Walk It

Active Local Parks

The effect of park modifications and promotion on physical activity participation

SUMMARY REPORT

NSW HEALTH
Working as a Team

'Walk It: Active Local Parks' Summary Report
A NSW Health Physical Activity Demonstration Project
conducted by Western Sydney Area Health Service

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Foreword

NSW Health recognises that active living constitutes one of the major components of a healthy lifestyle. There is now strong evidence that regular physical activity provides people of all ages, male and female, with substantial physical, social and mental health gains throughout life. Regular physical activity reduces the risk of premature mortality and also the development of the major non-communicable, chronic diseases such as diabetes, heart disease, osteoporosis, stroke and some cancers. It can also prevent obesity, injuries from falls and lead to increased well-being and quality of life.

In 1995 the NSW Chief Health Officer recommended that "Every adult in NSW should accumulate 30 minutes or more of moderate-intensity physical activity in most, preferably all days of the week." Population surveys estimate that only around half the people in NSW are sufficiently physically active to achieve health benefits.

The evidence linking physical activity and health is clear. However, knowledge about what actually helps people incorporate regular physical activity in their lives is not well understood. In 1996 NSW Health launched the Physical Activity Demonstration Project scheme to address the pressing need to obtain better evidence to guide the promotion of physical activity in NSW. It emphasised the importance of key settings (ie Local Government), working in partnership, rigorously designed studies, and the need to effectively disseminate the research results to guide best practice.

The Walk It: Active Local Parks Project set out to investigate the impact of park improvements and increased promotion of walking on the physical activity patterns of local residents in the Parramatta area. The project not only provides timely and useful evidence, it also exemplifies the partnership approach required to successfully promote physical activity. This project was the result of collaboration between Western Sydney Area Health Service, Parramatta City Council, NSW Health Department, the Department of Sport and Recreation, The University of Western Australia and The University of Western Sydney.

I congratulate Western Sydney Area Health Service for this excellent research study and report. It represents NSW Health's return on investment for research and development and also illustrates our commitment towards best practice in the promotion of physical activity in NSW.

Michael Reid
Director-General

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Executive summary

Participation in regular physical activity confers health benefits such as a reduced risk of heart disease, diabetes, colon cancer, high blood pressure and obesity as well as promoting psychological well-being, building and maintaining bone density and reducing the risk of dying prematurely. Environmental interventions may be influential in helping to promote healthy behaviours including participation in physical activity, making the environment a key setting for encouraging activity. Despite this there is limited evidence on environmental interventions that promote physical activity.

The Walk It: Active Local Parks project aimed to increase participation in moderate physical activity in adults aged 25-65 years. It had three main objectives:

- To evaluate the effect of the study interventions (promoting physical activity and park use, park modifications, and the establishment of walking groups) on physical activity in adults.
- To determine the validity of an infra-red counting device to monitor park use.
- To develop guidelines for local government interventions incorporating park re-development and promotion.

The project was conducted in 1997-1999 and was funded as part of a NSW Health Physical Activity Demonstration Grant Scheme. It was a collaborative effort between the Western Sydney Area Health Service (WSAHS) and Parramatta City Council, conducted within Parramatta local government area (LGA). A management committee consisting of representatives from the Area Health Service, Parramatta City Council, NSW Health Department, the Department of Sport and Recreation, The University of Western Australia, and The University of Western Sydney, Nepean oversaw the design and implementation of the project.

Two wards (an intervention and a control ward) within Parramatta LGA in NSW were selected for the study. Three parks in the intervention ward were selected to receive the park modifications and two parks from the control ward acted as control parks. The effectiveness of the project interventions was measured by physical activity participation rates, the proportion of people adequately active and use of local parks. Data collection methods included a telephone survey of residents from the control and intervention wards, direct observation of the five study parks and infra-red counter estimation of the number of people using the study parks. All measures were taken before the implementation of the interventions and again at follow-up, 12 months later.

The response to the telephone survey was low (20.3%) and respondents were not representative of residents in their ward in terms of education, household income, and usual language spoken at home, potentially biasing the results. At follow-up, telephone survey respondents from the intervention ward were significantly more likely than control ward respondents to report awareness of the project slogan, the walking promotion, the promotion of walking groups, and to have seen or heard information about local parks. Compared to control ward respondents at baseline, the odds of cued recall of the project slogan were 2 times higher in the control ward and 2.9 times higher in the intervention ward at follow-up, whilst the odds of being aware of the walking promotion activities were 2.5 times higher in the control ward and 4.2 times higher in the intervention ward.

Intervention ward respondents were more likely to have walked in the two weeks prior to the follow-up telephone survey than control ward respondents. A significant ward by gender interaction indicated that males in the intervention ward were 2.8 times more likely to walk than were males in the control ward whereas females in the intervention ward were only 20% more likely to walk than females in the control ward. Income, age and language significantly influenced the odds of walking. There were no significant differences between wards in the proportion of respondents that reported participating in activity at an adequate level at follow-up. There was also no measurable change from baseline to follow-up in levels of adequate activity in either ward. Gender was a significant factor, with the odds of being adequately active 30% lower for females than males.

Both telephone survey and direct observation data indicated that there was no change in park use from baseline to follow-up.

The control ward was exposed to some of the promotion campaign and the park modifications were not completed as planned. Combined with a number of data collection concerns (in particular the low response to the telephone survey), this did not permit any definite conclusions to be made about the effectiveness of the study interventions on increasing physical activity levels. In light of this, the methodological challenges of conducting research on environmental change in the natural setting are discussed. These issues include establishing effective partnerships with collaborating organisations, and methods for improving the accuracy and reliability of direct observation data.

For the second objective, information about overall park use and various aspects of path use was simultaneously collected by direct observation and the infra-red counter. When measuring overall park use, agreement between the counter and the observer ranged from 31% to 100%, depending on the park. Comparing the infra-red reading with the number of people that the observer judged would be registered by the infra-red counter (taking into account people that were considered too short to register a count and people who passed the counter simultaneously with another person/s) revealed that agreement was extremely high at 98%. A comparison of the counter reading and the number of individuals (counting each person only once) observed to pass through the counter indicated that the infra-red counter overestimated the number of individuals observed to pass through the counter in all study parks (range 14% to 78%). An examination of path use (in which each pass was considered independently, even if the person had previously passed through the counter) revealed that, depending on the park, the infra-red counter recorded 90% to 116% of the number of people recorded by the observer as passing through the counter. The variation between parks highlights the need to undertake site-specific validation of the counters, directly comparing results from the infra-red counter with an observer, prior to undertaking data collection.

The absence of any conclusive statements about the effectiveness of the study interventions precluded the development of local government guidelines for park redevelopment and promotion (objective 3). This was unfortunate, as evaluating the effect of environmental conditions on physical activity is important, although difficult. More research in this area is warranted, but may require alternate approaches such as the evaluation of natural experiments and using control sites in different LGAs or states.

1 Introduction

1.1 Physical activity and health

There is growing recognition of the health benefits that can be achieved through increased participation in regular physical activity. Regular physical activity positively impacts on health by reducing the risk of heart disease, diabetes, colon cancer, high blood pressure and obesity.[19,26,28] Participation in regular physical activity also promotes psychological well-being, helps build and maintain bone density and overall reduces the risk of dying prematurely.[28]

Increasing the prevalence of regular physical activity participation has become an important population health issue and has been identified as a priority at international, national and state levels.[6,19,28] The most beneficial method to achieve health gains at a population level is small shifts in low to moderate intensity activity amongst a large number of people, rather than large increases in physical activity amongst a small number of people.[17] Current research shows that substantial health benefits can be gained from moderate-intensity physical activity such as walking, provided it is performed with sufficient frequency.[12] This is reflected in the NSW Chief Health Officer's recommendation[19] that "Every adult in New South Wales should accumulate 30 minutes or more of moderate intensity physical activity on most, preferably all, days of the week."

1.2 Environmental interventions to increase physical activity

For some time health promotion has endorsed the value of environmental interventions. The creation of supportive environments and the development of healthy public policy are two of the five corner-stones of health promotion identified in the Ottawa Charter.[29] Physical activity is an area conducive to the potential influence of the physical environment, making the environment a key setting for promoting physical activity.[4,9] Despite this, environmental interventions have been inadequately applied to physical activity promotion.[27]

Research indicates that people want somewhere to exercise that is easily accessible, low cost, in close proximity to their home and workplace, and allows for a flexible schedule.[9] Focus group participants have emphasised the need to make walking easier and more accessible, for example through the provision of walking paths, and increased safety and pleasantness.[7] These findings are consistent with the work of other researchers who have concluded that urban design and maintenance need to be more conducive to exercise, and that existing environments need to be modified to make it easier to be physically active.[11,30]

There has, however, been little quantitative research to investigate whether particular physical environments encourage facility use and moderate intensity physical activity more than others. In their review of environmental and policy interventions, Sallis and colleagues[27] suggest that future research should focus on controlled evaluations of interventions to promote physical activity in specific behaviour settings such as walking/cycling paths, school facilities, youth sports clubs, health clubs, neighbourhood streets and parks. The difficulties in evaluating environmental interventions in controlled experimental trials has been a major constraint in this field of research and may account for the very small number of intervention studies conducted to date.

1.3 Project aim and objectives

Aim

The aim of this project was to increase participation in moderate physical activity through promoting physical activity and park use, park modification and the establishment of walking groups.

Objectives

The objectives of the project were:

- To assess the impact of the study interventions (promoting physical activity and park use, park modifications, and the establishment of walking groups) on physical activity in adults aged 25-65 years, as measured by:
  - awareness of the project promotional activities

  - physical activity participation rates (particularly walking)
  - proportion inadequately/adequately active and
  - use of local parks.
- To determine the validity of an infra-red counting device to monitor park use.
- To develop relevant and useable guidelines for local government health promotion interventions in park re-development and promotion.

1.4 Project management

The Walk It: Active Local Parks project was a collaborative effort between the Western Sydney Area Health Service (WSAHS) and Parramatta City Council, conducted within Parramatta local government area (LGA). The project was funded by a NSW Health Department Physical Activity Demonstration Grant (Reference number DP 97/10). A management committee was convened to oversee the design and implementation of the project. Membership consisted of representatives from the Area Health Service, Parramatta City Council, NSW Health Department, the Department of Sport and Recreation, The University of Western Australia, and The University of Western Sydney, Nepean (Appendix 2). A project officer was employed for four days a week for two years to implement and evaluate the project.

2 Methods

2.1 Study design

A before-after design with a control group was chosen to evaluate the project interventions as it allowed measurement of the outcome factors at baseline and again at follow-up.

Two geographical areas (an intervention and a control area) were selected. The areas were similar in as many features as possible, including the demographic profile of residents, climate, geography, surrounding features, proximity to major centres, transport and other services. The inclusion of both intervention and control areas was particularly important given that the project was undertaken at the same time as a state-wide physical activity mass media campaign.

As park modifications were an important component of the intervention and local councils are responsible for maintaining public open space, the project was conducted in collaboration with one of the councils in Western Sydney. Parramatta City Council was chosen as Parramatta LGA has a central business district that is surrounded by five wards which have similar public transport and road infrastructure, and a relatively homogenous population (Figure 2.1).

Selection of the study areas

A comparison of the wards in Parramatta LGA was undertaken using the ward profiles produced by the Council based on geographical and population census data[24,25] and in consultation with the Council's Open Space and Recreation Division. The 1991 Census data for the wards[24,25] demonstrated that two of the five wards matched quite closely: Lachlan Macquarie ward, selected as the intervention area, and Caroline Chisholm ward, selected as the control area. Two other wards separated the study wards, thereby creating a spatial barrier (Figure 2.2). It was anticipated that this separation would reduce any contamination of the study interventions.

