

Do mass participation sporting events have a role in making populations more active?

FINAL REPORT

THANKS TO...

The Irish Sports Council

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Foreword

As Chief Executive of the Irish Sports Council I very much welcome the publication of this report “Do Mass Participation Events Have a Role in Making Populations More Active?”

This is the second report to emerge from the examination by researchers at Waterford Institute of Technology into the sporting and physical activity behaviours of participants in the Dublin and Cork Women’s Mini Marathons during between 2007 and 2009.

The first report, “The impact of participation in the Flora women’s mini marathon on physical activity behaviour among women”, sought primarily to map the physical activity behaviours of participants. However this report goes much further in that it assesses whether there are particular ways in which national and local policy makers along with event organisers and other interested stakeholders could harness the impetus towards action generated by mass events to encourage more sustained involvement in healthy physical activity long after the event has occurred.

We have seen an enormous upsurge in recent years in Ireland of national and, more recently, local mass events in sports like running, cycling, triathlon, swimming, etc. What these events have shown is that it is possible to engage significant numbers of people in one-off events which generate great passion and enthusiasm among participants and spectators alike and to contribute value in a variety of ways, economically, societally, and health-wise.

Where this current research can add even further value is in providing practical guidance to assist event organisers along with agencies like the Council, the Local Sports Partnerships, Health Services Executive and other such agencies in their efforts to make Ireland a more active, healthier place.

I would like to thank the research team at Waterford Institute of Technology for their extensive efforts in bringing these two reports to light, in particular Aoife Lane and Dr. Niamh Murphy. I would also like to thank Professor Adrian Bauman of the Centre for Physical Activity and Health at the University of Sydney for his invaluable expertise right throughout this project.

Finally I would like to thank all the mini marathon participants who contributed to the study. I hope that they continue to enjoy the benefits of an active healthy life and that they will find something within this report to assist them in this regard.

John Treacy

Chief Executive

Irish Sports Council

May 2010

Executive Summary

Mass sporting events are becoming increasingly popular worldwide and may have health benefits as they foster low intensity participation in a non competitive, fun environment. We know little, however, about their long term effect, if any, on physical activity levels. This report describes the initial impact of three women only mass events in Ireland as well as the effectiveness of a series of initiatives designed to boost activity among the least active participants. It also presents key lessons and recommendations for all those charged with promoting physical activity in Ireland. Results will be discussed in five parts:

Part 1: Profile and Activity Levels of Event Participants

The sample was drawn from registered participants for the 2007 Dublin and 2008 Dublin and Cork Women's Mini Marathons. In comparison to the general Irish adult female population, women who participated in the mini marathon events were much more likely to report having some or complete tertiary education and less likely to have medical cards. The most notable reason for participation was an altruistic one (i.e.) to raise money for charity. The high proportion of walkers (50%) in the events indicates that they attract more than the dedicated, habitual exerciser. Participation did instigate some training among the majority of women and as a result over 75% met minimum physical activity requirements just prior to the event. This is somewhat higher than equivalent statistics produced by the most recent SLÁN survey (Morgan et al., 2008) and may be due to the demographic disparity in relation to education between these cohorts of women.

Part 2: Physical Activity Levels Post Event

In comparison to 2007 where little variation was apparent several months after the event, follow up in 2008 revealed approximate 6% increases in the proportion of participants deemed 'low active' and thus, not meeting minimum physical activity guidelines.

Part 3: Physical Activity Relapsers

Physical activity relapsers (i.e.) participants who decreased their participation by at least 60 minutes of moderate intensity per week and became insufficiently active were identified at follow up to investigate why physical activity was not maintained. Approximately 13% of participants in all events met these criteria. Walking the event and having no tertiary education were related to an increased risk of relapse while risk reductions were noted for participants who lived in urban areas, had lower BMI's and higher levels of self efficacy and social support as well as more positive perceptions of their physical environment. This information is useful because it helps identify those 'at risk' of inactivity and can allow agencies to target their efforts more effectively.

Part 4: Efforts to Maintain/Increase Physical Activity Post Event

- All relapsers and participants who did not meet minimum requirements for sufficient physical activity before or after the event in 2007 were recruited to a low contact, print based intervention to promote physical activity. The LEGit intervention included the dissemination of two print booklets containing strategies and tips to promote physical activity. After 6 weeks, participants in the intervention and control group increased their physical activity levels with those deemed insufficiently active just prior to the intervention reporting the most positive changes. It appears that any contact at all was sufficient to instigate improvements in activity.
- Following both 2008 events, participants meeting the same inclusion criteria took part in a community based intervention delivered in partnership with the national network of Local Sports Partnerships (LSP's), which are funded by the Irish Sports Council. This intervention aimed to communicate information about and increase the use of existing resources for physical activity in various regions. Pedometers were also distributed during the study as a prompt for further activity. After 9 weeks, awareness of LSP's improved considerably and a greater proportion of the intervention group engaged in sufficient physical activity for health benefits. This was primarily due to an increase in vigorous intensity activity among these participants. Time spent sitting also decreased among this group and recall of materials was quite positive. Traditionally less active cohorts of participants, such as those living in rural areas and those without tertiary education all displayed favourable changes in physical activity. Each minute improvement per participant per week was achieved for less than 18 cent.

Part 5: Recommendations for Event Organisers and Physical Activity Professionals

- Policy makers would benefit from interaction with event organisers to promote the physical activity message and harness the potential of initial engagement in events.
- Evaluation of efforts to promote activity is informative and can be done in a cost effective manner.
- Engaging charities and tapping into the altruistic motive for participation displayed by many women is a worthwhile endeavour.
- The promotion of group based training, particularly the existing forums for this, which include Meet and Train and Fit4Life groups may yield increased activity and adherence.
- It is important to demonstrate that programmes to promote physical activity are good value for money to lever investment in physical activity.

Factsheets with specific guidelines on how to implement these recommendations are presented at the end of this report.

Glossary and Definition of Key Terms

Local Sports Partnerships (LSP)	Regional groups funded by the Irish Sports Council that aim to promote participation in sport at a local level.
Irish Sports Council (ISC)	A national body that plans, leads and co-ordinates efforts to promote sports and physical activity in Ireland.
Health Service Executive (HSE)	National health organisation responsible for the provision of healthcare in Ireland.
Waterford Institute of Technology (WIT)	A university level education and research institution in the South East of Ireland.
International Physical Activity Questionnaire (IPAQ)	A previously validated instrument used to collect self report physical activity data on population samples.
High active	Engaging in at least one hour of moderate or 30 minutes of vigorous intensity physical activity per day.
Moderately active	Engaging in at least 30 minutes of moderate intensity physical activity on most days.
Low active	Not meeting either of the previous criteria for high or moderately active.
Sufficiently active	Meeting minimum physical activity requirements for health; at least 30 minutes of moderate intensity activity on most (five) days of the week.
Insufficiently active	Not meeting the above minimum physical activity requirements required for health benefits.
Meet and Train Groups	Training clusters that have developed nationwide to facilitate collective training for beginner and advanced runners.
Athletic Association of Ireland (AAI) Fit4 Life Groups	Running groups for recreational runners or walkers
Women in Sport Initiative	An initiative funded by the Irish Sports Council to promote, encourage and support women's participation in sport.

Introduction

The numbers of people participating in mass sporting events is growing significantly, both in Ireland and elsewhere. These events foster lower intensity participation, in a non-competitive and fun environment. They have the potential for public health action, in moving people to trial physical activity, usually in a spirit of social participation with their friends (Bauman, Murphy and Lane, 2009).

There is no quick fix for physical activity promotion at the population level. It requires a multitude of strategies, including individual advice, the availability of structured and unstructured programmes, and the facilitation of supportive physical and social environments in which to be active (Cavill, Kahlmeier and Racioppi, 2006). Given their population reach, mass sporting and physical activity events within the community have considerable potential as levers to encourage people to trial physical activity.

What is not known, however, is whether people who take part in an event do so as a 'once-off', or whether the event can be a trigger to longer term, sustained physical activity habits amongst participants. This project was undertaken to understand the profile of those taking part in a mass event, and to track their post-event activity. **The events investigated were targeted at women only:-the 2007 and 2008 Flora Women's Mini Marathon in Dublin, and the 2008 Evening Echo event in Cork.** Women in Ireland tend to be less active than men at every age (Morgan et al, 2008). Indeed, an Irish male (average age 44) is 2.64 times more likely to play sport than an Irish female of similar age (Lunn, 2007a). Whilst some women who took part in these events were already sufficiently active, there was a significant group of women who were motivated to become more active than they normally were for the duration leading up to the event only and a further sub group who failed to engage in any increased activity; it is these latter groups of women who are of particular interest in this research.

This report describes a series of initiatives which were undertaken to try and boost activity amongst inactive women, or women who had become inactive after the Mini Marathon. The report focuses on the key lessons for all those people interested in helping the population become more active, including Local Sports Partnerships (LSP), the Irish Sports Council (ISC), the Health Service Executive (HSE), and event organisers. It suggests practical ways in which we might maximise the potential of events to help people become more active.

There are five parts to the report:

1. What was the profile of event participants and how active were they?
2. What happened to the physical activity levels of participants 2 to 3 months after the event?
3. What can we learn about the characteristics of physical activity relapsers?

4. Can the physical activity levels of these relapsers be boosted if we;
 - a. Make contact and give them some visual information about being active? (Randomised Control Trial (RCT))
 - b. Make contact, give them visual information and aids to be active, and link them to local physical activity initiatives in their community? (Community Based RCT)

5. What are the practical steps which need to be taken by event organisers, and physical activity professionals to best engage non-active women? We present key lessons from the research, and practical tools for future practice.

