

# Active for a Day: Predictors of Relapse Among Previously Active Mass Event Participants

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**Background:** To promote maintenance of sufficient physical activity (PA), better understanding of factors associated with behavioral relapse is needed. **Purpose:** To identify PA relapsers and predictors of this state in a large community sample of women who participated in 2 mass 10-km events in Ireland. **Methods:** Relapsers to 'low active' were identified at 3-month follow-up, and factors associated with relapse investigated. **Results:** 11% of the sample decreased their participation by at least 60 minutes of moderate-intensity PA per week and regressed to 'insufficiently active.' Adjusted analysis indicated relapse was associated with walking the event (OR = 1.40; 95% CI = 1.05–1.85) and not achieving tertiary education (OR = 1.49; 95% CI = 1.18–1.88). Normal-range BMI, training continuously, urban residence, and increases in self efficacy and positive perceptions of the physical environment were related to lower incidence of relapse. **Conclusion:** Education, living in an urban area, BMI, walking the event, training, and self efficacy are all associated with relapse and while mass events are a useful motivator for PA, strategies are required following events to maintain participation levels and generate a lasting public health impact.

**Keywords:** behavioral relapse, physical activity, women

Many individuals do not maintain the regular physical activity needed to realize the health benefits of being active. Despite much correlational research, there is still limited understanding of physical activity maintenance in various populations. One method for studying this is through follow-up studies of participants in community-wide mass participation events.<sup>1</sup> The first comprehensive evaluation of such an event, the Women's 10-km Mini Marathon in Ireland, has provided empirical support for an initial impact on motivating inactive community members to be physically active before, as well as on the day of, the mass event.<sup>2</sup>

Such behavior change however, is often characterized by relapse to premaintenance behavior. Attrition rates of approximately 50%<sup>3</sup> following interventions to promote physical activity are usual. This rate is similar to 4 decades of observation among a range of behaviors<sup>4</sup> but may be erroneous due to the inclusion of participants who are active in a different setting.<sup>5</sup>

Physical activity relapse is a decrease in participation in physical activity to insufficient levels or a stage

regression in the transtheoretical model.<sup>6–10</sup> Sallis et al<sup>11</sup> reported that females and older adults in a community sample were more likely to relapse than males and their younger counterparts. Further studies indicated that regressors reported higher BMI levels,<sup>12</sup> lower use of behavioral processes of change,<sup>13</sup> lower social support,<sup>13</sup> and more negative perceptions about neighborhood attractiveness.<sup>13</sup> High proactivity (decision balance) scores, low con scores, and high self efficacy have all been found to reduce relapse.<sup>8,14,15</sup>

The purpose of this study was to report on the determinants of 3-month relapse among women participating in 2 10-km mass participation events in Ireland.

## Method

### Design, Participants, and Procedures

This was a longitudinal study of women living in Ireland who participated in 2 mass physical activity fun run events in 2008. The sample included all women (N = 51,661) who registered to participate. Questionnaires were disseminated online or by mail just before or on race day. Approximately 91% of the obtained baseline sample (n = 10,552, 20% response rate) consented to follow-up 3 months post event. Baseline and follow-up (n = 4182, 44% response rate) data were matched resulting in a sample of 3853 eligible study participants and a matching success rate of approximately 88%. Changes

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in physical activity following participation in the event (relapse) and its antecedents were identified. Random intercept interviews were also undertaken on the day of the first event ( $n = 300$ ) to demonstrate whether the obtained sample was representative of event participants overall. Ethics approval was obtained from Waterford Institute of Technology and all participants were entered into a competition to win a holiday to enhance response.

*Physical activity* was measured using the short form International Physical Activity Questionnaire (IPAQ), which has comparable reliability and validity to other self report physical activity measures.<sup>16</sup> Respondents provided detail on their total physical activity during the previous week. Using the IPAQ scoring protocol, participants were then categorized as ‘high’ or ‘moderately’ active if they exceeded the minimum physical activity guidelines; 150 minutes of at least moderate-intensity activity per week,<sup>17,18</sup> with the remainder, ‘low’ active, deemed ‘insufficiently active.’