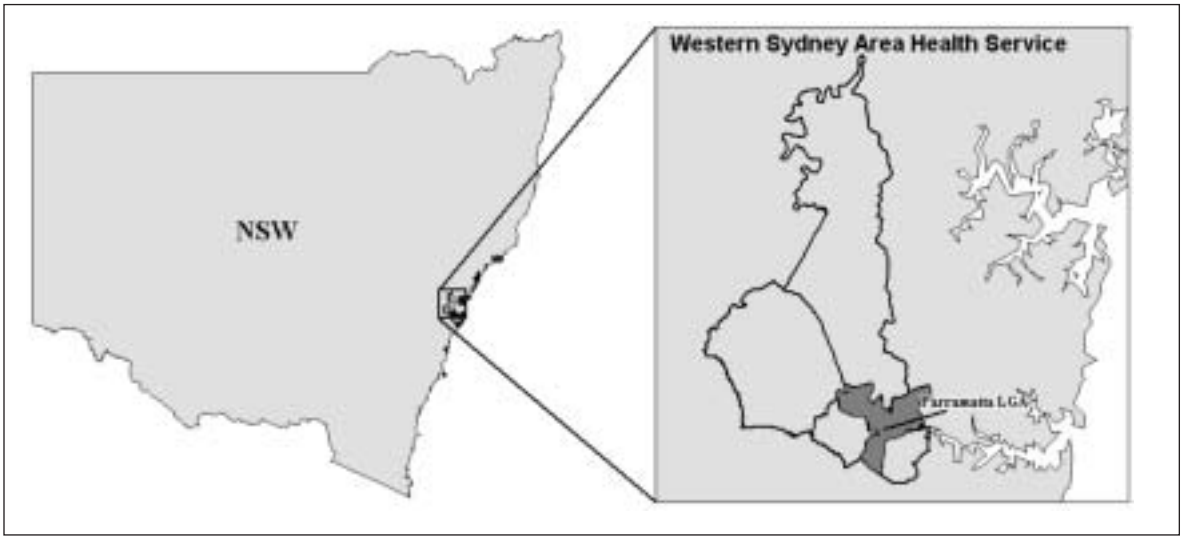


Figure 2.1 The location of Parramatta LGA within NSW

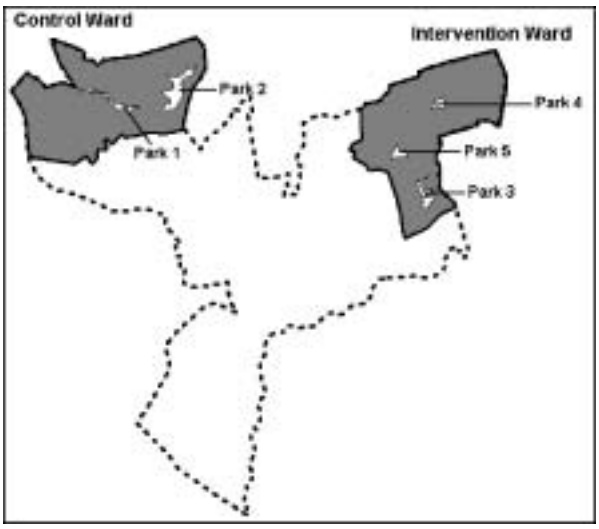


Figure 2.2 Parramatta LGA highlighting the control and intervention wards and the study parks

Selection of the study parks

Although many of the study interventions (see section 2.3) occurred across the intervention ward, for practical reasons (eg. time and cost) the park modifications were only undertaken in three parks within Lachlan Macquarie ward. Two parks within the Caroline Chisholm ward were selected as control parks.

Taking into account the great diversity between the parks and the areas surrounding them (Table 2.1), the intervention and control parks were chosen based on the following criteria:

- Located in areas that had similar socio-demographic attributes and geographical features (according to Council ward profiles).
- Surrounded, as much as possible, by similar features, eg. a residential area without major roads that might adversely influence local resident use, and amount of walking paths and tree cover.
- At least one hectare in size.
- Exclusion of parks that were too dissimilar as measured by a park environmental audit tool. The environmental audit developed for the study was modified from the 'Environmental Scan Questionnaire'[5] and the 'Footpath, Walkway and Cyclepath Checklist'[18] and also included some items added by the project team.

Park characteristics	Control ward		Intervention ward		
	Park 1	Park 2	Park 3	Park 4	Park 5
Classification	Park	Sports ground	Park	Urban bushland	Sports ground
Size (hectares)	12.95	9.85	12.34	4.15	6.46
Park features*					
Walking paths (bitumen or concrete)	Some sides of perimeter	Some sides of perimeter and radial	From entrance to playground only	None	All sides of perimeter. Provides a shortcut to rugby club and shop
Lighting	Basketball courts only	Sports oval only	None	None	Sports oval only
Playground	✓	✓	✓	✓	✓
Building/clubroom	✓	✓			✓
Basketball courts	✓				✓
Sporting oval		✓			✓
Park surroundings*					
Suburban housing only			✓		✓
Suburban housing and bushland	✓	✓			
Suburban housing and industrial				✓	

* The information for each park is based on the park audits conducted by members of the project team

Table 2.1 Characteristics of study parks at baseline

2.2 Study population

The intervention study population was defined as residents of Parramatta LGA aged 25-65 years living in Lachlan Macquarie ward. The control study population was defined as residents of Parramatta LGA aged 25-65 years living in Caroline Chisholm ward.

2.3 Interventions for objective 1

Three types of interventions were implemented: promoting physical activity and park use, park modifications and the establishment of walking groups. The timing of these interventions is shown in Figure 2.3.

Promoting physical activity and park use

The focus of the promotion campaign was raising awareness about the benefits of undertaking regular physical activity and using local parks. Activities included running an advertisement in the local newspapers, gaining publicity through feature articles, and the distribution of walking map leaflets to households in the intervention ward. An official project launch was also used to generate publicity.

Feature articles and paid advertisements

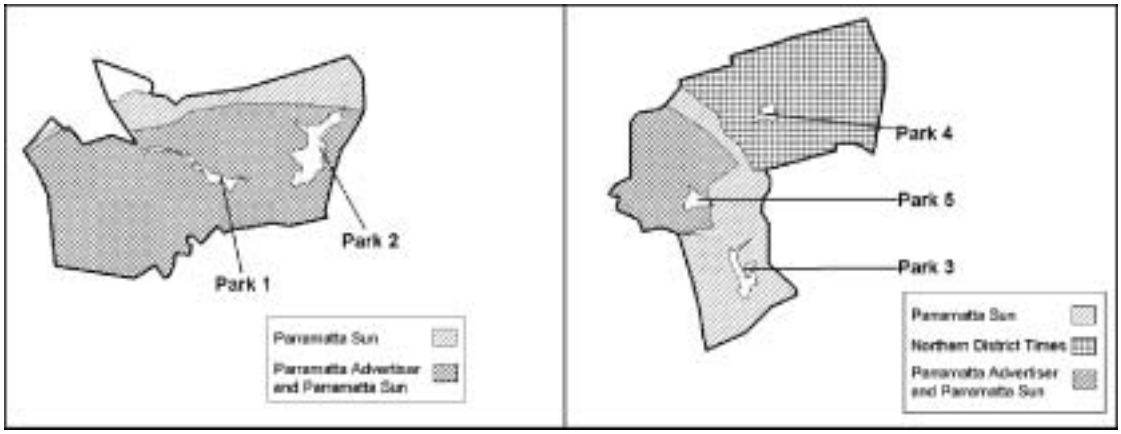
The publicity plan for the project, consisting of feature articles and paid advertisements, was implemented from July 1998 to December 1998. The campaign attempted to gain free media coverage through feature articles relating to environmental changes in parks (including specific information about the Walk It: Active Local Parks collaborative project between WSAHS and Parramatta City Council), awareness of the distribution of the walking map, walking the dog as a form of exercise, walking promotion, and hints on being active in local parks and neighbourhoods. The paid advertisement was a quarter page black and white version of the front of the walking map leaflet.

The feature articles appeared in either of two local papers, The Parramatta Advertiser or The Parramatta Sun. Nine feature articles, including six black and white photographs, were published covering 468 column centimetres. The paid advertisement appeared once in two local papers, the Parramatta Advertiser and the Northern Shire Times.

Due to the newspaper distribution areas, contamination of the media coverage occurred in the control ward, with the majority of the ward receiving both papers containing the feature articles, and one of the papers containing the paid advertisement. Within the intervention ward, the extent of the media coverage varied. Some areas of the ward received both papers containing the feature articles, some received only one of these newspapers and some did not receive either paper. The newspapers containing the paid advertisement were distributed to approximately one half of the intervention ward. The distribution of the papers within the intervention and control wards is illustrated in Figure 2.4.

	Date																
	1997		1998												1999		
Activity	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
Telephone survey	✓	✓															
Daily infra-red counter reading in parks	✓	✓															
Direct observation in parks				✓	✓												
Project promotion activities									✓	✓	✓	✓	✓	✓			
Park modifications						✓	✓	✓	✓	✓	✓	✓					
Walking groups											✓	✓	✓	✓		✓	✓
Telephone survey													✓	✓			
Daily infra-red counter reading in parks													✓	✓			
Direct observation in parks																✓	✓

Figure 2.3 Timeline of data collection periods and implementation of interventions



Control ward ***Intervention ward***

Figure 2.4 Newspaper coverage in the control and intervention wards

Walking maps

The walking maps were a double-sided, colour, A4, gloss-finish leaflet (Figure 2.5). One side highlighted the importance of being active (and in particular walking), provided tips for being active, and had a map indicating four parks that have walking trails. These included the three intervention parks and an additional park adjacent to but located outside the intervention ward. The messages promoting physical activity were consistent with NSW Health Department (1995) moderate physical activity recommendations.

The reverse side of the leaflet provided more detailed maps of the walking trails in each of the parks. Each of the walking trials were developed by project staff and the distance and the approximate time to complete the walk were detailed on the walking map. The walking maps were distributed by Australia Post to 9,759 households in the intervention ward and they were also sent to people who made inquiries about the walking groups, irrespective of where they lived.