For clarity, Tables and detailed results are presented in the Appendices at the end of the report.

Method: How did we measure the impact of the events?

Our primary focus was on the value of mass events in encouraging physical activity in women, and whether this activity was maintained several months after the event was over. There are other potential impacts of events, such as enhancing national sporting culture, and these are described more completely elsewhere (Murphy and Bauman, 2007), but are not considered in the current research.

For the Dublin events, we contacted all entrants to the Mini Marathon, in 2007 and 2008 and asked them to complete a questionnaire, either online or by mail, within weeks of participating in the event. Women who registered online were sent a link to the questionnaire by email. For the Cork Mini Marathon postal detail was not available prior to the race so questionnaires were disseminated on the day of the event. Mode of data collection and detail of undeliverables are visible in *Table 1 in Appendix 1*. Altogether, over 21,500 questionnaires were completed by women participating in the three events assessed in this study, and the response rates are displayed in *Table 2 in Appendix 1*.

The questionnaire used in all events was designed by the research team in WIT and incorporated a variety of tools, all of which have been previously validated (Appendix 2). Physical activity was measured using the International Physical Activity Questionnaire (IPAQ, 2004) and participants were categorised as high, moderate or low active based on their reported physical activity levels. We also measured other constructs of relevance to physical activity behaviour like self efficacy, readiness for change and beliefs about physical activity.

Part 1

Were this group of women representative of the Irish female population?

Approximately half of the respondents in both of the Dublin events were from Dublin, half were aged between 30 and 49 years, and one third were less than 30 years. Two thirds of the total sample lived in a city or town, and a third in a village or isolated location. To attempt some measure of social class, participants were asked about their level of schooling and medical card status. More event participants were tertiary educated, fewer were medical card holders, more were married and more were classified as 'white Irish' than is the case in the overall population (*Table 3, Appendix 1*). Online respondents had higher levels of education, were younger and were less likely to have a medical card or children than those who completed postal questionnaires. Only 1% of total respondents to the 2007 survey were members of Meet and Train groups, who were targeted specifically by the researchers.

Why did women take part in these events?

On average, approximately 40% of the women across the three events were taking part for the first time, and all others were repeat participants. Annual events such as the Mini Marathon obviously capture the long term interest of participants and people habitually return for more. This may be because the greatest driver for women appears to be an altruistic one. Over 70% of the women across all three events cited raising money for charity as their main reason for participating in the event. Other reasons for participating included as a motivator for activity (30%), and as a personal challenge (33%).

Were these women already dedicated habitual exercisers?

What is most encouraging about the profile of the participants in these events is that the events attract more than just the dedicated habitual exerciser. Just under half of the women in the events intended to walk, or mainly walk the route and an additional third intended to walk and jog. Intention to run was highest in those who had participated in the events between two and five times previously, and amongst younger compared with older participants; these were statistically significant findings. The majority of women in the Dublin event (almost 85%) started to do some training in the weeks and months before the event, again indicating the usefulness of the event as a spur to action. About a third of the women in the Cork event said they did not undertake training before participating.

Where and how did people train for these events?

A large majority of respondents trained in the streets and roads around where they lived (75%) with some mixing this with training in a local green area near where they work and, to a lesser extent, with a local gym/leisure centre. Indeed, only 11% cited the latter as a training location. Interestingly, training in streets and roads around where respondents lived was the most popular training location irrespective of where the respondent resided (city, town, village etc). Training in local green areas and in gym/leisure centres was approximately twice as common among people residing in cities compared to those living in villages and isolated locations (2007 Dublin survey only). It was also apparent that those who trained with a group of

people were less likely to walk the Mini Marathon and also reported greater levels of training, suggesting people who train in groups may undertake higher amounts of physical activity, at a greater intensity.

How active were Mini Marathon participants?

The National Physical Activity Guidelines for Ireland state that adults should engage in at least 30 minutes of moderate intensity physical activity on most (5) days a week (www.getirelandactive.ie). In this study, the 'moderately active' group achieved these guidelines, and the 'low active' category fell short of the recommended amount. The 'high active' group also met the above guidelines and engaged in the equivalent of an hour per day of moderate intensity activity. Between 75% (2007) and 82% (2008) of participants did meet these minimum physical activity requirements¹ (see Figure 1, Appendix 1).

¹Bauman et al. (2009) noted that although 'high active' equates to more than the minimum requirements for physical activity, it is more suitable to use as an indicator of sufficiently active than 'high and moderate active', primarily because IPAQ uses multiple domains in its assessment of physical activity. This would infer that a greater proportion of participants in the Mini Marathon (56-64%) and SLÁN (84%) survey do not meet minimum physical activity requirements than those indicated above (Figure 1, Appendix 1).

How did the physical activity levels of event participants compare to the general Irish population?

The latest population data shows that 31% of the Irish female population are 'low active' and do not meet the national physical activity guidelines (Morgan et al., 2008); a lower proportion (18-25%) of event participants in this study were similarly insufficiently active¹. This could be explained in part by the large proportion of tertiary educated women in the event relative to the general population. It has been previously observed in Ireland that physical activity levels and sport participation are considerably lower among the less well educated and those earning a low income (Lunn and Layte, 2008) compared to more affluent individuals with tertiary education.

Were some groups of women more active than others?

Women with children reported significantly higher amounts of total physical activity in both Dublin events than women who did not have children, mainly because they did more moderate intensity activity and walking. Participation was more equal in the Cork event where women without children participated in significantly greater amounts of vigorous activity. Moderate levels of activity were consistently higher among those who were tertiary educated in all events and overall, a greater percentage of women in the higher educated groups met minimum guidelines for physical activity than their less well educated counterparts. As noted earlier, participants in all three events reported considerably higher levels of education and lower ownership of medical cards than the general Irish female population suggesting that these events attracted the more affluent, middle and higher class Irish female. It is well recognised that there is a significant social class gradient in physical activity and sports participation in Ireland (Lunn, 2007b). A one-off sporting event is unlikely, and did not prove, to be a significant stimulus to action for these hard to reach groups. It suggests that further efforts need to be undertaken by event organisers to target this priority group.

How confident were participants in their ability to be active?

Self efficacy, i.e. confidence in one's own ability to be active even when barriers are present, was generally higher in the most active compared to the least active women (see *Table 4, Appendix 1*). In this research, Meet and Train group respondents were more confident than individual respondents in their ability to be active when stressed, when the weather was bad and when family demanded a lot of time; an indication that self efficacy was greatest amongst women who trained in groups. The main premise behind training in groups is that it fosters social support and greater self efficacy for physical activity; both predictors of physical activity (Lewis et al., 2002). Group based activities and programmes are widely used in interventions to increase physical activity in women.



Part 2

Who responded to the follow up surveys?

In 2007 we contacted those women who agreed to be followed up 2 months, and 6 months after the event. Because the 2 and 6 month data yielded similar results, we followed up only once in 2008 in Dublin and Cork (3 months after the event) and only these short term results are presented here. Short term response rates were relatively high and consistent across all three events (*Table 5, Appendix 1*). In total, across all 3 events, nearly 7,700 women were followed up post-event (*Table 6, Appendix 1*). Matched participants were largely similar to the total baseline group, in all events. The only consistent difference between groups was apparent in education level; there was a higher proportion of tertiary educated respondents in the matched group (*Table 7, Appendix 1*).

Did women remain active several months after taking part in the Mini Marathon events?

In the Dublin 2007 event, there was little variation in 'low active' between baseline and follow up, a slight decrease in 'moderately active' and a similar increase in 'high active'; among the matched participants. In contrast, there was an increase in 'low active' 3 months post baseline in both 2008 cohorts. This was complimented by a decrease in 'moderately active' and little variation in 'high active' (*Figure 2, Appendix 1*). As noted previously, respondents categorised as 'low active' were not meeting minimum physical activity requirements.

There was a significant increase in sedentary behaviour between baseline and follow up (*Table 8, Appendix 1* – measured in 2008 only). Sitting time and watching television was greatest among the least active respondents.

Part 3

Further analysis on the group of most public health interest – physical activity relapsers

As noted above, the 2/3 month period post event appears a good indicator of the effect on physical activity, if any, following participation in the event. It appears that this is an important and useful time for organisers or health/sport agencies to engage with participants and instigate sustained behaviour change beyond this point. From a public health point of view, it is important that physical activity is undertaken on a regular basis and over a sustained period of time to achieve health benefits. Not all individuals are ever or consistently sufficiently active, therefore it is those people who did not at any stage meet national physical activity guidelines, or who relapsed to below the minimum requirements (relapsers) that demand even greater attention. The latter group in particular are pertinent in this report as participation in the Mini Marathon induced increased activity levels but this was not maintained post event. It is of interest to try and highlight the characteristics which best predict women who are most likely to relapse. Such information may help us to better target our efforts to keep these 'at-risk' women active.

Physical activity relapse was defined as a decrease in reported physical activity by at least 240 MET-Mins per week (60 minutes of at least moderate intensity activity). Bauman, Ford and Armstrong (2001) estimated that a change of this magnitude in self reported physical activity is likely to be greater than the measurement error that is apparent in repeated measures, and therefore likely to be a real decline. Some individuals, despite a decrease of physical activity minutes, may still meet minimum physical activity requirements. Therefore relapse was additionally defined as being categorised as 'low active' at follow up, using IPAQ data; and therefore not achieving minimum 'sufficient activity' levels. Previous commentary (Williams et al., 2008; Luszczynska and Sutton, 2006; Sullum, Clark and King, 2000) defined relapse as meeting physical activity guidelines at baseline but failing to do so at follow up. Further detail on the statistical procedures undertaken to analyse the predictors of relapse are in *Appendix 3*.