*Physical activity relapse* has been defined elsewhere.<sup>19</sup> In brief, we defined relapse as a decrease by at least 240 MET-minutes per week (approximately 60 minutes or more of moderate-intensity activity) and also moving from ‘sufficient’ to ‘low’ active IPAQ categories. This corresponds to previous definitions of relapse.<sup>8,10</sup> Other definitions of relapse used include relapsing by ‘at least 480 MET-minutes per week and to low active,’ and regressing from ‘high’ to ‘low’ stage of readiness to change.

*Readiness to change* was assessed using a tool developed by Marcus et al<sup>20</sup> to measure ‘stage of change’ for exercise. *Physical activity self efficacy, social support, and environmental perceptions* were measured using items from previously validated scales.<sup>21–23</sup> Self efficacy in relation to ability to be active when stressed or tired, in poor weather conditions and limited time was investigated. Social support items included measurement of having someone to be active with, receiving encouragement from family and friends, and having someone to look after children. Finally, environmental perceptions incorporated assessment of the ability to be active in the local area and the presence of green areas to be active

in. Internal consistency (Cronbach’s alpha coefficients) ranged between .58 and .73. Information on demographic variables including age, education, marital status, place of residence, medical card ownership (an indicator of low socioeconomic status), and self reported height and weight was collected.

## Data Analysis

Numbers of relapsers according to different definitions were described, and Chi squared statistics and forced entry logistic regression was used to identify factors associated with relapse, using SPSS Version 17. Data were presented as adjusted odds ratios of the likelihood of relapse. Probability values and 95% confidence intervals for each adjusted odds ratio were presented.

## Results

At baseline, of those 3,853 women who completed the pre event questionnaire, 82% (95% CI = 81.6% to 83.1%) were ‘high’ or ‘moderately’ active. Intercept interview analysis of an independent random sample of race participants, indicated that 66% (95% CI = 60.6% to 71.4%) of respondents were sufficiently active, suggesting some selection effects among survey completers. Participants in the study were more likely to come from a higher socioeconomic group, (based on educational attainment and medical card ownership) than the Irish adult female population in general.<sup>24</sup> Further differences in the participating cohort were apparent in relation to age and marital status (Table 1).

Relapse rates at 3-month follow-up were estimated using the different definitions of relapse; a reduction of  $\geq 240$  and  $\geq 480$  MET-minutes/wk was noted for 43.2% ( $n = 1655$ ) and 37.6% ( $n = 1449$ ) of the cohort, respectively, but many of these women did not change to the ‘low’ active category. A reduction of both  $\geq 240$  MET-minutes/wk and moving into the ‘low’ active category, a clear ‘relapser’ was demonstrated by 418 women (10.8%), with the remainder ( $n = 3272$ ) defined as ‘nonrelapsers’ (while  $n = 157$  had missing data). Relapse through stage

**Table 1 Characteristics of Study Sample**

Characteristic	National statistics for adult Irish women ( $n = 1,697,272$ ) (%)	Total matched sample ( $n = 3853$ ) (%)	Relapsers ( $n = 418$ ) (%)	Nonrelapsers ( $n = 3278$ ) (%)
Some or complete tertiary education	27	67.8	59.3	69*
Medical card holder	37	16.1	19.7	15.7*
Aged between 20–29	21	26.9	21.4	27.2
Have no children	50	50.3	45.3	50.4
Married	46	59.4	64	59.1

\*  $\chi^2$  (bivariate) is significant ( $P < .05$ ) in Relapsers vs. Nonrelapsers.

of change regression was reported by 598 (15.5%) of women.

