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Original research

Epidemiology of cycling for exercise, recreation or sport in Australia and its contribution to health-enhancing physical activity

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ABSTRACT

Objectives: To provide population estimates and explore trends for recreational cycling by subgroups, and to understand the contribution of recreational cycling to meeting the physical activity guidelines among Australian adults.
Design: Repeated cross sectional population surveys.
Methods: Data from the Exercise, Recreational and Sport Survey (ERASS) for the years 2001–2009 were used. Approximately 13,000 Australian adults (≥15 years) were interviewed each year across all seasons. Data include frequency of cycling during the previous 12 months and average duration of a cycling session, asked since 2005. Three thresholds for meeting the physical activity guidelines were considered using the separate categories: achieving >150 min, >300 min, and 5 sessions of 30 min cycling per week.
Results: The pooled prevalence of recreational cycling was 10%. Employed middle-aged men with tertiary education reported the highest prevalence of recreational cycling. An increase in cycling was observed over time, mainly attributed to an increase in "irregular" cycling (<1/week). Among all cyclists a third met the physical activity guidelines of 150 min/week, and less than 20% met the guidelines of 300 min/week or 5 sessions of 30 min/week, respectively. Although a small group, almost two thirds of those participating in organised or partly organised recreational cycling met the guidelines.
Conclusions: Recreational cycling is a plausible way to accumulate sufficient health-enhancing physical activity. The majority of recreational cyclists do not cycle in organised rides. Targeted efforts are needed to exploit the full potential of recreational cycling for public health.

1. Introduction

Cycling to destinations or for exercise, recreation and sport is at least a moderate-intensity physical activity with documented health benefits. Regular cycling reduces the risk factors for chronic diseases and overweight/obesity, and improves cardio-respiratory fitness.[1] In addition, cycling does not overload the musculoskeletal system, making it suitable for overweight people.

Commuting cycling provides opportunities for regular physical activity. However, for those who live too far away from regular destinations, other options for health-enhancing physical activity are needed. Cycling for exercise, recreation or sport (in short: recreational cycling) is feasible for many population subgroups because most have learned cycling skills during their childhood and many Australians have access to a bike.[2] Further, among Australian adults recreational cycling is the fourth most popular recreational physical activity.[3] Therefore, recreational cycling has the potential to contribute to public health but the role of organised/structured versus non-organised/unstructured recreational cycling is not clear yet.

In Australia efforts to encourage population levels of commuting and recreational cycling have increased in the past decade[2] and most Australian states have published state wide and community cycling strategies.[4] For example, in New South Wales, the most populous state in Australia, a comprehensive 10-year Action For Bike plan included a commitment of $251 million investment in cycling network infrastructure (PCAL, Bike Plan 2010), alongside community awareness programmes.[5]

In order to quantify the effects of cycling promotion efforts, serial population measurements over time are needed. Trends in cycling behaviour can be obtained from transportation surveys.[6–8] However, travel surveys rely on a short period of recall (e.g. 24-hours) hence cannot describe the regularity of cycling behaviour. In addition, travel diaries (used in transport surveys) are not designed to report trips simply done for recreation. Therefore, other sources are needed to identify trends in population-level recreational cycling.

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In Australia the Exercise, Recreation and Sport Survey (ERASS)[9] data collected between 2001 and 2009 provides details on specific sports and recreational activities and are used here to answer the following research questions: (i) What is the overall prevalence of recreational cycling and its distribution across population subgroups (gender, age, education, work status) and by geographical areas in Australia? (ii) What is the overall trend in recreational cycling from 2001 to 2009 among irregular, regular and frequent cycling as well as in population subgroups? (iii) What is the proportion of cyclists meeting the physical activity guidelines, and (iv) does organised or non-organised recreational cycling contribute differently to meeting the physical activity guidelines?

2. Methods

The ERASS[9] is a joint initiative of the Australian Sports Commission and the State and Territory government agencies responsible for sport and recreation. Continuous telephone surveys were conducted quarterly (February, May, August and November) from 2001 to 2009. The survey assesses participation in exercise, recreation or sport during the 12 months prior to interview and employs standardised procedures for respondent selection, interviewing and coding system to allow comparability over time. Households were sampled using list-assisted random digit-dialling, and respondents were randomly selected from households to yield samples representative of the Australian population aged 15 years and older. Each year, data from 12,000 to 14,000 Australians were collected using a computer-assisted telephone interview (CATI). This secondary analysis was approved by the University of Sydney ethics committee (HERC No. 11233).