Table 9 (Appendix 1) displays the numbers of people classified as relapsers in each of the 3 events. There was consistency across the 3 events; 11.4% of the Dublin 2007 event, 11% of the 2008 equivalent and 14.4% of the Cork 2008 Mini Marathon participants were deemed to relapse by at least 240 MET-Mins per week and to low active. If relapse is categorised only as a decrease in the frequency and intensity of engagement in physical activity then, there is an approximate 40% relapse rate in all events at short term follow up.

What factors predicted relapse in women?

In the Dublin 2007 and 2008 groups a number of notable predictors of relapse were uncovered. Unlike the Dublin analysis, no significant or noteworthy predictors of relapse were apparent in the Cork event, most likely due to the small sample of relapsers (n = 49).

The following were the predictors of relapse identified in the Dublin events:

- 1. Walking the event.** In both Dublin events walkers were 1.5-2.0 times more likely to relapse. This is quite significant considering almost three quarters of participants intended to walk these events.

2. Place of residence. Living in an urban area was associated with a decreased risk of relapse. Areas with sidewalks, shops nearby and local transport stops, more common in urban areas, are linked with higher physical activity worldwide (Sallis et al, 2009).

3. Education level. In the 2007 Dublin event, reporting no tertiary education was related to an approximate 50% increased risk of relapse.

4. BMI. In the 2008 Dublin event, a lower BMI score (a one unit decrease) was related to a 13% reduced risk of relapse. Overall, relapsers were more likely to be overweight or obese than non relapsers.

5. Self efficacy, social support, and perceived physical environment. In both Dublin events, each one unit increase in self efficacy was accompanied by a 9% decreased risk of relapse; this is a relatively consistent predictor of relapse in other studies (Sullum, Clark and King 2000; Levy and Cardinal 2006). In the 2008 Dublin event, each single improvement in social support and physical environment was associated with a 5% and 10% reduced risk of relapse. Also, participants who believed they could be active when the weather was bad had a considerably reduced risk of relapse (*Table 10, Appendix 1*).

Part 4

a. Did we increase the physical activity levels of relapsers when we contacted them, and provided them with physical activity related information?

Results of a print based randomised controlled trial.

All relapsers (n = 414) in the Dublin 2007 event were contacted to participate in a trial and were randomly allocated to an intervention (n = 207) or control (n = 207) group. In total, 40% of the intervention group (n = 85) and 44% of the control group (n = 91), consented to participate. These women were slightly older ($p < 0.05$), and more likely to have children and to have run (rather than walked) the Mini Marathon than those who did not wish to participate in the trial ($p > 0.05$). Of the women who took part, 84% were aged between 21 and 49, just over half were married, 47% had children and 75% had received some or complete post secondary education; considerably higher than the general Irish female population

We measured physical activity using validated questions, which have been used frequently in population-level physical activity interventions and which have shown sufficient measurement stability in test-retest analysis (AIHW, 2003). Those reporting no physical activity were deemed 'sedentary'; people doing at least 150 minutes over at least five sessions were classified as 'sufficiently active' for health, and all others doing some activity but not enough to meet minimum physical activity requirements were categorised as 'insufficiently active'. These categories differ in name alone to those used in the overall Mini Marathon surveys (high, moderate and low active). We also measured readiness to change (Marcus et al, 1992), self efficacy (Marcus and Owen, 1992) social support, and barriers to activity (Sallis et al, 1987; 1989).

A logo and name was created for the intervention ('LEGit – Let's Exercise Girls'), which consisted of two print booklets (*Appendix 6*). These were specific to initial and later stages of motivational readiness and adapted for Irish women from materials previously used to promote physical activity (Marshall et al, 2003; 2004, see *Appendix 4* for more detail). A 'placebo treatment' was delivered to the control group who were mailed a healthy eating and nutrition booklet developed by the Irish Heart Foundation, An Bord Bia and the Health Promotion Unit. We contacted the women after 3 weeks and again after 6 weeks. Response rates are described in *Appendix 4*.

Although this sample were identified as relapsers, six months after their participation in the 2007 Mini Marathon, approximately half of the group were subsequently deemed sufficiently active in the baseline questionnaire of this study. This was likely due to the timing of this trial when participants were starting to re-focus on the next year's Mini Marathon event and had re-adopted some physical activity (over 60% of Mini Marathon participants are repeat participants).

Physical activity increased over the 6 weeks in both the intervention and control groups and there was also a significant increase in the number of respondents meeting minimum physical activity guidelines. The greatest

increases in physical activity were apparent in the insufficiently active groups (*Table 11 and 12, Appendix 1*). Since the control group materials were nutritional, it should not have influenced physical activity directly, but may have catalysed them into some thinking about health, and physical activity was then cued. Even this minimal contact may be useful to remind women to re-initiate physical activity behaviour.

This increase in physical activity, which was most apparent among the least active, is a positive outcome, irrespective of its origin and suggests that minimal contact may be sufficient in instigating improvements in physical activity among this previously inactive sub group. This pilot study shows that it is feasible to build on the initial impact of mass physical activity events while also offering suggestions for future investigations of these relapsing population samples; including larger, community based trials, leading into different seasons, and using more differentiated doses of intervention between groups.

b. Did we increase the physical activity of women by contacting them, giving them tailored information and aids to be active, and linking them to local initiatives in their community?

Results of a community based randomised controlled trial

One of the guiding principles of this study was to consider strategies to help boost women's physical activity that could be delivered in real-life settings, using existing resources. Therefore we linked with the LSP's countrywide. The LSP's or their equivalent where no LSP was in existence, were informed about the study and co-operated, with the assistance of some phone contact and reminders, in the design of tailored information for participants in the intervention group. This randomised controlled trial was administered in two phases 4 months post the 2008 events. Phase 1 of the intervention began in October (following the Dublin event) while Phase 2 (following the Cork event) commenced in February, presenting an opportunity to undertake a seasonal and regional comparison.

A total sample of $n = 402$ ($n = 311$, Dublin, $n = 91$, Cork) were recruited to participate in the trial, $n = 268$ were relapsers ($n = 221$, Dublin, $n = 47$ Cork) and $n = 134$ were low active at baseline and follow up ($n = 90$, Dublin, $n = 44$, Cork). Participants were grouped into their local county/Local Sports Partnership/geographical region. A cluster randomised trial, which recruits and incorporates groups of people with some similar characteristics as units in its research rather than individuals, was best suited to this design to prevent contamination between individuals within their respective region. Relevant LSP's, based on participants' address details, were matched into pairs based on the number of relapsers in their area, the length of time the LSP had been in operation and geographical location. One LSP from each pair was then randomly allocated into either the intervention or control group using random numbers. More detail is available in Appendix 5 on the randomisation procedures and on the response rates at different time points during the trial.

Each participant ($n = 193$) in the intervention group was mailed an information pack containing details of relevant events in their LSP or its equivalent, a print booklet matched to their readiness to change, a free

entry form for a 5k run scheduled for 5 weeks post baseline along with a training plan (Phase 1 only), details of local events (Phase 2 only) and a letter outlining the content and operation of the trial. After 7 weeks they were sent a pedometer, with a self monitoring booklet (*Appendix 6*). Each participant (n = 209) in the control group was mailed a healthy eating leaflet as well as a letter explaining that they had been chosen in the control group and would be mailed the information pack at the end of the trial.

The intervention and control group were similar on all baseline measures. At follow up, n = 125 (64.8%) of the intervention group and n = 159 (76.1%) of the control group returned completed questionnaires. The only notable difference between those who did, and those who did not return follow up materials was that follow up participants were much more likely to have trained continuously prior to their participation in the Mini Marathon.

We asked participants about their knowledge of the LSP's and usage of local facilities (see *Table 13, Appendix 1*). Although only 7% of respondents indicated that they contacted their LSP, 79% indicated that the intervention increased their awareness of this local vehicle to promote physical activity. Over two thirds stated that they were not familiar with LSP's prior to the intervention, which suggests a value in raising awareness amongst the public of the important role played by this community organisation. Surprisingly few women took part in Meet and Train groups (5.4%).

At final measurement, participants were asked if they felt their activity levels had altered due to the intervention. More than 50% of the intervention participants compared to 30% of their counterparts in the control group felt they were more active than prior to the study period. For measured physical activity, a greater proportion of the intervention group were sufficiently active (according to IPAQ categories) at follow up than the control group (62.5% v 50.3%). Also, the intervention group demonstrated a greater decrease in sitting time than the control group and there was no difference in the change in TV viewing time (*Table 14, Appendix 1*).

The intervention group reported a significantly higher recall and use of booklets compared to the control group. Overall, pedometers appeared to be the favourite aspect of the intervention for the women. Approximately a quarter of participants in the intervention group said that they used the training plan and attended exercise classes over the intervention period. This did lead to positive changes in physical activity, including a 35 minute increase in total physical activity in the intervention group. A similar change was noted in the control group. Walking showed the greatest change (approximately 12 minutes) between baseline and follow up in both groups while vigorous intensity activity also increased significantly, in the intervention group only (*Table 14, Appendix 1*). This is a hugely positive finding as the benefits of physical activity are boosted as intensity of activity increases (www.getirelandactive.ie).

At baseline, approximately 33% of the overall group disagreed that their environment was conducive to physical activity. At follow up, fewer than 10% stated that it was difficult to be active in their local area,

illustrating a positive change in perceived environment; there was no difference between the intervention and control group. There was no apparent seasonal or geographical effect; no differences were apparent between Dublin and Cork in the overall changes in physical activity and sedentary behaviour.

Who participated in the trial and how did they react?

