, Camperdown, NSW 2050, Australia. Tel.: +61 2 9515 9055; fax: +61 2 9515 9056.
E-mail address: criss@email.cs.nsw.gov.au (C. Rissel).

1440-2440/$ — see front matter © 2006 Sports Medicine Australia. Published by Elsevier Ltd. All rights reserved.
doi:10.1016/j.jsams.2005.06.001

Background

Cycling is a fun, effective and accessible form of physical activity.[1–3] Regular cycling significantly reduces overall mortality, diabetes and hypertension.[4–6] While there are no reliable measures of cycling frequency in Australia, in 2003 cycling was the fourth most popular physical activity among people aged 15 years and older, with 9% of the population cycling.[7] About 1 or 2% of the population cycled to work on census day 2001.[8]

Increase in the number of people cycling may also lead to injury prevention: the more people cycling, the less likely it is that a cyclist will be hit by a motor vehicle.[9] The British Medical Association found that, after the benefits of physical activity from cycling and the risk of injury were weighed up, the benefits outweighed the risks by a factor of 20 to 1.[2]

Cycling proficiency (skills) training assists children overcome skill-, knowledge- and confidence-related barriers to cycling. Research suggests that children who receive cycle training are more likely to cycle, cycle on-road, have safer cycling behaviours and less likely to make errors and to be involved in a crash than their counterparts without cycle training.[10–12] Isolated examples of programs of cycling proficiency training for adults do exist, but the effect on adults is unclear and has seldom been reported.[13]

The evaluation of cycling proficiency training (CPT) for adults is necessary to determine whether or not such programs can increase the number of people cycling, frequency of cycling and the use of bicycles for transport. We report here the evaluation findings of a pilot CPT program, developed in 2002.

The goals of the pilot CPT program were to increase participant frequency and duration of cycling and enhance their skills and confidence for leisure or commuter cycling. The program was designed for adults with low- to moderate-level skills and confidence for cycling. A more detailed report is available from the corresponding author.

Methods

The cycling proficiency training (CPT) program planning and implementation

Between April and December 2003, 20 CPT courses were conducted in central Sydney, New South Wales. The program was focused on practical skill development and supervised on-road or cycle path training.[11] Free courses for beginner- and intermediate-level cyclists were conducted either on weekdays or weekends, with each course comprising 6 h of tuition, broken into 2- or 3-h sessions. The maximum number of participants allowed on a course was eight, with a student-to-cycle coach ratio of 8 to 1.[14]

Participant recruitment

The CPT program was promoted to a general audience through promotional flyers, posters, media releases, articles and advertisements in local newspapers, and briefly on a popular TV program.

Prior to enrolment participants were screened for minimum cycling ability and any medical conditions that would preclude them from physical activity. Participants signed an informed consent form at the first session, and no one was excluded after screening.

Evaluation methods

Process evaluation

Process evaluation comprised regular working group meetings, participant observation and interviews. Post-course, participants were also asked to comment on their satisfaction with the course. Participants used a five-point Likert scale to rate the various course components (which included practical skills sessions, group ride, etc.) as 'excellent', 'good', 'uncertain', 'fair', or 'unsatisfactory'.

Impact evaluation

To evaluate the impact of the CPT program, a pre-course, end of course, and 2-month follow-up participant questionnaire were devised. Participants self-administered pre- and post-course questionnaires. Verbal consent was sought from participants for a trained interviewer to contact them by telephone 2 months after the course.

The pre-course questionnaire included demographics, distance and time travelled to work, main mode of transport to work, reasons for doing the course and self-rated level of physical fitness. Bicycle riding history was assessed by the question ''When did you last ride a bicycle?'', with response options including more than 12 months ago, in the last 12 months, in the last month and in the last week.