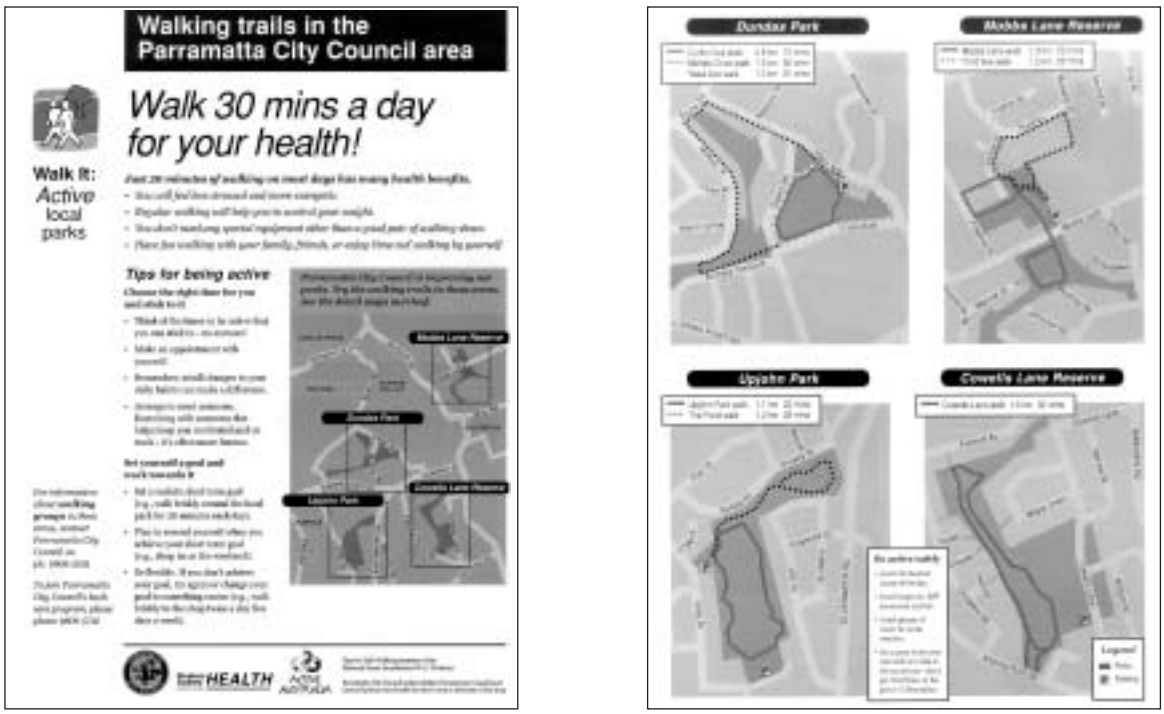


Figure 2.5 Front (left) and back (right) views of walking map leaflet

Park modifications

Park modifications were undertaken in three parks within the intervention ward. A team consisting of WSAHS and Parramatta City Council staff reviewed each of the intervention parks and developed a list of recommended modifications. Some interventions were generic to all intervention parks, whereas others were specific to the individual park, based on its existing facilities and features. Parramatta City Council staff were responsible for carrying out the modifications. All park modifications were to be completed during the period April to October 1998.

The generic modifications included erecting signs 'advertising' the walking trail/s in that park and indicating the length of each walk (in kilometres) and the approximate time (in minutes) that it would take to complete. Coloured arrows (signs) were positioned to indicate the relevant walking trail. The message 'Walk 30 mins a day for your health!' and the WSAHS, Parramatta City Council, Active Australia and Walk It: Active Local Parks logos were on the signs. The signs also contained a contact phone number for Parramatta City Council if people wanted a walking map or further information.

The modifications undertaken in each of the parks were:

- Park 3 – Project sign erected, pruning, gate repaired, and park sign repaired.
- Park 4 – Project sign erected, bridge erected over drain, bush cleared, new garbage bin, bush regeneration.
- Park 5 – Project sign erected, directional arrows erected, some parts of the path repaired, pram access to path created, new playground installed, buildings painted, bins replaced.

A number of problems were experienced in the park modification intervention. The extent to which the generic and the specific modifications were carried out in each park differed significantly. For instance, it was intended that the walking paths would be identified with coloured arrows, however, this occurred only in Park 5. Park 5 also received a number of specific modifications however, in contrast the modifications in Park 3 were minimal. Contrary to the project design, the playground in one of the control parks (Park 1) was substantially upgraded. This upgrade was beyond the influence of the project team members.

Walking groups

The walking groups were promoted by:

- Distribution of information flyers (letter box drop) to households in the areas surrounding the three intervention parks.
- Information about the walking groups and contact phone numbers provided in some of the feature articles in the local newspapers.
- Information relating to the project and walking groups was sent to service clubs (eg. Rotary and Lions Clubs), schools, preschools, playgroups, community nurses, doctors' surgeries, Dundas Rugby Club, and local businesses (eg. chemist shops, real estate agents, car dealerships) in the intervention area.
- The placement of posters and flyers in parks, at bus stops, local streets, shops, libraries and other public facilities.

People who expressed an interest in joining a group were asked to indicate their preferences for the time of day, day of the week and location of the walking group. Based on responses six walking groups were created with at least one group starting from each of the intervention parks. When the details were established the posters and flyers promoting the walking groups were replaced with flyers that advertised the times and places of the walking groups.

Initially, a member of the project team led the walking groups, however, it was envisaged that the groups would eventually become self-sustaining. At the end of the project only three of the original six groups continued unassisted: one group of three to eight people and two groups with two participants each.

2.4 Data collection for objective 1

A variety of methods were used to assess the effectiveness of the interventions. A park user survey was conducted but is not described in this report (details are available from NSW Health). All outcome factors were measured before the implementation of the interventions and again at follow-up, 12 months after the baseline measures were taken (Figure 2.3).

Telephone survey

Development of the survey instrument

The telephone survey instrument was developed by members of the project team using questions from previous surveys wherever possible. Specifically, the telephone survey assessed self-reported:

- Knowledge of the promotion campaign (including promotion of the walking groups) and messages about physical activity.
- Participation in physical activity including walking, vigorous exercise and light to moderate activity.
- Attitudes towards physical activity including intention to be more active and goal setting behaviour.
- Knowledge and use of local parks.
- Perception of local park environments.

The questions about participation in physical activity and attitudes towards physical activity were based on those used in earlier surveys, particularly the 1994 NSW Health Promotion Survey[4] and the NSW 1996 Physical Activity Survey.[20] Perceptions of the environment and knowledge of the message about physical activity were derived from the work of Corti and colleagues.[7,8]

In the follow-up survey five questions on campaign awareness, park utilisation and exercise behaviour were deleted and six questions related to walking groups, walking one's dog and local newspaper readership were added. The questions in the baseline and follow-up surveys are outlined in Appendix 3.

Pilot study of questionnaire

The survey instrument was pre-tested using a face-to-face 'question testing' procedure with fifteen residents from Western Sydney in the target age group (25-65 year olds). Following pre-testing, the questionnaire was piloted over the telephone.

Sample selection

In both wards, households that were separated from the study parks by major roads or distinctive surrounding features (eg. industrial estates) that may have acted as a physical barrier to accessing the study parks were excluded from the telephone survey. Using MapInfo,[14] all telephone numbers with addresses in the defined areas of the two wards were selected at each time period (baseline and follow-up) from the electronic white pages software packages.[3,22]

A description of the selected area within each ward and an explanation of the methodology used to select the appropriate telephone numbers is given in the full report available from NSW Health. A high proportion of Australian households have a listed telephone number, therefore it is anticipated that only a minority of the study population would have been excluded using this sampling method. Estimates in 1986 indicated that this methodology covers 93% of private dwellings in NSW.[1] The population subgroups that are excluded by telephone surveys are also difficult to reach using other data collection methods.[21]

Conduct of the telephone survey

The market research company hired to conduct the telephone interviews was provided with all telephone numbers from the defined areas of the intervention and control wards at baseline and again at follow-up. The telephone numbers were randomised and the company was instructed to conduct the interviews in the order that the phone numbers were listed. If a telephone number did not answer, there was an answering machine or the interviewer needed to call back for any other reason, the number was phoned again until six call backs were completed, after which the number was recorded as a permanent non-response. The market research company was instructed to only go beyond the first 420 telephone numbers for each ward after either a refusal, permanent non-response (based on completion of six call back attempts) or record error (eg. no one between 25 and 65 years of age living in the household) was encountered. Interviews in both areas were undertaken simultaneously and interviewers conducted interviews with residents in both areas. This procedure continued until 420 interviews were completed in each ward.

In accordance with Interviewer Quality Control Australia (IQCA) standards, a sample of each interviewer's work was selected and validated with a follow-up phone call. The validation calls confirmed the respondent's age and sex. At baseline 216 (26%) interviews were validated and at follow-up 103 (12%) interviews were validated.

The baseline telephone survey commenced on the evening of Friday 21 November 1997 and was completed on Saturday 6 December 1997. The follow-up telephone survey commenced on the morning of Saturday 21 November 1998 and was completed on Sunday 6 December 1998.

Infra-red counter estimation of park use

A pair of ONSPOT PC2000 infra-red counters were placed across a thoroughfare in all five study parks. These counters are a dual infra-red beam counter, consisting of a transmitter and a receiver. They operate in line of sight and the dual beam requires that both beams are broken to register a count. This makes the counters less likely to register false counts due to environmental conditions, particularly rain and dust. Deriving power from standard batteries, the counters are specifically designed for outdoor use where electricity is not available. The operational life of the batteries in the counters is approximately three months. The transmitter and receiver were protected from environmental conditions and vandalism by two steel galvanised padlocked posts. For security, the posts were cemented into the ground. The distance between each post ranged between 2.6 metres and 5.5 metres depending on the park. They were 1.6 metres high, which was high enough to register passing adults and most children but not dogs.

The counters recorded the number of times the infra-red beam was broken and were calibrated to register one count per infra-red beam breakage. To measure park use counter readings were taken at approximately the same time, every day, for a period of four weeks during November to December 1997 and during the corresponding period in 1998. After the daily reading was taken the counters were reset to zero.

Direct observation of park use

Direct observation in the intervention and control parks was undertaken to record the amount and types of use of the parks. It was undertaken simultaneously in the intervention and control parks on seven non-consecutive days, (four weekend days and three weekdays) from 6am until 8pm during February to March in 1998 and on matched days in 1999. Each observation day was divided into three shifts: morning (6.00am – 10.30am), day (10.30am – 3.00pm) and evening (3.00pm – 8.00pm). If sustained heavy rain occurred, the affected shift was cancelled and rescheduled for the same time and day of the following week. Over the two observation periods, 43 people carried out the data collection. These people were either university students (who were paid per hour), project staff or council staff.

The observers were required to sit at a specified point that was clearly labelled on a map of each park. The observation point was chosen based on safety considerations for the observer, to maximise visibility of the park, and so that the observer had the infra-red counter in full view at all times (see section 2.6). Each person who entered the park was recorded onto the direct observation data sheet against an identification number. If a person re-entered the park during the same shift they were assigned the same identification number and each subsequent activity they engaged in was recorded. The information recorded for each park user included:

- Time of entry.
- Gender.
- Estimated age group (using pre-specified categories)[16]: babies and toddlers (0-4 years), children (5-12 years), teenagers (13-19 years), young adults (20-39 years), middle aged adults (40-59 years) and elderly people (60+ years).
- Activity/ies undertaken in park (using pre-specified categories).[16]
- Whether the park user passed through the infra-red counter alone or simultaneously with another person/s. Park users who passed below the beam and children in strollers were not recorded as passing through the counter.
- Whether they were in the park with another person/s or alone.
- Exit time.

Babies and toddlers were only coded if they actually engaged in an activity in the park - if they were only being pushed in a stroller no information about them was recorded.

Prior to data collection, the observers were required to attend a two-hour training session during which the direct observation procedures were outlined. An observation package was given to each observer for use while in the park. The package included the protocol for the direct observation, an observation code sheet that listed the age group and activity codes (Appendix 4), and direct observation data sheets (Appendix 5). Each observer was provided with a identity badge and sign that identified them as working on a joint Parramatta City Council and WSAHS project, and a number of information sheets that could be given to park users if they requested any further information about the study. On the same training night, the observers were taken to one of the study parks where they were familiarised with the use of the infra-red counter and shown where to sit to conduct the observation.