Women with children, without tertiary education and who were not first time participants were more likely to participate in this trial ($p < 0.05$). Furthermore, there was a higher proportion of older women, married women, overweight/obese women, walkers and women with medical cards among participants compared to non participants, which is reflective of their 'low active' status. This intervention evidently held appeal for these various sub groups of women and observed overall increases in physical activity and decreases in sitting time can be viewed as even more beneficial and valuable, particularly from a public health perspective.

At baseline, rural women engaged in significantly less physical activity than their counterparts living in urban areas. Post intervention, however, rural women displayed an almost 20 minute greater increase in physical activity, although urban women remained more active. Participants in the intervention group who did not have tertiary education had a significantly greater increase in physical activity than those who did have some or complete college education; this trend was also apparent in the control group but may be due to lower participation among these participants at baseline. Overall however, women with lower reported education levels in the intervention group engaged in more physical activity at follow up than their counterparts in the control group. This is an important finding for two reasons. Firstly, it is very difficult to engage lower socioeconomic groups in physical activity and secondly, many studies show that physical activity and sport participation decreases from the highest to the lowest social class groups (Morgan et al, 2008; Lunn and Layte, 2008).

How much did the intervention cost?

We investigated the cost of the intervention and specifically the cost of each minute increase in physical activity. A summary of the inventory of costs, including personnel, intervention development, material, packaging, printing and posting costs is presented in *Table 16, Appendix 1*. An aggregate sum of costs per week per participants divided by the change in physical activity revealed that it cost 18 cent to attain a one minute improvement in physical activity. Ten and 14 cent per minute costs to improve physical activity were identified for women with no tertiary education and those living in rural areas, respectively. These are hugely significant findings for those charged with promoting physical activity in Ireland.

What are the take home messages from this trial?

- There was no between group difference in changes in physical activity in this research (i.e. there was not a statistically significant difference between the intervention and the control group as a result of the trial). This suggests that even non-exercise specific attention or contact caused this predominantly previously inactive cohort of participants to improve their physical activity. Nonetheless, the improvement in vigorous intensity activity, the decrease in sitting time and the reported use of the various strategies in

the intervention group was good, and offers encouragement that such minimal contact strategies hold promise in the promotion of physical activity.

- Favourable recruitment patterns and changes in behaviour among high priority sub groups was an extremely positive finding and should be considered by policy makers in efforts to promote physical activity among these population groups.
- Receipt and recall of the intervention was high. Of note is that approximately 90% of participants recalled receiving intervention materials; this increased to 98% in relation to the pedometer.
- There was disappointingly low contact with many of the existing physical activity supports in communities, including Meet and Train groups, LSP's, leisure centres and walking/cycling clubs. This would indicate that minimal communication may not be sufficient to stimulate engagement.
- Just under half of the participants used local walking routes while two thirds used the pedometers that were delivered to them after six weeks of the intervention. These latter statistics indicate that walking was perhaps the most feasible and accessible form of physical activity for the participants in this trial, unsurprising considering walking is the most common form of physical activity in Ireland, and worldwide.
- The lack of an intervention effect prevented a true cost effectiveness analysis but analysis revealed that for less than 18 cent per person, improvements in physical activity may be facilitated among the female population overall and in high priority sub groups using the strategies undertaken in this research.

Part 5

Key lessons from this research

Mass events have the potential to engage women who are not ordinarily active. The event itself is a prompt to get active. However, the impetus to be active declines over time; there was an increase in the 'low active' category of women three months post baseline in both 2008 cohorts. However, as we have shown here, with some careful planning, and using existing resources, it is possible to re-engage those women whose activity levels fall off. The following are some points to note.

1. It is likely to benefit policy makers to facilitate and encourage interaction with event organisers to use the opportunity provided by events to promote the physical activity message. Short term involvement in events, often motivated by altruistic, social or personal reasons, can be translated into long term behaviour change. *Factsheet 1* can help support this process of engagement.
2. There is value for all those involved in health, sport and physical activity promotion in evaluating the impact of interventions and programmes on physical activity and health. This can be done without major investment by stakeholders when agencies co-operate and share resources. *Factsheet 2* includes basic tools which can be used to evaluate programmes in a simple, cost effective manner.
3. Charity agencies could be helped to provide physical activity support to their fund raisers:-they are untapped potential physical activity change agents. There is a mutual benefit in this; women who progress to higher levels of physical activity are more likely to participate in events again, and fundraise again. Recommendations for offering advice and referral to other agencies who can help promote physical activity are on *Factsheet 1*.
4. Training in a group enhances adherence and helps women move to higher levels of activity. Recent developments as part of the ISC's Women in Sport initiative and through the Athletic Association of Ireland's Fit4Life scheme have begun to increase the capacity-building process in this regard. Additional recommendations to enhance this initiative are presented here in *Factsheet 3*.
5. The community based randomised controlled trial demonstrated that rural women benefitted from the intervention more than urban women. Post intervention, rural women displayed an almost 20 minute greater increase in physical activity than urban women, although urban women started, and remained, more active. This was also the case for women who did not have tertiary education; they had a greater increase in physical activity than women who were tertiary level educated. This is a valuable finding-that 'hard to reach' groups can be prompted to change behaviour through a low cost intervention of this type (*Factsheet 4*).
6. To make a stronger case for investment in physical activity promotion, we need to demonstrate that it is good value for money. We suggest a template for health and sport professionals to gather and use this information to lever investment in their activities (*Factsheet 5*).

Factsheet 1

Five tips on how policy makers could assist event organisers and charities in engaging with the health sector to help promote the physical activity message.

- When participants register and receive their entry pack, consider including some physical activity material or links to good physical activity resources. A link to the National Physical Activity Guidelines website provides information about safe and effective exercise for all, and provides further links to other useful resources (<http://www.getirelandactive.ie>). Another good website is <http://www.greatactivity.org>, which encourages people to get involved in an event and provides training programmes and practical advice. Information about Fit4Life and Meet and Train groups is also available on www.athleticsireland.ie.
- Ensure that charities and event organisers are using the same physical activity message and brand/logos. It may be possible to include this logo on promotional materials.
- Link with the Local Sports Partnership in your area. They may have lists of groups to whom you could target your event, and could provide you with advice on how to make your event attractive to the greatest number of people possible. Contact details are available online at http://www.irishsportsCouncil.ie/Participation/Local_Sports_Partnerships/LSP_Contacts/
- Providing a series of lead-in events can help people use the event as a goal, but gives them small steps to reach that goal. Having follow-on opportunities for people to stay motivated and active is also a good idea, and can help increase your participant numbers in subsequent years. These may not be timed events, but could be just a group walk or run in a local park. Adding a social element, such as a cup of tea afterwards will increase attractiveness.
- Engage the local media in the event with regular prompts to action for people. For example, follow the training progress of a local participant, undertake challenges with free race entry as a prize, or profile local 'Meet and Train' groups.

Factsheet 2:

Gathering information on your target audience

• It is easiest to gather this information at registration. You could add questions to your application form (see examples of questions below), or if using on-line entry, add a link to an on-line survey instrument, like SurveyMonkey (www.surveymonkey.com). It is quite easy to build a survey and it is free with a survey which has less than 100 responses. A yearly subscription costs 200 US dollars and allows unlimited responses and unlimited surveys. There is no data entry work and simple descriptive data is automatically generated. If you are using hard copy entry forms there is a bit of work in entering and analysing data.

• Think about the questions you want to ask. Consider seeking help on this from a local third level research group. It is useful to understand who your clients are so you can target events to best meet their needs. You might ask their age, whether they are regular event participants and what their motive is for taking part. A scale of answer choices is best. Keep the questions to a minimum, with short answers.

• Event and demographic questions could include:

1. Have you taken part in this event in previous years?

No, this is my first time Yes, 6-9 times
Yes, once before Yes, 10 or more times
Yes, 2-5 times

2. How do you expect to complete the event?

I expect to walk or mostly walk
I expect to walk and run/jog
I expect to run/jog or mostly run/jog
I expect to run

3. Why are you participating in this event? (Tick all that apply)

To raise money for charity
Because a friend/group of friends asked me to
As a personal challenge
For a day out
It motivates me to be active
Other _____

4. How would you describe your training/preparation for this event?

- I train continuously most of the time
- I have been training for several months before the event
- I started training in the last month before the event
- I am not training for the event

5. What age category are you in?

- < 20 years 50-59 years
- 21-29 years 60-69 years
- 30-39 years > 70 years
- 40-49 years

• Social class is a difficult construct to measure quickly and the census uses a lot of detailed questions to assess it. Although not a perfect tool, we used questions on educational status and eligibility for a medical card. The question we used on ethnicity is from the SLAN survey, for comparability purposes.

6. Are you covered by a medical card?

- Yes – full medical card
- Yes – GP medical card only
- No

7. What level of education have you received?

- No schooling or primary education only
- Some secondary education
- Complete secondary education
- Some or complete third level education

8. What is your ethnic or cultural background?

- White Irish Asian or Asian Irish
- Irish Traveller Chinese
- Black or Black Irish Any other Asian background
- African Other including mixed background
- Any other Black background

• There are several options for asking people about their physical activity levels. With large populations, the International Physical Activity Questionnaire (IPAQ) is useful and you can compare your participants with the overall Irish population. If you are following a group over time, an instrument like the Active Australia questionnaire is better. Both are shown here. A link to a web page containing these instruments will shortly be available on the Irish Sports Council webpage.

IPAQ

Think about all the **vigorous** activities that you did in the last 7 days. Vigorous physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the last 7 days, did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?