At baseline, the end of the course, and at follow-up (by telephone), the frequency of cycling and of other types of moderate intensity physical activity were measured by one week physical activity retrospective recall.[15] Participants were asked for each day of the preceding week if they rode a bicycle and, if so, for how many minutes. Participants

were also asked for each day if they did any moderate level physical activity other than cycling, with moderate activity being defined for participants as ''Moderate means activities that made you breathe harder than normal, such as brisk walking or swimming''. At follow-up only, participants were asked to choose from a range of statements describing their cycling status: ''I haven't ridden my bike'', ''I have cycled less since doing the course'', ''I haven't changed how frequently I cycle'', ''I now

Table 1 Self reported confidence performing various cycling tasks, and of cycling knowledge, before participation in cycling proficiency training and at 2-month follow-up

Self reported scoring of confidence performing different cycling tasks and knowledge	Per cent confident or very confident pre-CPT ($n = 113$) (%)	Per cent confident or very confident at 2-month follow-up ($n = 105$) (%)	McNemar's test, exact p value
Confidence[a] in:			
Stopping and starting bike			
Confident	54	89	<0.0001
Riding bike in a straight line			
Confident	60	89	<0.0001
Balancing on bike			
Confident	49	90	<0.0001
Hand signaling while riding			
Confident	28	60	<0.0001
Emergency and precision braking			
Confident	20	64	<0.0001
Ride bike through narrow spaces			
Confident	14	56	<0.0001
Manage gears cycling uphill			
Confident	26	72	<0.0001
Manage gears cycling downhill			
Confident	18	72	<0.0001
Riding bike in traffic			
Confident	11	40	<0.0001
Riding and braking in the wet			
Confident	12	38	<0.0001
Managing road hazards while cycling			
Confident	11	66	<0.0001
Knowledge[b] of:			
Road rules for cyclists			
Good	15	65	<0.0001
Bicycle maintenance			
Good	9	43	<0.0001
Identify quiet cycle routes			
Good	26	70	<0.0001
Able to access cycling info			
Good	26	81	<0.0001

[a] The Likert scale with categories 'very confident', 'quite confident', 'unsure', 'a bit confident', 'not confident' was recoded to a dichotomous variable. Categories of 'very confident' and 'quite confident' were recoded to 'confident', and the categories 'unsure', 'a bit confident' and 'not confident' were recoded to 'less than confident'.

[b] The Likert scale with categories 'excellent', 'good', 'uncertain', 'fair', 'poor' was recoded to a dichotomous variable. Categories 'excellent' and 'good' were recoded to 'good' and the categories of 'uncertain', 'fair' and 'poor' were recoded to 'less than good'.

cycle to work'', ''I cycle more frequently but not to work'', ''I cycle more frequently and I also now ride to work''.

At each of the three time points, participants completed five-point Likert scales to rate their confidence at various cycling skills (which included using gears, braking, riding through narrow spaces and riding in traffic) as 'very confident', 'quite confident', 'unsure', 'a little bit confident', or 'not confident'. Participants also rated their cycling knowledge (which included road rules and ability to identify quiet cycle routes) as 'excellent', 'good', 'uncertain', 'fair' or 'poor'.

Data management and analysis

The 'confidence' Likert scale 'was recoded as 'quite or very confident' and 'a bit, unsure, or not confident'. The 'excellence' Likert scale was recoded to 'excellent or good' and 'uncertain, fair or poor'. The exact *p*-value for McNemar's test for dependent paired samples was used to assess these dichotomous variables. An *F*-test and a *t*-test for dependent, paired samples and a repeated measures ANOVA were used to analyse overall physical activity data on frequency and duration of cycling and other physical activity. Because of high zero counts and the skewed distribution of responses, a negative binomial regression model was used to analyse frequency of cycling for baseline non-cyclists.

Results

Of the 113 people who started a CPT course, most (87%) were aged 25—54 years and 85 (75%) were female. Over one third (41, 36%) of participants lived a comfortable cycling distance (up to 5 km) from work. Most (77%) rated their physical fitness as 'fair' or 'good'. Most first session attendees ($n = 105$) took part in the 2-month follow-up interview.

Process evaluation

Of the 81 participants who completed a post-course evaluation questionnaire, 78 (96%) said they would recommend the course, 75 (93%) rated the theory component of the course as 'excellent' or 'good', 80 (99%) rated the practical skills components as 'excellent' or 'good', 74 (91%) rated the supervised ride/s as 'excellent' or 'good' and 72 (89%) rated the handout material as 'excellent' or 'good'. For improving confidence cycling, 74 (91%) participants rated the course as 'excellent' or 'good', for improving cycling skills 78 (96%) of participants rated the course as 'excellent' or 'good' and 72 (89%) participants rated the course as 'excellent' or 'good' with respect to increasing their frequency of cycling.