Park user survey

Surveys of park users were undertaken simultaneously with the direct observation data collection. Observers were instructed to conduct a minimum of two surveys per shift. In the two busiest parks, a member of the project team was present to conduct the surveys during the morning and evening shifts as these were the busiest times. The observers were instructed to approach adults aged 20 to 65 years who were using the park and to ensure that they had not previously completed the survey during that data collection period.

The survey assessed:

- Frequency of park use.
- Opinion about the park in terms of safety, accessibility, and aesthetic features.
- Awareness of amenities (barbecue areas and children's playground).
- Awareness of park promotion and whether they used the park as a result of this promotion.
- Frequency and length of time spent walking for exercise/recreation, and for other reasons.
- Physical activity levels.
- Location of residence.
- Demographic details.

2.5 Statistical analysis for objective 1

All analyses, except logistic regression, were conducted using SPSS. SAS was used for the logistic regression modelling. The project was undertaken in accordance with the WSAHS ethical code of conduct for research involving humans.

Telephone survey

Sample size calculations indicated that 420 completed interviews were required from each ward at each of the data collection periods. This would enable detection of a change in independent means of self reported physical activity, awareness of promotional activities and park use of 0.2 of a standard deviation with 80% power and an alpha of 0.05. The same sample size was required to detect a change in independent proportions of park use from 5% to 10% with the same power and alpha.

Age, sex, socio-economic status and ethnicity are some of the known variables that may confound performance on the outcome factors measured in this study. Univariate analyses were undertaken to determine the independent effect (if any) of these variables. Although not all variables had a statistically significant effect on outcome variables, they were all included in the logistic regression models as the literature indicates that they may be important confounders. Effect modification was tested using a forward stepwise method by examining the interaction between ward and each of the other variables. Any terms significant at 0.01 were retained. This more stringent significance level was chosen to take into account multiple testing of several effect modifers.

Significance tests to compare respondents from the intervention and control wards were undertaken for the main outcome factors of interest. Descriptive statistics were used to describe other findings, with no significance testing undertaken.

Infra-red counter estimation of park use

As a result of problems with the infra-red counter in one park (Park 2) during the baseline data collection period there was no reading for three days and five other readings were excluded from analysis due to being spuriously high. In the follow-up period there was an extra day of data collection in all parks.
To equate the number of daily readings in both data collection periods, if a counter reading was not available the data from the corresponding day in the opposite data collection period was deleted from the analysis. The daily readings from the infra-red counters were tested for Normality and homogeneity of variance. As the data were not Normally distributed, the Mann–Whitney U test was used to examine for differences between median daily counter readings at baseline and follow-up in each of the five study parks.

Direct observation of park use

Of the 210 direct observation shifts, one was excluded from analysis due to unreliable data, five shifts were not covered due to observer unavailability, and nine shifts had incomplete data. This was equivalent to 42.3 hrs of missing data, which was 4.3% of the total observation time. Park users who were participating in working bees, using a building on the premises or who were working (eg. council workers) were excluded from all analyses. Descriptive statistics were used to examine the types of activities that occurred in the parks, pooling data from baseline and follow-up and across the five study parks.

Differences between baseline and follow-up in the total number of park users and the total number of walkers were compared using independent t-tests, significance was accepted at $p<0.05$. To ensure that shifts were equal between baseline and follow-up, if a shift was not covered the corresponding shift in the opposite data collection period was deleted for this analysis.

Park user survey

Due to the non-randomised selection of respondents and the small number of surveys that were conducted in each park, the responses from all surveys, across both data collection periods and all parks, were combined for all analyses, except where otherwise indicated. Although it was intended that surveys would only be administered to park users aged between 20 and 65 years, a number of park users outside this age bracket completed the survey. These surveys were included in the analysis.

The analysis of survey questions that asked about specific project interventions was restricted to respondents who were residents of the control or intervention ward.

2.6 Data collection for objective 2

As previously described, the observer was required to record each time a person passed through the infra-red counter and to judge whether people who passed the counter simultaneously with another person/s would have registered one or more counts. During data collection it became apparent that it was not possible for the observer to devote sufficient attention to the infra-red counter in addition to recording overall park use. Therefore, the infra-red counter reading was only compared with the number of people recorded by the observer as being in the park, and the number of individuals recorded by the observer to have passed through the counter but not whether each person passed through alone or simultaneously with another person.

To more accurately assess this aspect, extra validation data were collected in one of the study parks after the main study was completed. Three members of the project team undertook this second period of observation during the morning (approximately 6.30am – 8.30am) and early evening (approximately 4.00pm – 6.00pm) during September to October 1999. The counter was observed for approximately 500 counts over 14 shifts. Each time someone passed through the counter the observer recorded the number of people that passed through, whether they passed through simultaneously or alone and whether they were too short to register a count. Prior to the start of data collection inter-observer agreement was tested.

2.7 Statistical analysis for objective 2

All analyses were conducted using SPSS.

In comparing data from the infra-red counter with data from direct observation, the data from 11 shifts were excluded from analysis due to unreliable data and the infra-red reading was not taken for five shifts. The infra-red counter readings obtained during the observation period were summed and compared with the total number of people using the park as recorded by the observers. Summed counter readings were also compared with the number of individuals observed to pass through the counter (counting each person only once) and the number of observed passes through the counter (counting each pass independently).

3 Results for objective 1

3.1 Survey respondents

Telephone survey respondents

Of the 24,808 telephone numbers selected for the telephone survey, an attempt was made to contact 13,691 (55.18%). Of these 13,691 numbers called, 9,849 (71.9%) resulted in contact with a household. Excluding households that did not satisfy the study eligibility criteria, the overall response to the telephone survey was 20.3%.

At baseline, respondents from the intervention and control wards were significantly different in terms of education level ($X^2_{(2)}=22.98$, $p<0.0001$) and respondents from the intervention ward were significantly more likely to speak a language other than English at home than were respondents from the control ward ($X^2_{(1)}=9.58$, $p=0.002$). These between ward differences persisted in the follow-up survey.

Respondents from the intervention and control wards were also compared on the main outcome variables of interest (awareness of promotional activities, walking, adequate activity and park use) at baseline. Respondents in the control ward were significantly more likely than respondents in the intervention ward to report having seen or heard information about parks in the local area in the last six months (18.6% and 12.4% respectively, $X^2_{(1)}=6.15$, $p=0.013$). Park use also differed, with respondents in the intervention ward significantly more likely than respondents in the control ward to report having used at least one local park in the two weeks prior to the survey (51.9% and 38.6% respectively, $X^2_{(1)}=15.07$, $p=0.0001$).
There were no other significant differences between the wards at baseline.

	Control ward				Intervention ward			
	Baseline		Follow-up		Baseline		Follow-up	
	n	(%)	n	(%)	n	(%)	n	(%)
Walking promotion								
Spontaneous recall of the Walk It: Active Local Parks slogan	4	(1.0)	3	(0.7)	0	(0.0)	4	(1.0)
Aware of promotion of walking in local area	52	(12.4)	111	(26.4)†	55	(13.1)	151	(36.0)*†
Cued recall of Walk it: Active Local Parks campaign	35	(8.3)	63	(15.0)†	31	(7.4)	86	(20.5)* †
Aware of promotion of walking groups in local area‡	-	-	90	(21.4)	-	-	129	(30.7)
Local parks promotion								
Recalled seeing/ hearing information about local parks in last 6 months	78	(18.6)	75	(17.9)	52	(12.4)	120	(28.6)*†
Recalled receiving a pamphlet with maps about walking paths in local parks	15	(3.6)	15	(3.6)	14	(3.3)	102	(24.3)*†

* $p<0.05$ for between-ward comparison at follow-up
† $p<0.05$ for within-ward comparison
‡ This question was not asked at baseline

Table 3.1 Awareness of walking and local parks promotion

Park user survey respondents

Park user surveys were administered to 231 people visiting one of the study parks over the two data collection periods - 119 surveys (51.5%) were completed at baseline and 112 (48.5%) were completed during the follow-up data collection period. Demographic information collected in the survey indicated that respondents were likely to be male (53.2%), aged between 40-59 years (36.8%), in paid employment (45.5%) and in a married/defacto relationship (71.4%). Of the 231 respondents, 196 (84.8%) were residents of the same ward as the park they were visiting.

3.2 Awareness of promotional activities

Telephone survey

Telephone survey respondents were asked what health slogans or messages came to mind "when I say 'physical activity or exercise'?". Combining results from both wards and both data collection periods, eleven respondents (0.6%) reported the project slogan *Walk It: Active Local Parks* (Table 3.1). Respondents were then asked whether over the past few months they had seen or heard any advertising, promotions, news items or articles about walking more in the local area. At follow-up, respondents in the intervention ward were significantly more likely than control ward respondents to report being aware of such promotions ($X^2_{(1)}$=8.88, p=0.003) (Table 3.1). When specifically asked whether they had heard of the Walk It: Active Local Parks campaign (cued recall), respondents in the intervention ward were also significantly more likely to report being aware of the campaign ($X^2_{(1)}$=4.32, p=0.038) than were control ward respondents (Table 3.1). A within-ward analysis revealed that in both the control and the intervention wards awareness of the walking promotion and cued recall of the project slogan were significantly higher at follow-up than at baseline ($X^2_{(1)}$=26.50, p<0.0001 and $X^2_{(1)}$=59.27, p<0.0001 respectively for awareness of the promotion and $X^2_{(1)}$=9.06, p=0.003 and $X^2_{(1)}$=30.04, p<0.0001 respectively for slogan recall).

Respondents were asked to indicate where they had seen or heard about the Walk It: Active Local Parks campaign. At follow-up, the most commonly reported sources of campaign awareness were the newspaper (39.6%), television (20.8%), leaflets/brochures (8.1%) and mailbox information (8.1%). Of note, respondents reported having seen or heard about the campaign through mediums that were not used (eg. television, radio and billboards). Intervention ward respondents were significantly more likely than control ward respondents to report having seen or heard anything about walking groups in the local area ($X^2_{(1)}$=9.34, p=0.002) (Table 3.1).

The adjusted odds ratios examining the relationship between study and demographic variables and awareness of promotional activities indicated that, compared to control ward respondents at baseline, the odds of being aware of walking promotion activities in the local area were higher at follow-up in both the control ward (OR=2.5, 95% CI 1.75-3.64) and the intervention ward (OR=4.2, 95% CI 2.94-6.00). Generally, as age increased so too did awareness of the walking promotion, with respondents 55-65 years being 2.6 (95% CI 1.80-3.83) times more likely than respondents aged 25-34 years to report having seen or heard walking promotions. No other variables had a significant effect on awareness of the walking promotion. There was no evidence of an interaction between ward and time, suggesting that at follow-up more respondents were aware of walking promotions, regardless of whether they were in the intervention ward or not.

After adjusting for all other variables in the model, compared to control ward respondents at baseline, the odds of cued recall of the project slogan were higher at follow-up in both the control ward (OR=2.0, 95% CI 1.26-3.07) and the intervention ward (OR=2.9, 95% CI 1.90-4.48). As age increased so too did cued recall of the slogan, with the odds of recall being 3.1 (95% CI 1.91-5.04) times higher amongst the oldest age group than in the youngest age group. The odds of cued slogan recall were 2.3 (95% CI 1.34-4.03) times higher amongst respondents whose usual language at home was not English compared with English-speaking respondents. Ward, gender, education and household income did not have a significant effect on cued recall when other variables were included in the model.