Yes No

2. On how many days did you do vigorous activities in the past 7 days?

No. of Days _____

3. How much time did you usually spend doing vigorous physical activities on one of those days?

Hours _____ Minutes _____

Think about all the moderate activities that you did in the last 7 days. Moderate activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

4. During the last 7 days, did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

Yes No

5. On how many days did you do moderate activities in the past 7 days?

No. of Days _____

6. How much time did you usually spend doing moderate physical activities on one of those days?

Hours _____ Minutes _____

Think about the time you spent walking in the last 7 days. This includes at work and at home, walking to travel from place to place, and any other walking that you might do solely for recreation, sport, exercise, or leisure.

7. During the last 7 days, did you walk for at least 10 minutes at a time?

Yes No

8. On how many days did you walk for at least 10 minutes in the past 7 days?

No. of Days _____

9. How much time did you usually spend walking on one of those days?

Hours _____ Minutes _____

Active Australia

The following questions are about any physical activities you have done in the past week.

1. In the past week, how many times have you walked continuously, for at least 10 minutes, for recreation, exercise or to get from place to place?

_____ No. of times

2. What do you estimate was the total time that you spent walking in this way in the last week?

In hours and minutes

Hours _____ Minutes _____

3. In the last week, how many times did you do any vigorous gardening or heavy work around the yard, which made you breathe harder or puff or pant?

_____ No. of times

4. What do you estimate was the total time that you spent doing vigorous gardening or heavy work around the yard in the last week?

In hours and minutes

Hours _____ Minutes _____

The next question excludes housework and gardening:

5. In the last week, how many times did you do any vigorous physical activity, which made you breathe harder or puff or pant? (e.g. jogging, cycling, aerobics)

_____ No. of times

6. What do you estimate was the total time that you spent doing vigorous physical activity in the last week?

In hours and minutes

Hours _____ Minutes _____

7. In the last week, how many times did you do any other more moderate physical activities that you have not already mentioned? (e.g. gentle swimming, social tennis, golf)

_____ No. of times

8. What do you estimate was the total time that you spent doing these activities in the last week?

In hours and minutes

Hours _____ Minutes _____

♦ You may also wish to measure sedentary behaviour:

1. How much time do you usually spend sitting on a typical day?

Hours _____ Minutes _____

♦ You may wish to follow up participants post-event, perhaps to check on satisfaction levels with the event. You need to ask people's permission in order to do this, and should include a piece such as that below. If you want to match up people's original response with this follow up response you will need to also include an identifier, such as mother's maiden name:

We would like to follow up participants to help us improve this event in future. If you would be willing to help us with this follow up, please enter a contact name and address below Or, if you would prefer to be contacted by email, please enter your email address (Please Print Details). Also, can you please detail your mother's maiden surname and day of your birthday as an identifier for future surveys.

♦ It is also possible to include questions on many other factors, for example on what kinds of events or initiatives people would like in order to get them more active, on whether they would like to join and club and what the barriers are to doing this, or on sports injuries. Always try to use short, tick box questions with a scale of possible answers.

Factsheet 3:

Promoting Meet and Train groups

- When people walk or run as part of a group, they are more likely to stay active, and they are more likely to progress towards higher levels of physical activity. The Athletics Association of Ireland (AAI) helps support Meet and Train groups countrywide through the Fit4Life programme. The programme is suitable for beginners through to regular runners, and the emphasis is on meeting with people of a similar ability on a regular basis to walk or run. The AAI have started to train Fit4Life leaders to organise local groups. Details of the Fit4Life groups, supporting training programmes, and how to set up a group can be found on http://www.athleticsireland.ie/content/?page_id=3156.
- There are opportunities to take part in leagues and events wherever you live. A blogspot which provides a good link between groups countrywide is <http://womensmeetandtrain.blogspot.com/>
- You could form a group at work and walk or jog at lunchtime, or form an informal group amongst neighbours or friends. The web links listed in Factsheet 1 can help you find the resources you might find useful to progress your training. Also, you can find new routes to run and walk on www.walkjogrun.net
- If you are trying to recruit people to join your group, be innovative! As well as notice boards in leisure centres etc, you could put a notice in the parish newsletter or the church or in children's lunchboxes through schools, and in post offices and libraries. Or organise a dog walking group and put a notice in your local vets' surgery.
- Having a goal makes training more fun and focused. This can be an event, or a fundraising activity, or a treat of a night away! Sometimes it can be motivational to get feedback about how active you are, and pedometers are a low cost, easy way to do this. For examples of how to use pedometers for your group, and where to buy one, go to www.ebay.ie or <http://www.youthsportdirect.org/>

Factsheet 4:

Tips for sports/physical activity promoting agencies including Local Sports Partnerships

1. Communication: Three quarters of this sample were not aware of LSP's prior to the study but simple communication led to a similar proportion becoming cognisant of this local entity at follow up, high recall rates and favourable changes in high intensity activity and sedentary behaviour. LSP's engage in hugely beneficial practices, including the development of newsletters and websites, and the provision of events and programmes designed to directly increase physical activity. It is essential that these efforts are communicated to individuals in their locality to instigate similar beneficial changes.

2. Dissemination of information: Generating databases of individuals' names and contact details as well as their activity status and preferences for activity can assist in the overall communication of the workings of the LSP. At any opportunity, gather these contact details and ask simple questions like the one underneath to assist the provision of more tailored information to the target group of interest. This undertaking will simultaneously assist the targeting of high priority groups; a core function of LSP's

**Which statement best describes your current physical activity, and your intentions to be active?
(Regular physical activity means undertaking a half an hour of at least moderate physical activity on most days of the week)**

I am not regularly physically active and do not intend to be so in the next six months

I am not regularly physically active but am thinking about starting to do so in the next six months

I do some physical activity but not enough to meet the description of regular physical activity

I am regularly physically active but only began in the last six months

I am regularly physically active and have been so for longer than six months

3. Evaluation: Although some evaluation is undertaken by LSP's, a more concerted effort is required. Asking some basic questions before and after events (*Factsheet 2*) can provide some assessment of a particular initiative and merits for/against its replication. Evidence of success can assist funding applications and wider dissemination of the programme in question while evidence otherwise can inform better future allocation of funds. Evaluation can also contribute to the aforementioned database.

4. Motives for participation: LSP's are charged with promoting physical activity among hard to reach, at risk groups and thus must consider the specific needs of these cohorts. Strategies identified earlier will assist this but it is also important to remember that motives for participating in activity may be quite different among these sub groups than the general population and already active individuals. For example, there is a link between participation and the benevolent nature and altruism of Irish communities that may merit further exploitation. Also, physical activity, may benefit from the adoption of a 'trojan horse' approach where physical activity is packaged as something more than a health requirement and a difficult, unpleasant experience but rather an enjoyable, worthy venture

5. Additional suggestions for physical activity promotion:

- ♦ Provision of (more) information about opportunities to be active is warranted. Such information can be acquired from the Irish Heart Foundation, Irish Sports Council and Coillte websites, as well as local tourism sites, heritage sites, commercial 'What's On' guides and from Athletic Association of Ireland walking and training groups. LSP's should avail of information that is already available and use their individual vehicles of communication to inform where and how to avail of this detail.
- ♦ The provision of pedometers is another useful endeavour. These can be purchased cheaper in bulk and are a simple motivational tool to prompt activity. Providing additional information about how and when to use the pedometer is also worthwhile.
- ♦ More physical activity events at a regional level should be promoted and supported. It is unlikely that LSP's have time to organise these initiatives but instead could advocate their development by local running/walking groups and clubs, charity organisations or community groups.
- ♦ Greater or more cohesive partnerships could be fostered between all relevant health and sport promoting agencies in and between particular regions. Suggestions offered here could be disseminated to and adopted by all groups to facilitate a more collaborative, sustained effort to promote one common physical activity message. The development of Irish guidelines for physical activity (www.getirelandactive.ie) should assist this process.

Factsheet 5: Basic Cost Assessment

• Firstly, to facilitate a cost assessment of a particular endeavour to promote physical activity, its impact on physical activity must be quantified. This can be achieved by asking some simple questions prior to and following the initiative in question. Examples of and information about these is provided underneath and is also available from the following source:

The UK Health Promotion and Health Economics Forum. Moving from evaluation into economic evaluation: a health economics guide for health improvement programmes. Welsh Assembly Government, 2007.

• Secondly, a detailed inventory of all costs associated with the strategy in question must be recorded. These include person hours as well as administration, postage and programme costs. Person hours can contain time spent doing the following; developing the idea, in meetings about the idea, generating databases, data entry and analysis, photocopying, phone calls, emailing, devising programme content and packing envelopes. Administration costs can include costs of phone calls, paper, labels, envelopes, subscription to online data collection and photocopies. Postage refers to all costs associated with mail shots, questionnaire dissemination, reminder letters etc. Finally, programme costs includes purchase or hire of any specific equipment such as pedometers, hiring facilities or community centres, specialists to deliver the programme, provision of tea/coffee and transport expenses. These lists are not exhaustive but should suggest how important it is to record all costs, however minor they may appear, to conduct an accurate cost assessment.

• The collection of information on the impact and cost of the programme will facilitate the following:

• Calculate the net change in physical activity in minutes,

• Calculate the total cost of the programme,

• Divide the total cost by the number of participants in the programme (just those who completed pre and post questionnaires?)

• Divide the cost per participant by the number of months/weeks the programme ran for to generate cost per participant per month/week

• Divide the cost per participant per month/week by the number of minutes of change in physical activity. This will present the cost of every one minute increase in physical activity per participant per month/week and a satisfactory estimate of the cost effectiveness of the programme.