Impact evaluation

At 2-month follow-up, compared to pre-course measures, CPT participants reported significant increases in their confidence on all measures (Table 1). Participants also reported statistically-significant increases in their knowledge of road rules, bike maintenance and their ability to identify quiet cycling routes and access cycling information.

Overall, at 2-month follow-up, there was no change in participants' reported mean frequency or

Table 2 Weekly frequency and duration of cycling and other forms of moderate physical activity

Physical activity recall measures	Pre-cycling proficiency training, mean (S.D.)	At 2-month follow-up, mean (S.D.)	*p* Value
Mean number of days rode bike last week	1.1 (1.84), $n = 110$	1.1 (1.84), $n = 105$	0.82[a]
Mean duration of bike riding last week (min)	47.1 (86.07), $n = 109$	57.5 (104.75), $n = 105$	0.36[b]
Mean number of days did other type of moderate intensity physical activity last week	2.7 (2.33), $n = 110$	3.8 (2.42), $n = 105$	<0.0001[a]
Number of days cycled to work last week	0.3 (1.11), $n = 110$	0.3 (0.97), $n = 105$	0.57[a]
Mean number of days rode bike last week among 55 participants not cycling at baseline	0	0.89 (0.21)	0.991[c]
Mean duration of bike riding last week (min) among 55 participants not cycling at baseline	0	40.36 (76.21)	0.00025[c]

[a] *F*-test and *t*-test for dependent samples.
[b] Repeated measures ANOVA.
[c] Negative binomial regression.

duration of cycle trips based on a 1-week activity recall (Table 2). However, participants not cycling in the month before the course reported a significant increase ($p < 0.001$) in their mean duration (in minutes) of cycling. For baseline non-cyclists (not cycled in the previous week and for whom there were follow-up data), 22 participants of 55 (a 40% increase) cycled at least once in the previous week at 2-month follow-up, although this was not statistically significant. In addition, there was a significant increase ($p < 0.0001$) in participants' mean frequency of participation in moderate-intensity physical activity other than cycling.

Of the 105 participants interviewed 2 months after their course, 59 (56%) said they cycled more frequently since the course. Less than a third ($n = 31$; 29.5%) had not changed how frequently they cycled, six (5.7%) cycled less and nine (8.6%) had not ridden a bike since completing the course. The most common reported reason for an increase in cycling frequency was increased confidence and skills for cycling.

Discussion

Following the cycling proficiency training program, participants had significantly increased their self-reported skills and confidence for cycling, and more than half of the participants said they cycled more than before the course, including to work. However, the increase in cycling was only statistically significant among those not cycling before the course according to the 1-week physical activity recall comparison. These findings illustrate that this type of group training program can increase cycling participation among those not cycling, an important result given that there is a paucity of evidence for strategies that promote cycling.

That participants showed a significant increase in weekly participation in other forms of moderate intensity physic activity may be because cycling prompted or was a part of a desire to be more physically active. It is probable that the experience of cycling at low to moderately vigorous levels was enjoyable, the skills learned increased their self-esteem or self-efficacy and inspired the participants to want to be more active generally.

The differences in the increase in frequency of cycling between the self-report and the 1-week recall may reflect a tendency for participants to say they had cycled more rather than remember all their activity over the preceding week. However, the relatively small sample and the 1-week recall of cycling frequency may not have been sensitive enough to detect statistically significant changes in behaviour.

A major limitation of this evaluation is the simple pre-post design, with no control group. It is possible that factors other than the program may account for the findings, although it is hard to imagine what would have led to self-reported increases in cycling skills and knowledge. It is likely that participants were at a stage of readiness to become more physically active and were generally positively motivated.

The difference in mode of administration at the 2-month follow-up (telephone interview) compared with the pre- and post-program (self-completed questionnaire) may have contributed to a positive follow-up result. Participants may have felt that they should give a response that the interviewer might want to hear, that they were cycling more. This may be particularly true of the cycling frequency data, although the knowledge and confidence ratings were already high immediately after the program.

The CPT course was designed to develop personal skills to facilitate behaviour change; it did not address societal, cultural, and environmental barriers to cycling in an urban setting. These structural barriers to cycling need to be removed for a sustained increase in the number of people cycling.[16]

Practical implications

- A group program where adult participants ride bicycles and practice basic cycling skills will increase cycling skills and confidence.
- Positive experiences of cycling coupled with increased skills and confidence leads to a greater frequency of cycling, particularly for those people not cycling at baseline.
- Programs that increase cycling are also likely to increase other forms of physical activity.