The ERASS starts with a generic screening question asking about any physical activity done "for exercise, recreation or sport" in the past 12 months. Participants were instructed not to include work or household related physical activities. Those who indicated participation were asked to list, unprompted, up to ten specific activities they engaged and how many times during the past 12 months they participated in each activity. Activities were coded by the interviewer against a list of 164 activities with cycling activities appearing in three codes: Cycling (general but not cycling as a means of transportation), BMX and Mountain Bike. Since 2005 onwards, for the three activities with the highest frequency of participation over the previous 12 months, respondents also reported the last two weeks number of sessions and average minutes per session.

Bicycling behaviour was defined and categorised as follows. The reported frequency of general cycling, BMX, and Mountain Bike was summed and the participants were than divided into "cyclists" if ≥1 cycling occasion was reported during the past 12 months versus "non-cyclists" (no cycling reported). Thereafter, the summed cycling frequency during the past 12 months was divided by 52 weeks to get an "averaged weekly cycling" frequency. Based on this, we categorised cyclists into (1) irregular cyclists (<1 cycling session/week), (2) regular cyclists (1–2 cycling sessions/week), and (3) frequent cyclists (3+ cycling sessions/week).

The total volume of cycling was estimated by multiplying the duration per session and the number of cycling sessions per week (based on the past 2 week recall). Meeting the physical activity recommendations with recreational cycling was defined in three ways: "bicycled at least 150 min per week" (achieving the minimum cumulative recommended moderate-intensity activity for general health), "bicycled 5 times per week at least 30 min each time" to account for the recommended regularity (it should be spread across the week), and "cycled 300 min and more per week" which is recommended for additional health benefits.[10] Sampling weights were always applied to the data to account for the probability of selection from each state and territory and to correct the sex by age distribution of the population at the year of the survey.

Significant differences within population subgroups were based on the weighted 95% confidence intervals not overlapping and the magnitude of the difference is expressed in adjusted odds ratios. The Chi-Square test for trend (linear by linear association) was applied to assess the significance over time. Statistical significance was set at $p < 0.05$. All analyses were performed using IBM SPSS Statistics 20.0 for Windows.

3. Results

The prevalence (pooled ERASS data from 2001 to 2009) of "any cycling" during the past 12 months, "irregular cycling" (<1/week), "regular cycling" (1–2/week), and "frequent cycling" (≥3/week) among the whole population and by subgroups is presented in Table 1. Overall, 10% of Australians adults cycled for recreational purposes in the past 12 months, but the differences across population groups and place ranged from as low as 3.2% to as high as 16.5%. The odds for any bicycling was significantly higher for men than women, for those between 25 and 54 years compared to the youngest and the older age groups. Participants with at least a high school degree and those employed had significantly higher odds for bicycling than the comparison groups. There were also significantly higher odds for recreational bicycling in all States/Territories compared to New South Wales.

Among irregular, regular, and frequent cyclists the cycling pattern within subgroups is somewhat similar with respect to the direction of the odds although differences were not always statistically significant partly due to the smaller sample sizes.

Although significant increases in the prevalence of irregular, regular and frequent cyclists were noted, the increase relative to baseline was the highest for irregular cyclists of about 1% (Fig. 1a). In the population subgroups most trends were positive, statistically significant, and followed a similar pattern. Women started with a 6.1% cycling prevalence in 2001 and had a 7.1% cycling prevalence in 2009. Men started with 13% in 2001 and increased their cycling prevalence to 14.7% in 2009. The cycling prevalence increased in study participants aged 35+ years whereas participants aged 15–34 years were the only group showing a decrease in cycling prevalence over time (Fig. 1b).

In 2001 the cycling prevalence in the three educational groups was 5.7%, 9.6%, and 14.9%, respectively. The increase of the cycling prevalence to 6.1% among those with the lowest educational level was not significant. In the other two groups the cycling prevalence increased significantly to 10.8% and 16.3% in 2009. People not in the workforce started with 5.8% cycling prevalence in 2001 and had a 6.9% cycling prevalence in 2009. Among employed people 11.6% cycled at least once during the past 12 months in 2001, increasing to 13.2% in 2009

People living outside capital cities showed little change in cycling (8.4% in 2001 to 8.8% in 2009), whereas people resident in capital cities reported an increase (10.1% in 2001 to 11.8% in 2009). Non-organised cycling as well as non-organised & organised cycling significantly increased over the years from 8.7% to 9.6% and from 0.3% to 0.7%, respectively. The organised cycling prevalence remained constant at 0.5% level between 2001 and 2009 (Fig. 1c).

In Table 2 (pooled ERASS data from 2005 to 2009) the medians and inter-quartile range for weekly cycling frequency and duration are reported, as well as the proportion of participants meeting the three differently expressed physical activity recommendations. Among the Australian population 2% met the physical activity guidelines of at least 150 min of moderate to vigorous intensity physical activity per week only with recreational cycling. Of all cyclists, a third cycled at least 150 min per week. More men than