Tables 2 and 3 show the factors associated with relapse. After adjustment for demographic and participation variables, women who had no tertiary education were more likely to relapse (OR = 1.49; 95% CI = 1.18–1.88) as were those that walked the event (compared with running) (OR = 1.40; 95% CI = 1.05–1.85). A reduced risk of relapse was apparent among those living in urban areas, who undertook regular training, and who were in the acceptable BMI range. Similarly, each unit increase in self efficacy score and positive perceptions about the environment were accompanied by a 7% (OR = .93; 95% CI = .90–.96) and 9% (OR = .91; 95% CI = .86–.96) decreased risk of relapse. The most significant self efficacy item related to relapse was the ability to be active when the weather is bad, which was associated with a 30% reduced risk of relapse. One of the social support items, ‘having someone to look after children to

facilitate physical activity,’ showed a relapse reduction of 41% (OR = .59; 95% CI = .39–.91).

## Discussion

This longitudinal study described rates and predictors of relapse in a large sample of Irish women following a mass physical activity 10-km event. Most women were regularly active before the event but substantial decreases in activity were reported by over a third, although many still remained above the ‘sufficiently active’ threshold. Regression to the mean is a possible explanation for some of the decrease among those with very high baseline levels of reported physical activity. Thus, a more comprehensive classification of relapse, using a combination of decreased activity and a change to ‘low’ active provided a better estimate of the ‘true relapse’ rate at 3 months post event of around 11%.

**Table 2 Demographic and Event Participant Characteristics as Predictors of Relapse (Relapse is Defined as a Decrease at 3-Month Follow-Up by at Least 240 MET-Minutes per Week and to Low Active, n = 418)**

		Relapser (%)	Nonrelapser (%)	Adjusted OR (95% CI)
Age	Aged > 40	40.4	39.3	1.00
	Aged < 40	59.6	60.7	1.24 (.96–1.60)
Children	Children	54.7	49.6	1.00
	No children	45.3	50.4	.91 (.69–1.21)
Education	Tertiary	59.3	69	1.00
	No tertiary	40.7	31*	1.49 (1.18–1.88)†
Medical card	No	80.3	84.3	1.00
	Yes	19.7	15.7*	1.20 (.90–1.58)
Location	Rural	36.1	30.2	1.00
	Urban	63.9	69.8*	.78 (.63–.98)†
Marital status	Single	36	40.9	1.00
	Married	64	59.1	1.22 (.94–1.60)
Previous participation in this mass event	Previous Participant	62	61.2	1.00
	First-time participant	38	38.8	.94 (.75–1.18)
Mode of completion	Run/jog	19.4	29.7	1.00
	Walk	80.6	70.3*	1.40 (1.05–1.85)†
Training	Do not train/week or 2 Train continuously	51.6	39.3	1.00
		48.4	60.7*	.65 (.52–.81)†
BMI	Overweight/obese	31	22.9	1.00
	Underweight/Normal	69	77.1*	.74 (.57–.97)†

Note. Odds ratios adjusted for age, level of education, marital status, children, previous participation, mode of completion, and training.

\*  $\chi^2$  (bivariate) is significant ( $P < .05$ ).

† Odds ratio is significant ( $P < .05$ ) in Relapsers vs. Nonrelapsers.

**Table 3 Psycho-Social Predictors of Relapse**

	Relapser $\chi$ (SD)	Nonrelapser $\chi$ (SD)	Adjusted OR (95% CI)
Self efficacy	10.5 (3.4)	9.4 (3.3)*	.93 (.90–.96)†
Social support	7.2 (2.6)	6.9 (2.6)	.97 (.93–1.01)
Perception of physical environment	4.2 (1.9)	3.8 (1.8)*	.91 (.86–.96)†

Note. Odds ratios per unit change in the scores for efficacy or social support adjusted for age, level of education, marital status, children, previous participation, mode of completion, and training.

\*  $\chi^2$  (bivariate) is significant ( $P < .05$ ).

† Odds ratio is significant ( $P < .05$ ) in Relapsers vs. Nonrelapsers.