• This information can be used to make a stronger case for investment in physical activity promotion; we need to demonstrate that it is good value for money. Some comparable costs of programmes and what they entailed are presented in the table underneath:

Author/Programme	Programme Content	Programme Cost
Lane et al; Mini marathon participants	Print information about promoting activity, opportunities to be active in locality, pedometers, training plans	74 cent per minute improvement of physical activity per participant per month
Sevick et al (2007); Project Stride	Low contact, print information, provision of tailored feedback	57 cent per minute improvement of physical activity per participant per month

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Appendices

Appendix 1

Table 1

Undelivered Baseline Questionnaires

	Total Target Population	Undelivered Mail	Undelivered Email	Adjusted Target Population
2007 Dublin	32,705	168	551	31,986
2008 Dublin	42,661	92	600	41,969
2008 Cork	9,000	n/a	n/a	9,000

Table 2

Baseline Surveys Response Rate

	Target Population	Total Responses	Online Responses	Postal Responses	Response Rate
2007 Dublin	31,986	11,205	6,804	4,401	35%
2008 Dublin	41,969	9,523	6,497	3,026	23%
2008 Cork	9,000	1,029	n/a	1,029	11%

Table 3

Characteristics of Respondents to Surveys

Characteristic	National Statistics (n=1,697,272) (%)	Dublin Mini Marathon Population 2007 (n=11,205) (%)	Dublin Mini Marathon Population 2008 (n=9,523) (%)	Cork Mini Marathon Population 2008 (n=1,029) (%)
Some or complete tertiary education	27	63	62	62
“White Irish”	87	96	n/a	n/a
Medical Card Holder	37	16	18	18
Aged between 20-29	21	27	33	19
Live in Dublin/Cork	36 (Dublin)	50 (Dublin)	49 (Dublin)	89 (Cork)
Have no children	50	52	51	42
Married	46	57	58	63

Table 4**Self Efficacy of Participants in IPAQ Categories: Baseline Surveys**

	Dublin 2007 (n = 11,205) (M,SD)	Dublin 2008 (n = 9,523) (M,SD)	Cork 2008 (n = 1,029) (M,SD)
High Active	4.5 (9)	9.1 (17.1)	8.2 (3.4)
Moderate	4.7 (9.4)	10.4 (16.6)	13.7 (64.4)
Low Active	5.1 (10.2)*†‡	12.4 (29.8)*†‡	11.7 (3.8)

Note: Only two items were used to calculate self-efficacy in 2007 surveys.

* p < 0.05 (Low v Moderate), † p < 0.05 (Low v High), ‡ p < 0.05 (Moderate v High)

Table 5**Short Term Follow Up (2/3 months) Target Population and Response Rates**

		Dublin 2007	Dublin 2008	Cork 2008
Baseline Response Rate		35%	23%	11%
Total Short Term Follow Up Target Group (n)		8,935	8,618	955
Short Term Follow Up Sample (n)	Online	3,494	3,148	297
	Postal	1,292	616	121
	Total	4,786	3,764	418
Short Term Follow Up Response Rate		54%	44%	44%

Table 6**Matched Analysis**

	Matched Data	Matching Rate
Dublin 2007	3,803	79%
Dublin 2008	3,505	93%
Cork 2008	348	83%

Table 7**Characteristics of Matched Participants v National Statistics**

Characteristic	National Statistics (n=1,697,272) (%)	Dublin Mini Marathon Matched Sample 2007 (n=3,803) (%)	Dublin Mini Marathon Matched Sample 2008 (n = 3,505) (%)	Cork Mini Marathon Matched Sample 2008 (n = 348) (%)
Some or complete tertiary education	27	70	67	73
“White Irish”	87	95	n/a	n/a
Medical Card Holder	37	14	16	18
Aged between 20-29	21	29	28	21
Live in Dublin	36	52	51	1.4
Have no children	50	53	51	43

Table 8**Sedentary Behaviour at Short Term Follow Up**

		Sitting (M, SD)	Television (M,SD)
Dublin 2008	Baseline	186.3 (125.9)	111.5 (70.1)
	Follow Up	206.7 (131.6)*	118.4 (72.1)*
Cork 2008	Baseline	261.9 (152.3)	104.5 (69.9)
	Follow Up	274.7 (154.1)*	119.1 (64.9)*

Table 9**Relapse Rates at Short Term Follow Up**

	Dublin 2007		Dublin 2008		Cork 2008	
	n	%	n	%	n	%
Total Matched Group	3,803		3,505		348	
Relapse by at least 240 MET-minutes/wk	1,482	38.9	1,515	45.2	150	44
Relapse by at least 480 MET-minutes/wk	1,301	34.2	1,317	39.3	132	38.7
Relapse to low active	478	12.6	410	12.2	60	17.6
Relapse by at least 240 MET-minutes/wk and to low active	414	11.4	369	11	49	14.4
Relapse by at least 480 MET-minutes/wk and to low active	410	10.7	348	10.1	46	13.5
Relapse by motivational stage	-	-	541	15.4	57	16.4

Table 10**Self Efficacy, Social Support and the Environment as a Predictor of Relapse, Dublin 2007 Short Term Follow Up Dublin 2008 and Cork 2008.**

		240 MET-minutes/wk and low active (M, SD)		Adjusted OR
		Relapser	Non Relapser	
Self Efficacy	07 Dublin	5.2 (1.8)	4.7 (1.7)*	.91 (.87-.96)^
	08 Dublin	10.6 (3.4)	9.5 (3.3)*	.91 (.88-.94)^
	08 Cork	9.6 (4.2)	9.2 (3.6)	.99 (.91-1.09)
Social Support	08 Dublin	7.3 (2.6)	6.9 (2.6)*	.95 (.91-.99)^
	08 Cork	6.5 (2.4)	6.6 (2.6)	1.06 (.93-1.22)
Physical Environment	08 Dublin	4.2 (1.8)	3.8 (1.8)*	.90 (.85-.96)^
	08 Cork	4.3 (1.9)	3.9 (1.8)	.88 (.74-1.05)

Table 11**Physical Activity at Baseline and Follow Up in RCT**

		Intervention	Control
n	Baseline	85	91
	6 Weeks	55	57
Average Total Physical Activity Minutes per week (M, SD)	Baseline	255.5 (238.2)	324.5 (210.6)
	6 Weeks	364.9 (284.8)*	464.6 (295.3)*
Change in Total Physical Activity Minutes per week (M, 95% CI)		109.4 (30.4-188.4)	140.2 (59.3-221.1)
Average Total Sufficient Physical Activity Minutes per week (M, SD)	Baseline	318.2 (343.2)	390.7 (259.1)
	6 Weeks	392.2 (297.7)	536.3 (309.1)*
Change in Total Sufficient Physical Activity Minutes per week (M, 95% CI)		73.9 (-24.9-172.8)	145.6 (64-227.1)
% Sufficiently Active	Baseline	50 (38.5-60.5)	64.8 (54.1-74.6)
	6 Weeks	67.3 (53.3-79.3)*	84.7 (72.1-92.5)*

* = p < 0.05 (Baseline vs. 6 Weeks)

Table 12**Physical Activity at Baseline and Follow Up: Sufficient and Insufficiently Active in RCT**

		Intervention		Control	
		Sufficiently Active	Insufficiently Active	Sufficiently Active	Insufficiently Active
n	Baseline	42	42	59	32
	6 Weeks	37	18	50	7
Average Total Physical Activity Minutes per week (M, SD)	Baseline	402.5 (185.4)	108.6 (190.7)	416.8 (186.7)	129.6 (91.4)
	6 Weeks	465.6 (328.2)	264.2 (191.3)*	524.7 (318.5)	337.8 (190.1)*
Change in Average Total Physical Activity Minutes per week (M, 95% CI)		63.2 (48.9-175.2)	155.7 (44.9-266.4)	107.9 (3.9-219.8)	208.3 (125.7-290.9)
Average Total Sufficient Physical Activity Minutes per week (M, SD)	Baseline	499.4 (267.1)	137 (317.4)	503.8 (228.8)	152 (119.6)
	6 Weeks	515.6 (331.5)	268.7 (198)	604.9 (325.1)	391.3 (215.2)*
Change in Average Total Sufficient Physical Activity Minutes per week (M, 95% CI)		16.15 (-105.4-137.7)	131.7 (-23.3-286.8)	101.2 (-10.2-212.5)	239.3 (155.3-323.3)

* = p < 0.05 (Baseline vs. 6 Weeks)

Total activity = vigorous, moderate activity and walking

Sufficient activity = vigorous activity (x2), moderate, moderate and walking

Table 13**Contact with Existing Structures in the Community in Community Based RCT**

	Contacted Existing Structures	
	Yes (%)	No (%)
Local Sports Partnership	7	93
Leisure Centre	27.7	72.3
Walking/Cycling Clubs	15.2	84.8
Meet and Train	5.4	94.6

Table 14**Physical Activity and Sitting Time at Baseline and Follow Up in Community Based RCT**

		Intervention	Control
n	Baseline	193	209
	6 Weeks	125	159
Average Total PA Minutes Per Week (M, SD)	Baseline	51.3 (52.4)	48.6 (67.9)
	6 Weeks	86.7 (78.7)*	82.9 (72.2)*
Change in Total Physical Activity Minutes Per Week (M, 95% CI)		35.5 (20.4-50.5)	34.4 (19.5-49.3)
Average Total Activity Sessions Per Week (M, SD)	Baseline	2.6 (2.3)	2.2 (2.3)
	6 Weeks	6 (3.6)*	5.6 (3.8)*
Change in Total Activity Sessions Per Week (M, 95% CI)		3.8 (2.9-4.5)	3.4 (2.8-3.9)
Average Vigorous Intensity Minutes Per Week (M, SD)	Baseline	12.2 (28.8)	17.3 (38.7)
	6 Weeks	21.6 (37.3)*	21.3 (41.3)
% Insufficiently Active	Baseline	100	100
	6 Weeks	37.5	49.7
% Sufficiently Active	Baseline	0	0
	6 Weeks	62.5	50.3 ^a
Total Sitting Minutes Per Day (M, SD)	Baseline	268.5 (171.9)	253.5 (154.1)
	6 Weeks	246 (145.9)	244.7 (115.2)
Change in Total Sitting Minutes Per Day (M, 95% CI)		-22.4 (-48.3-3.5)	-8.8 (-36.3-18.7)