At follow-up, respondents in the intervention ward were significantly more likely than control ward respondents to recall having seen or heard information about parks in the local area within the last six months ($X^2_{(1)}$=13.52, p<0.0003) (Table 3.1). Similarly, intervention ward respondents were significantly more likely to recall receiving a pamphlet with maps about walking paths in parks in the local area ($X^2_{(1)}$=75.16, p<0.0001) (Table 3.1). There was no change from baseline to follow-up in the proportion of control ward respondents who reported recall of parks

information or the walking maps ($X^2_{(1)}$=0.07, p=0.789 and $X^2_{(1)}$=0.00, p=1.00, respectively). However, there was a significant increase from baseline to follow-up in the proportion of intervention ward respondents who recalled these interventions ($X^2_{(1)}$=33.81, p<0.0001 and $X^2_{(1)}$=77.45, p<0.0001, respectively).

Park user survey

Surveyed park users were also asked whether they had seen or heard about any of the project promotional activities. The proportion of respondents who recalled hearing or seeing any information about local parks, increased from baseline to follow-up in both wards (8% to 12% in the control ward and 15% to 38% in the intervention ward). Respondents who recalled parks information were asked what they recalled hearing or seeing. The most popular response in both the control and the intervention ward was pamphlets, followed by the local paper. Respondents from the intervention ward also reported seeing signs, walking maps, notices and posters.

The proportion of respondents who recalled receiving a pamphlet with maps about walking in parks in the area increase from baseline to follow-up in both wards, but most notably in the intervention ward (0% to 49%, compared to an increase from 8% to 21% in the control ward).

3.3 Participation in physical activity

Walking

At baseline, just over half the respondents (55.7%) reported walking for exercise or recreation within the two weeks prior to the survey, and a similar proportion (55.6%) reported walking for other reasons, such as getting to places or walking to work, public transport or shops (Table 3.2). Overall, 81.9% of respondents reported walking for exercise or recreation and/or walking for other reasons (ie., any walking) in the two weeks prior to the baseline survey.

There were no significant differences between the control and intervention wards in walking at baseline ($X^2_{(1)}$=2.34, p=0.126 for exercise or recreation and $X^2_{(1)}$=3.52, p=0.061 for walking for other reasons). Similarly, at follow-up there were no significant differences between wards in walking for exercise or recreation ($X^2_{(1)}$=0.12, p=0.728). However, intervention ward respondents were significantly more likely than control ward respondents to have walked for reasons other than exercise or recreation in the previous two weeks ($X^2_{(1)}$=15.99, p<0.0001) (Table 3.2). When walking for exercise or recreation and walking for other reasons were combined, intervention ward respondents were also significantly more likely than control ward respondents to have walked in the previous two weeks at follow-up ($X^2_{(1)}$=11.51, p=0.001). A within-ward analysis revealed that walking for other reasons significantly increased from baseline to follow-up in the intervention ward ($X^2_{(1)}$=10.49, p=0.001), but not in the control ward ($X^2_{(1)}$=1.23, p=0.268). Similarly, any walking significantly increased from baseline to follow-up in the intervention ward ($X^2_{(1)}$=5.85, p=0.016), but not in the control ward ($X^2_{(1)}$=0.07, p=0.794). After controlling for all other variables in the model, there was a significant ward by gender interaction such that the effect of ward on walking varied depending on gender. The interaction indicated that in the control ward females were more likely to walk than males, but in the intervention ward males were more likely to walk than females. For males in the intervention ward the odds of walking were 2.8 times higher than for males in the control ward.

Walked in the last two weeks	Control ward				Intervention ward			
	Baseline		Follow-up		Baseline		Follow-up	
	n	(%)	n	(%)	n	(%)	n	(%)
Walking for exercise/ recreation	223	(53.1)	236	(56.2)	245	(58.3)	241	(57.4)
Walking for other reasons	220	(52.4)	236	(56.2)	247	(58.8)	292	(69.5)
Any walking *	337	(80.2)	340	(81.0)	351	(83.6)	375	(89.3
Vigorous exercise	155	(36.9)	174	(41.4)	160	(38.1)	177	(42.1)
Light to moderate physical activity	215	(51.2)	211	(50.2)	225	(53.6)	204	(48.6)

* Respondents were coded as having engaged in any form of walking if they had walked for exercise or recreation, and/or they had walked for other reasons

Table 3.2 Physical activity in the two weeks prior to the survey

In comparison, the odds of walking for females in the intervention ward were only 20% higher than for females in the control ward. Higher income was also associated with increased odds of walking - compared with people earning less than $25,000 the odds of walking were at least 50% higher for respondents whose income was $45,000 or more. The odds of walking were 30% (95% CI 0.46-0.94) lower for respondents aged 35-44 years, compared with people aged 25-34 years. Compared to English-speaking respondents, the odds of walking were 40% (95% CI 0.33-0.95) lower for respondents whose usual language at home was not English. No other variables had a significant effect on walking after adjusting for the other variables in the model.

Vigorous exercise and light to moderate activity

There were no significant differences between wards at follow-up in the proportion of respondents that reported engaging in vigorous exercise ($X^2_{(1)}$=0.04, p=0.834) or light to moderate physical activity ($X^2_{(1)}$=0.23, p=0.629) in the two weeks prior to the survey (Table 3.2).

Changes in physical activity

Respondents were asked how their current level of physical activity compared to the amount of physical activity that they were doing at the same time the previous year. More than 40% of respondents from both wards at both baseline and follow-up indicated that they were doing about the same amount of activity as last year. Overall, there was little variation between baseline and follow-up in the proportion of respondents in each response category.

3.4 Adequate activity

Respondents were classified as being adequately active if they engaged in at least 150 minutes and five sessions of moderate activity or three sessions of 20 minutes of vigorous activity per week. Less than half the respondents were adequately active at baseline (47.8%) and at follow-up (46.0%). There were no significant differences between wards at baseline (46.4% and 49.2% for control and intervention wards respectively, $X^2_{(1)}$=0.65, p=0.419) or follow-up (42.9% and 49.0% for control and intervention wards respectively, $X^2_{(1)}$=3.13, p=0.077) in the proportion of respondents that reported participating in activity at an adequate level. There was no change from baseline to follow-up in either ward in the proportion of respondents who reported being adequately active ($X^2_{(1)}$=0.99, p=0.320 for the control ward and $X^2_{(1)}$=0.001, p=0.972 for the intervention ward).

The odds of being adequately active were 30% (95% CI 0.54-0.81) lower for females than males. Similar to the walking results, the odds of 35-44 year-olds being adequately active were 30% (95% CI 0.52-0.88) lower than for the youngest respondents. No other variables had a significant effect on adequate activity.

3.5 Use of local parks

Self reported use of local parks – telephone survey

Telephone survey respondents from the intervention ward were significantly more likely than were control ward respondents to have used a local park in the two weeks prior to the baseline survey (38.6% and 51.9% for control and intervention wards respectively, $X^2_{(1)}$=15.07, p=0.0001). This between-ward difference persisted at follow-up (36.2% and 49.3% for control and intervention wards respectively, $X^2_{(1)}$=14.72, p=0.0001). There was no change in park use from baseline to follow-up in either ward ($X^2_{(1)}$=0.51, p=0.467 for the control ward and $X^2_{(1)}$=0.58, p=0.448 for the intervention ward).

Results from the logistic regression analysis found that after controlling for the other variables in the model, at baseline the odds of using a local park were 80% (95% CI 1.34-2.34) higher amongst intervention ward respondents than control ward respondents. This difference persisted, although was not as strong (OR=1.5, 95% CI 1.14-1.99), at follow-up. Although increasing income was associated with an increasing likelihood of having used a local park, only respondents whose annual household income was above $70,000 had significantly higher odds (OR=1.7, 95% CI 1.27-2.21) of using a local park than did respondents whose income was less than $25,000.

Self reported use of local parks – park user survey

Information about park use was also obtained by surveying people visiting the study parks during the direct observation period. A high proportion of respondents (44%) reported that they usually visited the park daily, and the most popular mode of transport to get to the park on the day that they completed the survey was walking (68.4%) or car (23.8%).

Opinions of local parks

Respondents to the telephone survey were asked to rate their opinion of parks in their local area on a four point scale of strongly agree, agree, disagree, strongly disagree. Strongly agree and agree responses were combined to determine overall agreement with each statement. Nearly all respondents agreed with the statement that the park was easy to get to (95.7%), with most reporting that it was within walking distance from their home (94.2%). Only a minority of respondents reported that they felt personally safe using it at night (27.2%) or that it had adequate lighting after dark (28.9%). Although the majority reported that the park had attractive trees or birds (83.6%) fewer agreed that it had interesting cycles, jogs or walks (43.0%) or a variety or walks to take (31.8%). Of note, respondents to the park user survey were more positive than telephone survey respondents about the features in the parks, but were less positive about the level of park maintenance.

Infra-red counter estimation of park use

The infra-red counters were used to obtain an indication of the number of people who used the study parks at baseline and at follow-up. The median daily counter readings indicated that in all study parks park use increased between the baseline and follow-up periods (Table 3.3). However, the extent of this increase varied across the parks, with the median daily increase ranging from 6 to 27. To allow for the substantial variation in park use at baseline, increase in use was also calculated as a percentage of baseline use. This further highlighted the variation between parks in the degree to which use increased.

Direct observation of park use

The direct observation data provided a measure of the number of people using each of the study parks at baseline and follow-up. There was no significant difference between baseline and follow-up in the mean number of park users per shift (Table 3.4) or the mean number of walkers per shift (Table 3.4) in any of the parks.

As there were no differences, the baseline and follow-up data were combined to give an overview of the activities of park users. During the fourteen days of direct observation 10,050 people were observed to use the study parks and of these 6,145 were recorded as walking at some time during their visit. The majority of observed park users (60%) were male, 37% were female and the observer did not record the gender of the remaining 3%. Young (27%) and middle aged adults (24%) were the most frequent users of parks, whilst fewer babies and toddlers (3%), teenagers (13%) and elderly (13%) used the parks than children (20%).

Park	Median daily counter readings			
	Baseline	Follow-up	Difference (follow-up - baseline)	% change (difference/ baseline)
Control ward				
Park 1	53	80	27	50.94*
Park 2	24	42	18	75.00*
Intervention ward				
Park 3	82	88	6	7.32
Park 4	30	38	8	26.67*
Park 5	182	203	21	11.54

* $p<0.05$

Table 3.3 Median daily infra-red count readings for each park

Activities undertaken in parks

Each observed activity was categorised as follows:

- Walking: walking alone, walking with friend/ family, walking with stroller, walking with dog off lead, walking with dog on lead.
- Running: running alone, running with friend/ family, running with dog off lead, running with dog on lead.
- Passive activity: sitting alone, sitting with friend/family, reading, sleeping, spectating, supervising (eg. child on playground), picnic/ BBQ/ drinking.
- Informal activity: playground, ballgames, climbing trees, cycling, kite flying, rollerblading/ skateboarding, children's games, calisthenics, golf practice.
- Sporting games: football, soccer, hockey, tennis, cricket, basketball, baseball, rugby, teeball, netball.

Every activity engaged in by a park user was recorded, thus park users could be coded as participating in more than one category of activity. The observer did not record the activity of 41 (0.4%) park users. Walking was the most popular activity with 61.1% of park users engaging in this activity. Similar numbers of park users participated in informal activities (14.9%), passive activities (15.1%) and sporting games (15.8%). Very few park users were coded as running (3.4%).