Acknowledgements

The authors wish to acknowledge and thank the following people for their valuable contributions to this program and its evaluation: Alex Voukelatos, Katie Irvine, Ms Margo Eyeson-Annan, Rose Avery, Katherine Rowe, Nadia Rosin, Angela Balafas, Denise Barry, Lyn Jensen, Keith Fletcher, Chloe Mason, Mary McInerney, Gabrielle Kuiper, Helen Jones, Jay Ramanathan, and all the course participants.

Contribution of authors: Barbara Telfer planned, implemented, monitored and evaluated the CPT program and prepared the paper, Chris Rissel initiated and helped plan, implement, monitor and evaluate the CPT program and prepare the paper, Jeni Bindon implemented and monitored the CPT program, and Tanya Bosch designed and implemented the CPT program.

Ethics statement: This research conforms to the Code of Ethics of the World Medical Association (Declaration of Helsinki) and was approved by the Royal Prince Alfred Hospital Ethics Review Committee.

References

1. Roberts I, Owen H, Lumb P, et al. *Pedalling health — health benefits of a modal transport shift*. 1996. ISBN 0 7308 0741 X.
2. British Medical Association. *Cycling towards health and safety*. Oxford: Oxford University Press; 1994.
3. Pate RR, Pratt M, Blair S, et al. Physical activity and public health: a recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 1995;**273**(5):402—7.
4. Andersen LB, Schnohr P, Schroll M, et al. All-cause mortality associated with physical activity during leisure time, work, sports and cycling to work. *Arch Intern Med* 2002;**160**:1621—8.
5. Hu G, Qiao Q, Silvertoinen K, et al. Occupational commuting and leisure-time physical activity in relation to risk for Type 2 diabetes in middle-aged Finnish men and women. *Diabetologia* 2003;**46**(3):322—9.
6. Pereira MA, Folsom AR, McGovern PG, et al. Physical activity and incident hypertension in black and white adults: the Atherosclerosis Risk in Communities Study. *Prevent Med* 1999;**28**(3):304—12.
7. Standing Committee on Recreation and Sport. *Participation in exercise, recreation and sport survey 2003 Annual Report*. Canberra: AGPS; 2003.
8. Australian Institute of Health and Welfare. *Australia's Health 2000: the seventh biennial health report of the Australian Institute of Health and Welfare*. Canberra: AIHW; 2000.
9. Jacobsen PL. Safety in numbers: more walkers and bicyclists, safer walking and bicycling. *Injury Prevent* 2003;**9**(3):205—9.
10. The Royal Society for the Prevention of Accidents. *The Effectiveness of Cyclist Training*. September 2001. Available at http://www.rospa.org.uk/pdfs/road/cyclist_training.pdf. Accessed 20.01.2004.
11. Saville T, Bryan-Brown K, Harland G. *The effectiveness of child cycle training schemes*. TRL Project Report PR 214. Crowthorne: Transport Research Laboratory; 1996.
12. Coggan C, Patterson P, Hooper R. *IPRC Evaluation of Christchurch City Council Cycle Safe Program*. Injury Prevention Research Centre, Te Puu Taki Aukati Whara, University of Auckland, New Zealand. Centre Report Series No. 62, 2001. ISSN 1174-5371. Available at http://www2.auckland.ac.nz/ipc/pdf/cr62.pdf. Accessed 20.01.2004.
13. The Royal Society for the Prevention of Accidents. *A survey of Adult cyclist training in Scotland*. 2001. Available at http://www.rospa.org.uk/pdfs/road/cycling_survey.pdf. Accessed 20.01.2004.
14. Department of the Environment, Transport and Regions, CTC, Association of Chief Police Officers, City of York Council. *Guidelines for the Management and operation of Practical Cyclist Training Schemes*. 2000. The Royal Society for the Prevention of Accidents. Available at http://www.rospa.org.uk/pdfs/road/cyclist_schemes.pdf. Accessed 20.01.2004.
15. Merom D, Bauman A, Vita P, et al. An environmental intervention to promote walking and cycling-the impact of a newly constructed Rail Trail in Western Sydney. *Prevent Med* 2003;**36**(2):235—42.
16. Rissel C. Ride your bike: healthy policy for Australians. *Health Promot J Aust* 2003;**14**(3):151—3.