* = p < 0.05 (Baseline v 6 Weeks)

^a = p < 0.05 (Intervention v Control)

Table 15**Changes in Physical Activity and Sedentary Behaviour and Demographic Characteristics in Community Based RCT**

	Change in Average Total Physical Activity Minutes Per Week (M, SD)		Change in Average Total Sessions Per Week (M, SD)		Change in Sitting Time Minutes Per Day (M, SD)	
n						
	Intervention	Control	Intervention	Control	Intervention	Control
Aged <40	32.1 (88.2)	37.6 (103)	4 (4.3)	3.6 (3.9)	-34.8 (104.5)	-12.3 (137.8)
Aged >40	39.9 (75.5)	32 (86.9)	3.4 (3.8)	3.3 (3.9)	-8.1 (90.9)	-6.8 (127.4)
Married	32.3 (72.5)	29.9 (92.5)	3.5 (3.9)	3 (3.7)	-10.8 (74.6)	6.3 (120.8)
Unmarried	43.3 (105.9)	44.9 (99.2)	4.3 (4.3)	4.3 (4.2)*	-26.5 (103.9)	-40.6 (149.3)
No Children	31.9 (101.5)	31.4 (113.9)	3.9 (4.1)	3.9 (4.1)	-40.6 (89.9)	-60.9 (147.8)
Children	37.8 (69.8)	37.5 (81.8)	3.6 (4.1)	3.3 (3.8)	-4.8 (79.7)	11.3 (119.8)*
Urban	26.7 (63.2)	34.2 (107.6)	3.5 (3.9)	3.7 (3.9)	-16.9 (82.3)	-25.7 (139)
Rural	45.9 (102.3)	36.3 (66.5)	4.1 (4.3)	2.9 (3.9)	-27.9 (113.7)	27.2 (107.3)
No Tertiary	63.6 (98.3)	44.1 (100.6)	4.5 (3.9)	3.3 (3.8)	-30.3 (113.7)	23.3 (110.1)
Tertiary	15.5 (64.1)*	27.2 (89.2)	3.3 (4.2)	3.6 (4.1)	-13.2 (78.5)	-47.8 (145.7)*

* = p < 0.05 (Aged < 40 v Aged > 40, Married v Unmarried, No Children v Children, Urban v Rural, No Tertiary v Tertiary)

Table 16**Cost of Intervention in Community Based RCT (€)**

	Cost (€)
Research Costs	
Idea Development	700
Identification of Study Sample	350
Intervention Development	
Preparation of Intervention	2912
Cost of Materials	3152.77
Administration Costs	
Preparation of Questionnaires, Consent, Tailoring Analysis	1227.78
Copies, Packing Post Questionnaires and Reminders, Labels	544.32
Postage	1973.05
Meeting Costs	302.46
Meeting Overheads	45.37
Total	11,207.75
Cost per person over 9 weeks	58.07
Cost per person per week	6.45
Cost per week per minute of improvement in PA	0.18c

Note:

- To compute cost per minute improvement in physical activity, the cost per person per week was divided by the change in minutes in the intervention group between pre and post intervention (36 minutes).
- For rural and non tertiary educated participants, the cost per person per week was divided by the change in these sub groups (46 and 64 minutes respectively).
- Personnel costs are included in research costs and in the preparation and administration of the intervention. Additional personnel costs for initial idea development and refinement are not included above and amount to €5900

Figure 1

IPAQ Activity Categories of Mini Marathon Participants

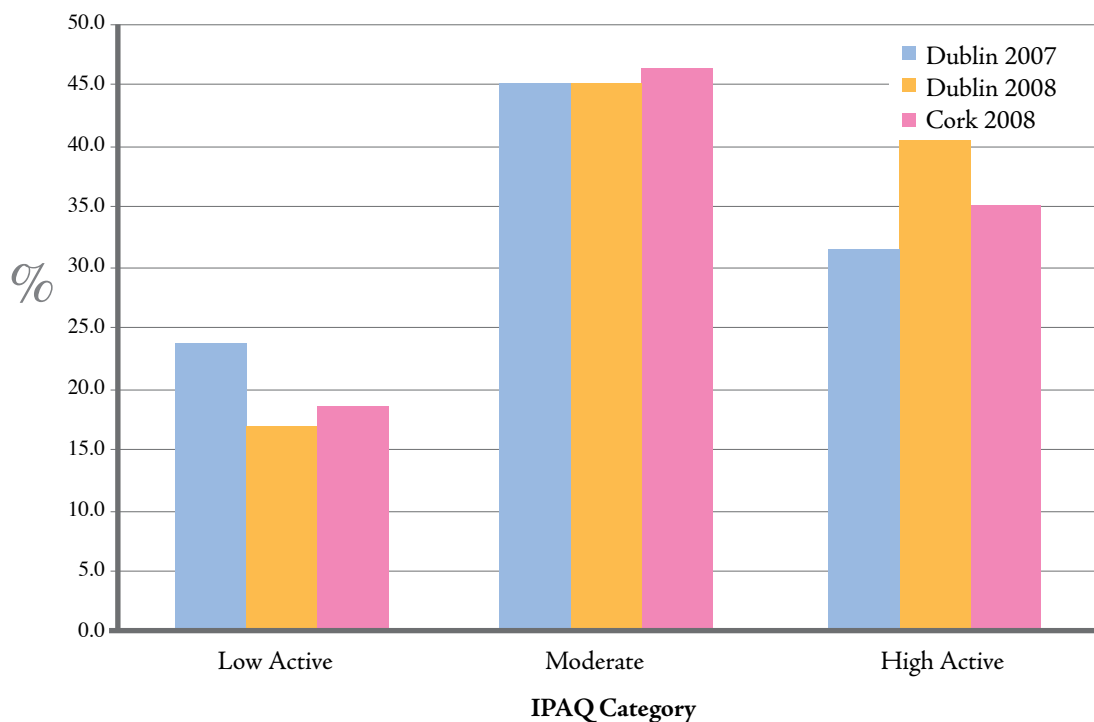
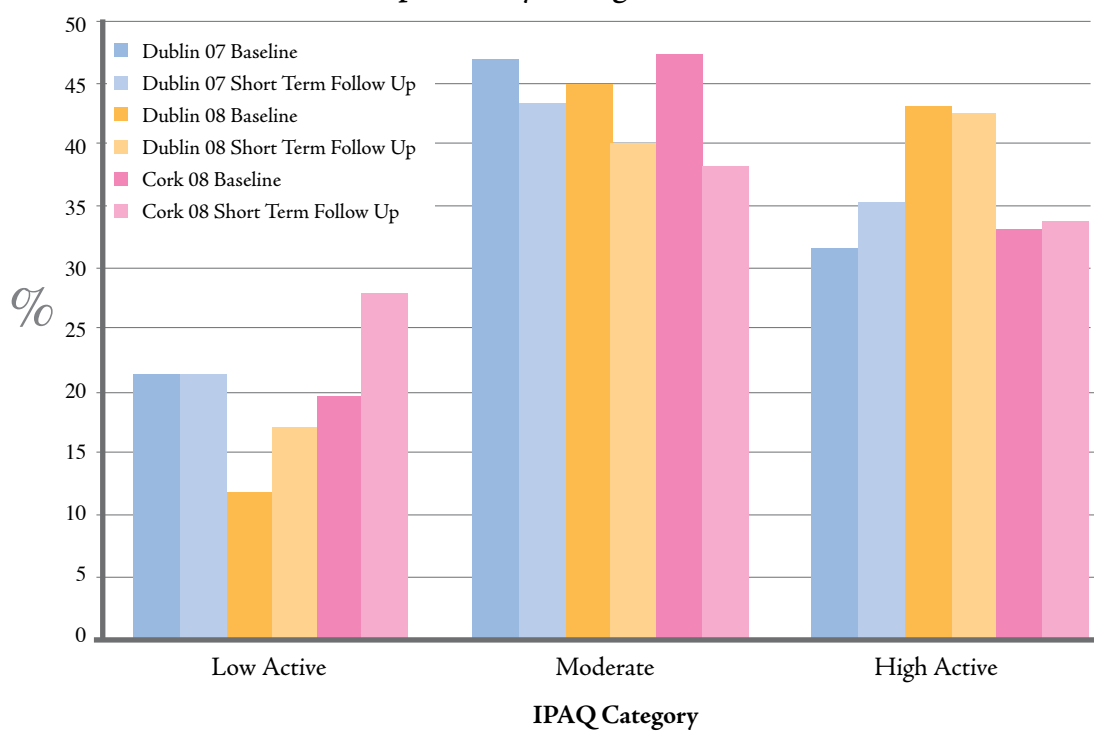


Figure 2

Baseline and Follow Up Activity Categories



Appendix 2

Details of the survey instrument

The questionnaire was developed by the research team at WIT and included questions from the International Physical Activity Questionnaire (IPAQ), the ISC's Sports Monitor Questionnaire and the latest Irish National Health and Lifestyle Survey 2006 (SLÁN). The IPAQ was developed to accurately measure all domains of physical activity using a questionnaire. A long and short version of the instrument was developed and then evaluated in twelve countries (Craig et al., 2003). Respondents were asked to provide detail on the amount of vigorous and moderate activity, and walking, they participated in, in the previous week. Using the IPAQ scoring protocol, participants were categorised as 'high', 'moderate' or 'low active'. The 'high activity' category refers to higher levels of participation in physical activity, incorporating at least one hour per day of at least moderate intensity exercise, above basal participation rates. The 'moderate' category is defined as doing some activity, more than the low active category. This level of activity corresponds to half an hour of at least moderate intensity activity on most days of the week. The 'low active' category is defined as not meeting either of the previous two criteria and reflects a sedentary population. Individuals who are categorised as 'high' or 'moderately' active meet minimum physical activity guidelines; 150 minutes of at least moderate intensity activity per week (USDHHS, 2008). In the 2008 Dublin and Cork event, sedentary behaviour was also assessed; participants were asked to indicate how much time they spent sitting and watching television.