Park users showed different preferences for activities undertaken in the park depending on their gender and age group (Table 3.5). Females preferred to walk or engage in passive activities (75.8% and 17.1% respectively). The majority of males also chose to walk (53.3%), although participation in sporting games was nearly six times higher than that of females (21.8% compared to 3.8%). Although only a minority of park users ran in the parks the prevalence of male runners was nearly twice as high as females (4.2% compared to 2.4%). The majority of babies and toddlers using the park engaged in informal activities (61.4%). Children preferred informal activities (42.2%), sports games (31.9%) and walking (30.3%). Although teenagers participated in similar activities to children, the order of the preferences differed. Most teenagers preferred walking (44.2%), followed by sports games (34.7%) and informal activities (21.1%). The majority of young adults walked (60.6%) and a quarter (24.7%) engaged in passive activities. A high proportion of middle aged and elderly park users used the parks for walking (82.8% and 96.5% respectively).

Park	Mean number of people per shift		Mean number of walkers per shift	
	Baseline	Follow-up	Baseline	Follow-up
Control ward				
Park 1	36.15	39.90	24.95	26.25
Park 2	27.43	31.67	10.62	12.95
Intervention ward				
Park 3	34.18	29.00	24.12	26.53
Park 4	9.11	9.83	6.61	6.56
Park 5	73.25	92.10	123.35	146.00

Table 3.4 Mean number of people and walkers per shift in each park

Park users were coded as being alone, with another park user, or as being part of an organised event. Park users were most commonly observed to arrive at the park with another person and/or engage in activity with another person (41.5%). Over one-third (35.0%) were alone and almost a quarter (23.6%) of park users were participating in or spectating an organised event, usually a sports game. A relatively small proportion of park users (17.6%) had a dog with them and of these dogs 56.5% were on a leash.

	Activity/ies engaged in during park visit* (%)					
	n	Walking	Running	Passive	Informal	Sport
Gender						
Male	6,056	53.3	4.2	13.4	17.5	21.8
Female	3,670	75.8	2.4	17.1	11.1	3.8
Unspecified	324	42.9	0.3	25.6	10.8	41.0
Age group						
Baby/toddler	189	37.6	0.0	11.6	61.4	13.2
Child	1,983	30.3	2.0	8.9	42.2	31.9
Teenager	1,193	44.2	2.2	9.3	21.1	34.7
Young adult	2,714	60.6	6.2	24.7	8.3	12.6
Middle aged	2,443	82.8	3.7	14.3	2.5	2.7
Elderly	1,274	96.5	1.5	7.4	0.9	0.2
Unspecified	254	18.9	0.8	37.4	0.8	43.7

* Park users may have engaged in more than one activity therefore percentages may sum to more than 100

Table 3.5 Preferred park activities by gender and age group

4 Results for objective 2

The results from observers and from the infra-red counters were compared in terms of their measurement of overall park use and various aspects of walking path use.

4.1 Measurement of overall park use

There was large variation between the parks regarding how well the infra-red counter equated with the number of people using the park as recorded by the observer. This variation ranged from 31% to 100% (Table 4.1).

4.2 Measurement of path use

A comparison of the infra-red counter reading and the number of individuals observed to pass through the counter indicated that in each of the five study parks the infra-red counter overestimated the number of individuals that were observed to pass through the counter (Table 4.1). The extent of overestimation varied from 14% to 78%. In this analysis each person recorded by the observer was only counted once, irrespective of the number of times they passed through the counter. Over-estimation by the counter therefore occurred if people passed through the counter on more than one occasion during the same data collection period.

Park	Counter reading compared to observed park usage	Infra-red estimation of observed individuals*	Infra-red estimation of observed passes†
Park 1	53%	116%	90%
Park 2	31%	150%	116%
Park 3	69%	114%	95%
Park 4	100%	161%	113%
Park 5	59%	178%	100%

* Each person was only counted once, irrespective of how many times they passed through the counter

† Each pass was considered independently therefore one person could be counted multiple times

Table 4.1 Comparison between infra-red counter reading and observed number of park users

Alternatively, when path use was assessed by total use rather than individual people, agreement between the infra-red counter and the observer ranged from 10% underestimation by the counter to 16% overestimation (Table 4.1). Using this method of analysis, underestimation occurred if people passed through the counter simultaneously or the observer incorrectly recorded people as passing through the counter. Overestimation by the counter can occur if miscellaneous objects such as sticks or birds break the beam, or the observer fails to record people who pass through the counter.

4.3 Extra validation study

In the first inter-observer reliability testing session, compared with raters B and C, rater A underestimated the number of people that passed through the infra-red counter by two. There was also variation between the raters in the number of people coded as passing alone, simultaneously and below the infra-red beam. Inter-rater reliability improved significantly at the second testing session, with the raters agreeing on all four measures.

During the extra validation data collection period there were 626 passes through the counter (counting each time a person passed through the counter, as opposed to counting the number of individuals who passed the counter) and 501 counts were registered by the infra-red counter. Thus, the infra-red counter recorded 80% of passes through the counter. The observers noted that 39 passes were too short to register a count and 147 people passed through simultaneously.

To assess the accuracy of the counters in this setting, we eliminated passes that were too short to register, or who passed through simultaneously with another person to calculate the number of passes that the infra-red counter "should" have recorded. Using this method, the infra-red counter recorded 98% of expected registrations.

5 Discussion

5.1 Objective 1

The first objective of this study was to assess the effectiveness of the study interventions (promoting physical activity and park use, park modifications, and walking groups) on physical activity levels. This assessment involved three data collection methods: telephone survey, direct observation and infra-red counters. Unfortunately, significant limitations in the implementation of the interventions and in data collection, (including the low response rate), prevented this objective from being achieved. Each of the interventions and data collection techniques are discussed with recommendations for overcoming some of the problems encountered. The results are also discussed, however, considering the methodological problems due care should be taken when interpreting these data.

Implementation of study interventions

Promoting physical activity and park use

The promotion campaign focused on using local newspapers to promote physical activity and the use of local parks. Whilst the project was successful in attracting good publicity through the papers, their distribution areas made it impossible to keep the control ward isolated. Consequently both wards were exposed to a significant proportion of this aspect of the intervention, thereby eliminating our control group. This problem could be overcome by increasing the distance between the study areas, however this may make it harder to select areas with similar demographics and may necessitate collaborating with two local councils.

Park modifications

Cross contamination of the park modifications undertaken by the local council also occurred with one of the control parks receiving a significant upgrade of its playground during the course of this project. In addition, only one of the intervention parks received significant modifications, with the other two parks receiving minimal changes, most of which could be considered as general maintenance. Developing partnerships and collaborating with other organisations is an integral aspect of health promotion and in many cases, such as this study, the success of a particular intervention may be dependent on the actions of the partners. For this project collaboration agreements were developed with individual staff members and following an organisational restructure at the council commitment to the project was reduced. It may be more appropriate to have collaboration agreements confirmed in writing and endorsed at management levels (eg. a full council meeting), thus ensuring the established relationship is not jeopardised by staff or organisational changes in any of the participating organisations.

Walking groups

The walking groups were in general poorly attended. Delays between advertising and starting the groups may be partly responsible for this. However, initial interest in the groups, as indicated by phone inquiries, was not strong and may suggest that the promotion of the walking groups was not effective. Indeed, results from the telephone survey indicate that less than a third of respondents were aware of the walking groups. Unfortunately the information collected about the walking groups and their participants was not sufficient to enable proper assessment of the implementation and effectiveness of this intervention and to determine why it was not successful.

Data collection

Telephone survey

The response rate to the telephone survey was lower than expected and lower than has been reported for other telephone health surveys.[4,21] Reasons for the low response rate are not known, however in the NSW 1997 Health Survey WSAHS had the lowest response rate of all the area health services.[21] A variety of possible explanations for the low response rate to the current survey can be suggested. The survey was undertaken in late November and early December. This is a time of year when people are generally busier at both work and socially as the lead up to Christmas begins. Consequently, some people may be less responsive to participating in telephone surveys, even those undertaken for non-commercial organisations such as the health sector. The length of the survey (approximately 20 minutes) may have also deterred some potential respondents.

It may be hypothesised that people who were less interested in physical activity and/or who were less active may have been less likely to participate in the survey. This argument is supported by a comparison of the demographic characteristics of residents in the intervention and control wards with respondents to the telephone survey. Survey respondents from both wards tended to be more highly educated and have a higher household income than average, and were more likely to usually speak English at home. These characteristics are generally associated with an increased likelihood of being physically active, indicating that the respondents were a biased sample. Caution therefore needs to be taken in drawing strong conclusions from these results or from generalising these results to other groups.

Infra-red estimation of park use

The infra-red counters were an inaccurate method of measuring overall park use as revealed by the comparison between data obtained from the counters and observers during the direct observation period. This is discussed further in 'Measurement of overall park use'.

Direct observation of park use

During this study a number of limitations of using direct observation to collect data became apparent. These issues and possible solutions have been discussed in detail elsewhere[10] and will be briefly outlined here. Due to the size and geographical layout of the parks, it was not possible for the observer to view the entire park from one location. The data obtained were therefore limited to behaviour within the visible section of the park. This has particular implications for evaluating the effectiveness of an intervention since behaviour patterns may be different in the areas of the park that are not visible to the observer. In Park 3 for instance, the observer could not see the playground or a large area of open space. Consequently, the observation data underestimated the number of people using the playground and participating in activities in the open space, and potentially overestimated the proportion of park users that participated in other activities such as walking. Observers were required to record several pieces of information about each park user. Whilst this was straightforward when there were only a few people in the park, it was more complicated at busy times. Parks with sporting fields had large influxes of people for games and training sessions. During these times it was difficult to record all the necessary information for participants, spectators and other park users. This was particularly difficult if the park user left the park and returned later in the shift. These issues highlight the importance of understanding both the study environment and typical behaviour patterns in that environment prior to beginning data collection. A period of pilot testing undertaken at the same times and days as the observation will reveal some of the problems that may be encountered, enabling you to be aware of, if not circumvent, them before data collection begins.

Limited resources precluded measurement of inter-observer reliability in this study, however, a training session prior to data collection and ongoing supervision during data collection were undertaken to maximise reliability. In hindsight it may have been more practical to limit the number of observation sites and/or decrease the number of shifts per day to minimise the number of observers that were required and to make testing of inter-observer reliability more feasible. Interval sampling (eg. recording all behaviour that occurs during a specified time period) has been used in a larger scale study of parks[16] and would also reduce the number of observers required.

Outcomes

Awareness of promotional activities

Compared to baseline, telephone survey respondents from both the intervention and control wards were significantly more likely to have heard of the project slogan and be aware of the walking promotion at follow-up. This is consistent with the fact that both wards were exposed to the media component of the promotion campaign through the local newspapers. Univariate analysis indicated that at follow-up, intervention ward respondents were significantly more likely than were control ward respondents to report awareness of the project slogan, the walking promotion, the promotion of walking groups, and to have seen or heard information about local parks. This could be attributed to the fact that the intervention ward was exposed to the other components of the promotion campaign in addition to the media component and therefore received a larger dose of this intervention.

Participation in physical activity

At follow-up, intervention ward respondents to the telephone survey were more likely to have walked in the two weeks prior to the telephone survey than were control ward respondents. There was a significant interaction between ward and gender, indicating that the intervention had a greater effect on males than females. Males in the intervention ward were more

highly educated than females, which may at least partly explain this result. The direct observation data found that males were more likely to use parks than females and may therefore have been exposed to more of the project interventions (eg. the walking signs in the parks) than the females. The low response rate to the telephone survey makes it difficult to draw any conclusions from these results, especially as respondent characteristics suggest that the respondents may be more likely than non-respondents to participate in physical activity.