Other studies<sup>8,10,25</sup> have used similar classifications of relapse. Sullum, Clark, and King<sup>8</sup> recruited a sample of sufficiently active college students and at 10-weeks follow-up, around 13% had relapsed to insufficiently active. Relapse rates between 31% and 33% were described by 2 further studies<sup>10,25</sup> that assessed physical activity over a 12-month<sup>10</sup> and 3-month<sup>25</sup> period. The lower rates of relapse in this research may be due to the presence of the mass event as a catalyst and motivator for activity. Alternative classifications of relapse in the literature include stage regression analyses,<sup>6</sup> which revealed 13% relapse rates over a 3-month period akin to the rate of 16% identified in this study, using this same relapse criterion.

The most notable predictor of relapse in this study included having no tertiary education, while living in an urban area and having a normal range BMI were both related to a decreased risk of relapse ( $P < .05$ ). Two previous studies<sup>12,26</sup> have reported that higher education was predictive of maintenance, observed in females only in the later study. In a more recent study,<sup>9</sup> lower education was associated with lower adherence to physical activity. Higher levels of education are cross-sectionally related to regular participation in physical activity and it now appears that it is also related to enhanced maintenance of physical activity.

The decreased risk associated with living in an urban area is likely related to the greater opportunities for activity in these areas. The presence of sidewalks, shops nearby, bicycle facilities, local transport stops, and low-cost exercise facilities and programs are related to increased physical activity levels in several countries,<sup>27</sup> and previous research<sup>28</sup> has shown that urban women more frequently report these features in their local environment than rural women. Relapsers in this study were more likely ( $P < .05$ ) to perceive a lack of spaces to be active in their locality, in contrast to one previous study,<sup>25</sup> which found no relationship between access to facilities and relapse.

Walking the event was related to lower physical activity levels at both time points and was the most consistent predictor of relapse irrespective of the definition of relapse applied ( $P < .05$ ). This is important as three-quarters of participants intended to walk these events. Furthermore, limited training before this event was also a significant predictor of relapse. Studies<sup>7,29</sup> have noted

that previous success with and participation in physical activity as well as a more active lifestyle in general was associated with physical activity maintenance. It could be assumed that women who ran or jogged the Mini Marathon and trained for the event fulfill these criteria and were less likely to relapse.

Finally, higher self efficacy and some aspects of social support, especially the presence of child care facilities, reduced the risk of relapse ( $P < .05$ ), a finding observed previously.<sup>7,8,15</sup> One efficacy indicator, increased confidence to be active despite poor weather, which was protective of relapse is notable in this instance because Ireland has a wet, cold, and changeable climate and follow-up was undertaken in September when weather typically deteriorates. A review of studies<sup>30</sup> that assessed physical activity in different seasons cited a relationship between physical activity and adverse or very cold weather conditions. Efficacy to overcome this is evidently an important factor in promoting sustained behavior change among this cohort.

There are limitations of the current study. A low response rate at baseline (20%) infers some selection bias; that healthier, more enthusiastic event participants returned the questionnaires. This was confirmed by comparison with the random sample of 300 participants interviewed on race day and may have led to an underestimate of the true incidence of relapse. Secondly, the study used a self report assessment, with the possibility of measurement error. Any such overestimation of activity was likely to have been similar at both time points so should not influence these findings.

## Conclusion

This study assessed relapse in a population based sample in a relatively unique context, representing the first investigation of this type in an Irish setting. Findings indicated that education, BMI and self efficacy were related to behavioral relapse. Furthermore, evidence for the role of place of residence and associated environmental perceptions substantiates the increased attention on the role of the physical environment in maintaining physical activity. In addition, while mass events may be a useful motivator for activity, with many participants maintaining their sufficient physical activity levels post event,

for some this was only for the day of the event. Reinforcement strategies are required following mass events, particularly targeted to walkers and irregular trainers to alter their preparation and nature of participation and/or to maintain their physical activity participation levels. Event organizers and public health professionals should harness this initial engagement in physical activity events to develop ongoing interaction with these participants to help them remain active.

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