Readiness to change (Marcus et al, 1992), self efficacy (Marcus and Owen, 1992), reasons for participation, usual preparation for the event, beliefs about physical activity, and, in 2008, self reported height and weight and hence Body Mass Index (BMI) was also measured.

In the Dublin events, interviews (n = 414 – 2007, n = 300 – 2008) were undertaken two hours prior to race start, to assess whether data collected in the postal and web based online baseline survey were similar to a random sample of participants on race day. Upon creation and analysis of IPAQ categories for the intercept interview data, it was notable that there were lower reported levels of high and moderately active women compared to the total baseline sample, in the 2007 and 2008 Dublin events. There were twice as many women in the low active category, in both events, in the intercept interview sample compared to the overall group.

Appendix 3

Data Analysis: Relapsers

Short and long term matched data were used to identify relapsers according to the criteria defined earlier. Descriptive analysis presented a basic overview of the numbers of relapsers in each classification and cross tabulation and chi square allowed an initial assessment of the predictors of these relapse states. Lastly, logistic regression permitted an investigation of these predictors of relapse. Binary regression was used with relapse/non relapse (using the different criteria in Figure 1) used as the outcome variable. Predictor variables

were inserted and analysis was computed. Adjusted odds ratios were used in the presentation and analysis of results; adjusted for age, marital status, children, level of education, and previous participation and mode of completion in the event. Odds ratios less than one were associated with a decreased risk of relapse, while those greater than one were related to an increased risk of relapse. Probability values and confidence intervals for each adjusted odds ratio were assessed to determine significance.

Appendix 4 – Randomised Controlled Trial (RCT)

Intervention Detail

The booklets were based on materials previously used in various settings to promote physical activity. Initial consideration was given to booklets used in a study in Australia (Marshall et al, 2003; 2004). In this study, four 'Active Living' brochures were developed, broadly based on the TTM stages of change; specifically the precontemplation, contemplation, preparation and action/maintenance stage. Each of these was used in the creation of the two booklets for this research. These are presented underneath and available online at <http://www.wit.ie/healthandsports/science/ResearchCentres/HealthBehavior/>. Other materials referred to and used in the development of booklets for this research included an Irish Heart Foundation brochure 'How to be Active for a Happy Heart', used in Heart Week 2007 and the 'Step by Step: A Self Help Guide to A Physically Active Lifestyle' brochure developed in the New South Wales Centre for Physical Activity and Health for a study that used pedometers to promote physical activity.

Response rates

Participants in the intervention group were contacted (76% response rate) 3 weeks post baseline to provide process evaluation data. Follow up data, at six weeks, was collected on 65% of the intervention and 63% of the control participants. Participants who provided follow up information were significantly younger, had higher levels of tertiary education and more likely to not have children ($p < 0.05$). Receipt and use of materials was significantly higher ($p < 0.05$) in the intervention group (95%), although use of materials in the control group was still quite high (80%).

Appendix 5 – Community Based RCT

Randomisation Procedures in partnership with LSPs

As noted earlier, eligible participants who consented to participate ($n = 402$) were grouped into their respective county LSP region in Phase 1 and geographical regions within two LSP's in Phase 2. County allocation was necessary for two regions where there was no LSP in operation (i.e.) Down and Wicklow. However, there were Sport/Leisure/Recreation Authorities established in both of these areas, which were deemed equivalent to a LSP. The large predominance of Cork based participants in Phase 2 required the use of various regions within this area, and the respective LSP each were affiliated to.

Phase 1

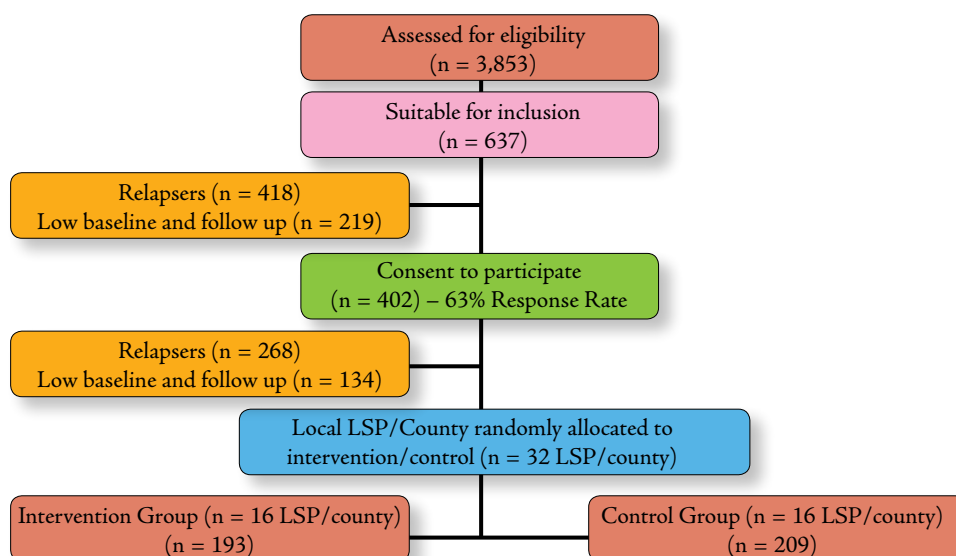
Relevant LSP's ($n = 30$), based on participants address details, were matched into pairs based on the number of relapsers in their area, the length of time the LSP had been in operation and geographical location. As noted earlier, LSP's have been developed in stages and some are more advanced and mature than others in relation to their staff expertise, programme development and community effectiveness. LSP's were also matched geographically to prevent any contamination between people in the intervention and control group. Some LSP's were combined due to small numbers and geographical location (i.e. Sligo and Leitrim, North and South Tipperary, South Dublin, South City Central and South East City Central and Dublin North West City Central, North City Central and City Central). One LSP from each pair was then randomly allocated into either the intervention ($n = 15$) or control group ($n = 15$) using random numbers generated in www.graphpad.com. Final analysis showed that there was a sample size of $n = 142$ in the intervention group and $n = 169$ in the control group. It has been stated that cluster trials with less than five clusters per arm are not recommended (Medical Research Council, 2002, cited in Puffer et al., 2005); the 14 clusters per arm in this study should enhance the credibility of subsequent findings.

Phase 2

As the majority of the study sample was based in the Cork region, participants were grouped into four regions within the county (Cork City, Cork North, Cork West, and Cork South). All remaining participants outside this region were matched to their local LSP and included as one other cluster. These clusters were grouped together based on the number of eligible and consenting participants in that area, which resulted in two clusters; Cork South ($n = 51$) and Cork City/West/North and Other ($n = 40$). The clusters were then randomly allocated into an intervention and control group. At the final analysis stage, there were $n = 16$ clusters in each arm of the trial and Figure 3 illustrates the combined recruitment and progression of participants to this cluster randomised trial.

Figure 3

Recruitment and progression of participants in Community Based RCT



Appendix 6 LEG IT Booklets

Booklet 1 was entitled 'Time to Get Moving' and was designed to target participants in the earliest stages of motivational readiness. It included information on the benefits of physical activity, minimum physical activity guidelines and a step by step guide on how to increase motivation. Booklet 2 was called 'Keep Moving' and was tailored to participants who were already somewhat active and in the middle stages of motivational readiness. It included more detailed information on the term 'moderate intensity', tips for overcoming barriers and tips for being active at home.

Booklet 1 – Time to Get Moving



Booklet 2 – Keep Moving



A further booklet was designed and delivered to all participants in the intervention group of the community based RCT. These participants received a pedometer during the study period, which was accompanied by this booklet. It incorporated instructions on how to use the pedometer and tips and ideas to promote walking.

Booklet 3 – Pedometer Booklet



Note: All of these booklets are available online at able online at <http://www.wit.ie/healthandsports/science/ResearchCentres/HealthBehavior/>

Appendix 7 Associated Publications

Lane A, Murphy NM, Bauman A. *The Impact of Participation in the Flora Women's Mini Marathon on Physical Activity Behaviour in Wwomen. Research Report 1*. Ireland: Centre for Health Behaviour Research, Department of Health Sport and Exercise Sciences, Waterford Institute of Technology and Irish Sports Council, 2008.

Lane A, Murphy NM, Bauman A, Chey T. Randomised controlled trial to increase physical activity among insufficiently active women following their participation in a mass event. *Health Education Journal*, in press.

Bauman A, Murphy N, Lane A. The role of community programmes and mass events in promoting physical activity to patients. *British Journal of Sports Medicine*, 2009; 43: 44-46

Murphy NM, Bauman A. Mass sporting and physical activity events: are they bread and circuses or public health interventions to increase population levels of physical activity? *Journal of Physical Activity and Health*, 2007; 4: 193-202.