Adequate activity

Less than half of the telephone survey respondents reported adequate levels of activity. This figure is similar to other research in NSW (56.2%).[21] Consistent with other reports, women were significantly less likely than males to be adequately active. Adequate activity levels were not significantly influenced by the study interventions.

Use of local parks

There was no difference in park use between baseline and follow-up, as measured by the telephone survey. Data from the direct observation of the study parks similarly indicated that there was no increase in park use between baseline and follow-up. Contrary to these results, the daily infra-red counter readings taken over a one month period were significantly higher in three of the study parks (two control and one intervention) at follow-up.

Male users outnumbered females in a ratio of 62 to 38 and males were more likely to participate in organised sporting games than were females. Interestingly, another study has also reported that males outnumber females in parks in a ratio of 60 to 40.[16] Males are reported to have a higher participation rate in sport and physical activities than females.[2,4] In the present study this was undoubtedly influenced by the fact that the majority of organised sporting facilities in the parks were for soccer and cricket, both of which are predominantly played by males.

Walking was the most popular activity undertaken in parks by all age groups, except children, and babies and toddlers. It appeared that the preference for walking as an activity increased with age. In the observational study of park use in Melbourne[16] walking was the preferred activity among middle aged adults and the elderly. It appeared that some parks were more conducive to walking than others. In particular, although Park 5 was classified as a sporting ground it had a defined bitumen walking circuit that was used by walkers, runners and joggers for doing laps — many seemed to specifically come to the park to do their exercise. The addition of the walking path is an excellent example of how an area that was primarily designed for one purpose (sports games) can easily be modified to maximise its use for multiple purposes (walking, running and cycling). Corti et al.[7] suggested that the way public space is designed gives cues about how it should be used. The addition of a formal path in this setting may have encouraged walking, without which this space may otherwise not have been utilised for this purpose.

The fact that the activities undertaken in the parks varied by age and gender suggests that the requirements of public open space in terms of facilities and design may vary according to the types of people who use the park. This has been demonstrated previously with requests for facilities in parks varying to some extent according to the age of the respondent.[16] This finding highlights the importance of ensuring adequate community consultation is undertaken for the purposes of equity, and to ensure that parks best serve the needs of the local community.

Although the results from the telephone survey suggest that there was an increase in walking in the intervention ward, there was no evidence of an increase in park use. Behaviour change is typically hard to achieve through community-based intervention campaigns. Based on a review of studies, Iverson and colleagues[13] found that although the use of mass media in community-based intervention programs appears to successfully increase awareness and interest in physical activity, it is not as successful at changing attitudes or exercise behaviour in the short term. Owen[23] suggests that if mass media campaigns are to be relevant and useful they must be supported by a community infrastructure of opportunities and resources that encourages people to be more physically active. The interventions in our study were more extensive than solely a media campaign, however they may not have been extensive enough to achieve changes in all of the desired behaviours. Indeed, not all the park modifications were implemented as planned and the modifications undertaken in some parks were only minimal. In situations where time or other resources are limited, a more effective use of resources may be to concentrate on substantially upgrading one park rather than completing minimal interventions in multiple parks. This will also allow a better evaluation of the interventions.

5.2 Objective 2

Comparing the number of passes that the observer judged would be registered by the infra-red counter (taking into account passes that were considered too short and simultaneous passes), with the infra-red reading revealed that agreement was extremely high at 98%. Using the same method of analysis Miners and colleagues (1999) also reported 98% agreement between the counter and observer. Disagreement between the observer and the counter may be the result of observer error rather than counter error as the observer is required to make judgements about height and simultaneous passes from a distance. Whilst this analysis provides important information about the performance of the infra-red counter, it may not be the most appropriate method for determining its validity. It is more informative to know how well the counter performed compared with an observer in recording the number of people passing the counter and the number of people using the park.

Measurement of overall park use

The infra-red counters were an inaccurate method of measuring overall park use, with agreement between the counter reading and the total number of people using the park as measured by an observer ranging from 31% to 100%. The position of the counter within the park and the size and layout of the park are important influences on how useful the counter will be in measuring overall park use. Typically parks are open spaces that are easy to access from many directions. This layout is not conducive to measuring park use with a single stationary device such as an infra-red counter since people may engage in activities within the park without passing through the counter. Although the counter reading in Park 4 was in 100% agreement with overall park use as measured by an observer, not all park users passed through the counter. Coincidently, the location of the counter was such that the number of park users that the counter did not count was equivalent to the extra counts registered by people who passed through more than once. This illustrates the point that in order to give an accurate impression of what the counter is actually measuring a period of comparison with an observer is essential.

Measurement of path use

Two major limitations exist when using the infra-red counter to assess path use in terms of the number of people using the path. The first limitation is that the infra-red counter cannot distinguish between individual people. For instance, a reading of five could indicate five people passing through the counter, one person passing through five times, or any variation in between. This was illustrated in all five parks, as the infra-red counters consistently overestimated the number of individuals that passed through the counter (14% to 78%). The second limitation is that the infra-red counter registers the number of times the beam is broken. Thus, when multiple people pass through the counter simultaneously or a person passes below the height of the beam, the counter reading will underestimate the actual number of people passing.

The second aspect of path use examined in this study was overall use, which considered each pass independently, even if the person had previously passed through the counter. Analysis revealed that, depending on the park, the infra-red counter registered 90% to 116% of the number of passes recorded by the observer. In the extra validation study all passes, irrespective of height and simultaneous passes, were included and the infra-red reading equated to 80% of observed passes. This figure is comparable to that of Miners et al.[15] who found that along a coastal walkway the infra-red counter registered 76% of the number of people recorded by an observer.

In assessing both aspects of path use, the counter reading varied greatly across the five parks indicating that this validation is site-specific and not generalisable to another site. This again highlights the importance of validating the infra-red counter by including a period of comparison with an observer.

5.3 Objective 3

It was intended that the findings of objective 1 would inform the development of guidelines for local government interventions incorporating park redevelopment and promotion. As methodological problems precluded the formulation of any conclusive statements, it was not feasible to develop these guidelines. Being able to make a statement and recommendations about the impact of environmental conditions on physical activity is an important, but difficult, area of research. Our experience suggests that not only is more research in this area is warranted, but that alternate approaches may be more effective. Evaluating natural experiments may be a useful and informative starting point. Furthermore, using control sites in different LGAs or states may overcome some of the methodological problems encountered in this project.

The validation of infra-red counters (objective 2) has implications that may be useful to other health promotion or council projects. Guidelines for the installation and use of infra-red counters in open space have therefore been developed (Appendix 6).

6 Conclusions and recommendations

Due to problems in the implementation of the study interventions it was not possible to evaluate their effectiveness in increasing participation in physical activity (objective 1). However, based on the experience of this project, the following recommendations are made about how this may be better evaluated in future studies.

Increasing the distance between study areas will reduce the possible contamination of project interventions. Clearly distinguished intervention and control groups are best for evaluating the effect of an intervention. Contamination of interventions may result in an underestimation of the effectiveness of the intervention.

In order to maximise the impact of the park modifications, a more intensive approach is recommended. By focusing project resources on one intervention park, rather than three, it should be possible to undertake more extensive changes. Many of the changes that were undertaken in the parks for this study could be categorised as repairs and maintenance, rather than modifications. Although parks that are well maintained will be more aesthetically pleasing to potential users, this is not the same as modifying the environment to encourage behaviour change. Modifications that may be more effective could include creating pathways, varying the landscape (eg. creating undulations in a flat park), providing shade structures, introducing or upgrading playground equipment and picnic facilities (including gas barbeques), and improving parking facilities. The most appropriate modifications for a particular park will depend on what the park is used for and by whom. Community consultation could be used to collect this information as well as eliciting local opinion about features that would encourage park use.

It is also recommended that intervention parks be selected on the basis of their potential for environmental modifications that will encourage park use. The existing facilities and design of some parks may already be sufficient and further modification may not have any effect. In other cases it may not be appropriate to alter the park environment. Parks that are already used by a large number of people and parks that are used by very few people may not be suitable choices. A period of observation to determine typical patterns of park use will assist in evaluating the suitability of a particular park.

The validation of the infra-red counter (objective 2) demonstrated that the infra-red counter did not accurately measure the total number of people using a park and therefore it is not recommended for measuring the use of large areas with multiple entry and exit points. The infra-red counter was much better at measuring path use, indicating that the counter may be a viable alternative to direct observation for measuring the number of times that a path is used (described in this report as the number of passes). However, a period of validation undertaken in each site that the counters are used is essential prior to data collection. Guidelines for the use of infra-red counters in open spaces have been developed and are included in Appendix 6.

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Appendix 1

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Appendix 2

Management committee

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Appendix 3

Telephone survey questions

1997 survey questions

Q1 What health slogans or messages, if any, come to mind when I say 'physical activity or exercise'?

Q2a Over the past few months, have you seen or heard any advertising, promotions, news items or articles about walking more in your local area?

Q2b What have you seen or heard?

Q3a* What did you see or hear from the [as mentioned in Q2b]?

Q3b* What was the main message of that advertising?

Q4a Before this interview, which, if any, of the following community campaigns or programs had you heard of?

Quit Smoking Campaign

Exercise, you only need to take it regularly not seriously

Walk It: Active Local Parks

Life, Be In It

Dairy corporation physical activity messages

Q4b Where do you remember seeing or hearing about the 'Walk It: Active Local Parks' campaign?

Q5 Did the publicity you saw or heard about Walk It: Active Local Parks encourage you to do more walking or more exercise or physical activity?

Q6a In the last two weeks, not including today, have you walked for exercise or recreation?

Q6b On how many days during the last two weeks have you walked for exercise or recreation?

Q6c How many times in the last two weeks have you walked for recreation or exercise?

Q6d Still thinking about walking for exercise or recreation, in the last two weeks, how many times have you:

Walked around the local streets or local area?

Walked in a park in your local area?

Q6e Please estimate the total time spent on [activity in Q6d] in the past two weeks.

Q6f And in the last two weeks are there any other occasions where you have walked for recreation or exercise? What were they? Ask number of times and total time spent.

Q7a In the last two weeks, not including today, did you walk for other reasons, such as getting to places, or walking to work, public transport or shops?

Q7b On how many days during the last two weeks did you walk for other reasons such as getting to places, walking to work, public transport or shops?

Q7c How many times in the last two weeks did you walk for reasons such as getting to work, public transport or shops?

Q7d Still thinking about walking for getting to places, in the last two weeks, how many times have you:

Walked to or from work?

Walked to or from public transport?

Walked to or from shops in your local area?

Q7e Please estimate the total time spent on [activity in Q7d] in the past two weeks.

Q7f And in the last two weeks are there any other occasions where you have walked to get to or from places? What were the occasions? Ask number of times and total time spent.

Q8a In the last 2 weeks, did you do any vigorous exercise which made you breathe harder or puff or pant? I mean activities like football, tennis, netball, squash, athletics, jogging, keep - fit exercises and vigorous swimming.

Q8b How many times over the past 2 weeks?

Q8c Please estimate the total time you spent doing vigorous physical activity during the last 2 weeks.

Q9a Apart from what you have already told me, In the past 2 weeks did you do any other light to moderate physical activity for recreation, sport, health, fitness or transport purposes? I mean

things like heavy gardening, slow swimming, social tennis, casual cycling or heavier housework you don't usually do.

Q9b How many times over the past 2 weeks did you do light to moderate physical activity?

Q9c Please estimate the total time spent doing light to moderate physical activity during the past 2 weeks.

Q10a In the last 2 weeks have you done more, less or the same amount of physical activity as you usually do?

Q11a In general are you doing more, less or the same amount of physical activity as you were doing at the same time last year?

Q11b Would you say the amount of physical activity you currently do is:

About right / Too much / Not enough?

Q11c Compared to other people of your age and sex, would you say you are:

Much less active / A bit less active / About as active / A bit more active / Much more active?

Q12 I am going to read a number of statements about doing more physical activity. When I say physical activity, I mean even moderate physical activity, including walking. Which of these applies to you?

I'm not thinking about doing any more physical activity at the moment

I'm thinking about doing more physical activity, but not in the next fortnight

I'm thinking about doing more physical activity at the moment

I am trying to do more physical activity at the moment

Q13a In the past month, did you:

Set a goal for how much physical activity you would like to do?

Plan particular days on which to do physical activity?

Arrange to meet someone to do physical activity with?

Q13b And in the last month how often did you [Q13a subitems]?

Q14a From where you live, approximately how many minutes would it take you to walk to a local park – that is, a park where you could exercise, walk the dog and so on?

Q14b* Is this your closest local park?

Q14c* Why didn't you mention your closest local park as a park where you could exercise or walk the dog?

Q15a To what extent do you agree or disagree that you have access to a park in your local area:

That is within walking distance from where you live?

That is easy to get to?

That is used by friendly people?

That you feel comfortable using?

That you feel personally safe using whenever you want to during the day?

That has facilities that are well maintained?

That you usually have someone to go to with?

That your spouse or partner is supportive of you going to?

That you often see other people using?

That has attractive trees or birds?

That has interesting cycles, jogs or walks?

That has children's play equipment available?

That has an attractive feature like a lake or a view?

That has a variety of walks to take?

That you feel personally safe using at night?

That only has dogs on leads?

That has clean and tidy grounds?

That offers picnic and BBQ areas?

That has attractive landscaped areas?

That has adequate lighting after dark?

Q16a Could you please tell me all the parks in your local area that you know of? By local area I mean a park within walking distance.

Q16b Which, if any, of these parks have you used in the past two weeks?

Q16c How did you get to [each park mentioned in Q16b]? Did you walk, drive or cycle there?

Q17a Do you recall seeing or hearing any information about parks in the local area within the last six months?

Q17b What do you recall seeing or hearing?

Q18a Do you recall receiving a pamphlet with maps about walking paths in the parks in your local area?

Q18b Did you use a local park as a result of receiving this pamphlet on walking paths in the parks in your local area?

Q18c I'm going to read a number of statements about walking in parks. Which of these applies to you?

I'm not thinking about going for walks in a park in my local area at the moment

I'm thinking about going for walks in a park in my local area but not in the next fortnight

I'm thinking about going for walks in a park in my local areas in the next fortnight

I'm going for walks in a park in my local area at the moment

Q19a Do you have a dog?

Q19b Do you personally walk your dog in the local area?

Q19c Does this include walking in a park?

Q20a Over the last 3 months, which of the following people, if any, did moderate physical activity with you, including walking?

Your spouse or partner

A family member

A friend

A neighbour

A workmate

Q20b How often in the past three months did [each person mentioned in Q20a] do any physical activity with you?

Q21 Assuming that you planned to try to do moderate physical activity for half an hour each day over the next two weeks, how likely or unlikely is it that you would actually do this?

Q22* We would like to find out how likely you would be to exercise in a number of situations. Could you please tell me if you are likely or unlikely to exercise in the following situations:

When you are tired?

When you are in a bad mood?

When you feel you don't have time?

When it is raining?

When it takes a lot of effort?

Q23 How many days each week do you think adults should do moderate physical activity, including walking, for it to be good for their health?

Q24 To be beneficial for your health, should moderate daily physical activity each day be done:

All at one time / In several short sessions throughout the day / It doesn't matter?

Q25 Whether you do physical activity all at one time or in several short sessions throughout the day, what should be the total time per day spent doing moderate physical activity for it to be good for you?

Q26 To what extent do you agree or disagree with the statement: "Vigorous physical activity for at least 20 minutes each time, at least 3 times per week is necessary to improve your health"?

Q27 To what extent do you agree or disagree with the statement: "Half an hour of brisk walking on most days is all that is needed to improve your health"?

Q28 In the last 6 months has a doctor or other health practitioner given you any advice on increasing your level of physical activity or exercise?

Q29 In general would you say your health is:

Excellent / Very good / Good / Fair / Poor?

Q30 Do you have any physical or health problems that have prevented you from doing any physical activity, even walking, in the last 2 weeks?

Q31 What language do you usually speak at home?

Q32 What is the highest level of education you have completed to date?

Q33 What is your current marital status?

Q34 Does your spouse or partner engage in regular physical activity, including walking?

Q35 How would you describe your current employment status?

Q36 What is your usual occupation? (If retired, ask previous occupation)

Q37 How many hours per week do you usually spend in paid employment?

Q38 Is your main place of employment in the Western Sydney area?

Q39 And how long have you lived in the Western Sydney area?

Q40 Could you tell me how many children under 18 do you have living with you? Could you tell me the age of each child living with you?

Q41 Do you own or have access to a car?

Q42 And into which of the following income ranges is your total household income before tax?

Q43 Ask sex of respondent.

Q44 Can you please tell me which age bracket you are in?

Questions added in 1998 survey

Q7a Have you seen or heard anything about walking groups in your local area?

Q7b Have you walked with a walking group in your local area during the past two months?

Q7c Are you interested in joining a walking group in your local area?

Q19d How many times, if any, in the past two weeks did you take your dog for a walk?

Q19e Please estimate the total time you spent walking your dog in the past two weeks.

Q27b** How often do you read the local newspaper?

* question was omitted from the 1998 survey

** question was added part-way through the 1998 survey

Appendix 4

Direct observation code sheet

Age group codes

BT Babies and toddlers (0-4 years)
CH Children (5-12 years)
TE Teenagers (13-19 years)
YA Young adults (20-39 years)
MA Middle aged adults (40-59 years)
EL Elderly (60+ years)

Activity codes

Walking

WA Walking alone
WF Walking with friends/family
WS Walking with a stroller
WD Walking with dog (no leash)
WDL Walking with dog on leash

Jogging

RA Jogging or running alone
RF Jogging or running with friends/family
RD Jogging or running with dog (no leash)
RDL Jogging or running with dog on leash

Passive activities

SA Standing/sitting/lying alone
SF Standing/sitting/lying with friends or family
RE Reading
SL Sleeping
SP Spectating (active sport)
SU Supervising children (eg. on playground)
PB Picnic/BBQ/drinking

Informal activities and games

PG Using playground
BG Ball games
CT Climbing trees
RS Rollerblading/skateboarding
CY Cycling
KF Kite flying
CG Informal children's games

Active sport

FO Football
SO Soccer
HO Hockey
TN Tennis
CR Cricket
BB Basketball/netball
RU Rugby

Other

Please describe

Weather codes

SU Sunny
CL Cloudy
LR Light rain
TH Thunderstorm
HR Heavy rain

Appendix 5

Direct observation data sheet

Park name: ____________ Date: ____________ Shift: morning day afternoon

Observer's name: ____________ Infrared counter reading: 6.00am: ________ 10.30am: ________ 3.00pm: ________ 8.00pm: ________

Park user no	Time of entry	Sex M/F	Approx age (see age codes)	Passed infrared counter (Y) ALONE (Please tick each time a park user passes the infrared counter)	Passed infrared counter (Y) TOGETHER	Activity (see activity codes)	Time at end of observation	Weather and other comments (see weather codes)	Approached for survey (Y)	Survey completed (Y)

KEY: { = engaged in activity together

Remember to phone through results at the end of your shift

Appendix 6

Guidelines for the use of an infa-red counting device in open spaces

The following guidelines for the use of an infra-red counting device are based on the use of a pair of ONSPOT PC2000 infra-red counters. These counters are a dual infra-red beam counter, consisting of a transmitter and a receiver. They operate in line of sight and the dual beam requires that both beams are broken to register a count. The transmitter and receiver each require eight D type batteries.

The infra-red counter is a novel approach to collecting data in open spaces. Its ability to provide accurate data is dependent on several issues and when considering using an infra-red counter it is important to first establish whether it can provide the information that you wish to collect or whether an alternative method of data collection is more appropriate.

Characteristics of the open space

1 The number of entry and exit points in an open space will influence the accuracy of the infra-red counter in measuring the number of people using the area. Open spaces with multiple entry and exit points are not conducive to being counted by a single stationary device. Use of multiple infra-red counters in such spaces is a possible alternative but has not been tested and as such no comment about the accuracy or usefulness of this can be made. Open spaces with a single entry point may be more accurately measured by a strategically placed infra-red counter.

Location of counters

2 A period of observation prior to data collection is needed to assess the most appropriate location within the open space to install the counters. Ideally the position of the counters should maximise the probability of counting the target group whilst avoiding counting people outside the target group.

Installation

3 Protection - Consideration should be given to vandal - and weather-proofing the counters. Placing the counters inside padlocked galvanised steel posts was effective in preventing them from being damaged when used in one study over a two-year period. Be aware that raising and lowering the detachable lid will register two 'false' counts each time the reading is taken, and this should be subtracted from the total counter reading.

4 Height - Ensure that the infra-red counters are set at an appropriate height so as to record the majority of the target group that you are aiming to measure. Counts of animals, or of people that are shorter than your target group, can be avoided by raising the height of the beam, however taller people cannot be excluded by altering the height of the beam. Consequently this tool is not appropriate for measuring children to the exclusion of older people that may also pass through the counters.

5 Width - In order to minimise the number of people that are not counted by the infra-red counter because they pass through simultaneously with another person, ideally the distance between the transmitter and receiver should encourage people to pass through in single file. In practice the counters will generally be placed across a pre-existing path or walkway which will determine this distance. If a pathway is particularly wide putting a number of counters across the pathway could be considered, but again this has not been tested. However, care should always be taken to ensure that the counters are not so intrusive that they alter typical behaviour and result in people choosing to avoid passing through them.

6 Maintenance - The counters can be calibrated to adjust the delay between registrations. It is imperative that a measuring device is consistent throughout the period of data collection, therefore the calibration of the counters should be regularly checked against a gold standard. It is also important to monitor battery operation and general functioning. The operational life of the batteries in the counter is approximately three months.

Validation

7 When correctly calibrated, the infra-red beam is broken (thus registering a count) every time something passes through. This has implications for the information that can be obtained using the infra-red counter:

- The counter will overestimate the number of individuals passing through the counter if they tend to pass through the counter more than once (eg. doing laps or making return journeys);
- The counter should be more accurate at measuring the overall number of people, in which a person is counted each time they pass the counter;
- The counter will underestimate the number of people passing through the counter if people pass simultaneously (see point 5);
- The counter will be a poor tool for measuring the number of people using a space if that space can be accessed without passing through the counter (see point 1).

The accuracy of the counter for measuring each of these will vary from site to site. It is therefore essential to validate the infra-red counter against an observer for each open space in which the counter will be used and also over the different conditions during which data are being collected (eg. time of day and day of week). Only after a period of validation will it be possible to determine how accurate the counter is for collecting the data you want. A period of comparison will also highlight any abnormal readings that may occur due to environmental or other conditions (eg. the angle of direct sun or branches falling from trees).

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