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'Project Spraoi': A randomized control trial to improve nutrition and physical activity in school children

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ABSTRACT

Background: Recent evidence predicts that by 2030, Ireland will have the highest rate of obesity in Europe. Consequently, there are concerns that health problems associated with this condition will present in childhood. Studies have shown that interventions based on increasing physical activity (PA) levels, reducing sedentary lifestyles and improving nutritional habits all pose protective mechanisms against obesity and its related disorders in youth. Yet, to date, there are no interventions being delivered in Ireland that concurrently target PA, nutritional habits and sedentary time amongst school children.
Purpose: The purpose of this study is to implement and evaluate an intervention that targets PA, nutritional habits and sedentary time in primary school children.
Methods: 'Project Spraoi' is a school based health promotion intervention, based on 'Project Energize,' which has been in operation in New Zealand since 2004. Measures of PA, nutritional knowledge/behaviours and health parameters including body composition, blood pressure (BP) and fitness will be gathered before and after the programme completion (24 months). For comparative purposes, we will compare these scores to a separate group who will not participate in the intervention and to counterparts partaking in Project Energize, NZ.
Conclusions: There is strong evidence that quality multi-component school-based programmes can increase PA, improve weight status and promote healthier dietary habits. Due to the increasing obesity levels, the implementation of such a programme that is rigorously evaluated is warranted in Ireland.

1. Background/Introduction

Researchers have predicted that by 2030, Ireland will have the highest rate of obesity in Europe [1]. As a result, health problems associated with this condition may present in childhood [2–5]. One in four children in Ireland are already overweight or obese [6] and if this trend continues, as a consequence of unhealthy nutritional habits and physical inactivity, we may see this generation of children having a shorter life expectancy than their parents [7]. A mere 25% (31% boys, 18% girls) of Irish children undertake physical activity (PA) every day and only 20% (19% boys, 22% girls) report consuming vegetables more than once a day [8]. Furthermore, compared to their international counterparts, Irish children have low levels of PA, high levels of sedentary behaviour [9] and have poor dietary habits [8]. Such behaviours are unlikely to change as these children mature, and, subsequently, will contribute to rising health care costs.

Studies have shown increased PA levels [10–17], a reduction in sedentary behaviours [16,18–20] and improved nutritional habits [10,21–23] all pose protective mechanisms against obesity and its related disorders. A large number of studies have also shown positive outcomes from interventions targeting these variables in youth [14,24–29]. Yet, to date, there are no interventions being delivered in Ireland that concurrently target PA, healthy eating and sedentary time amongst school children. In direct response to this need, a health promotion intervention titled 'Project Spraoi,' (pronounced 'spree') was developed. The term Spraoi is a Gaelic Irish word, directly translated as 'fun'. This intervention, incorporating

Abbreviations: PA, physical activity; BP, blood pressure; BMI, body mass index; BF, body fat; CONSORT, consolidation standards of reporting trials; DEIS, delivering equality of opportunity in schools; MVPA, moderate to vigorous physical activity; RE-AIM, reach; effectiveness, adoption; implementation, maintenance; FM, fat mass; FFM, fat free mass; HBSC, health behaviour of school children.

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the Social Ecological Model of Health Behaviour [30], attempts to create environments which promote PA and healthy nutritional choices to provide the individual with the knowledge, skills and motivation to engage in health enhancing behaviours.

The primary aim of 'Project Spraoi' is to be the first study to implement and evaluate an intervention targeting increased PA, reduced sedentary time and improved nutritional habits among Irish primary school children. Secondary aims are to evaluate intervention effects on (i) physical markers of health (body mass (BMI), body fat (BF), cardiorespiratory fitness, blood pressure (BP) and (ii) nutritional knowledge and habits (questionnaires) among Irish primary school children. This current article describes the methods of the project, which adheres to the Consolidation Standards of Reporting Trials (CONSORT) guidelines [31,32].

2. Methods

2.1. Study population

The Irish Department of Education and Skills website [33] listed 349 primary schools in Cork City and County in the 2011/12 academic school year. The Principal in each of these schools was sent a preliminary questionnaire in May 2013 examining (i) current policies and practices relating to PA and nutrition in their schools, (ii) barriers and facilitators relating to the promotion of increased PA and improved nutritional habits in their school, and, (iii) their schools interest in implementing the 'Project Spraoi' intervention. Each of the 151 schools who returned the questionnaire expressed an interest in implementing 'Project Spraoi'. For the purposes of this evaluation, however, certain inclusion criteria were set. These included (i) medium size (100–300 pupils) [34], (ii) have proximity (20 km) to the research Institute, (iii) willingness to implement the 'Project Spraoi' intervention, and, (iv) not currently participating in another PA and/or healthy eating intervention in their school. Future plans are to offer the intervention to all interested schools in the region; subject to positive findings from the evaluation and the securing of external funding.

In Year 1 of the research (academic year 2013/14), a sample of schools meeting this criteria ($n = 6$) with similar demographic characteristics relating to location (urban, rural), school type (single sex, mixed), socioeconomic status (DEIS (schools in lower SES areas), non-DEIS) were matched and randomly assigned as intervention or control. Participants in control schools did not receive any of the intervention components. They did, however, undertake all physical measurements, have their PA, sedentary and fitness levels monitored and completed the questionnaire/s at the same time points as the intervention participants.

Due to practical, logistical and financial constraints, the research team are implementing a stepped wedge intervention design [35] and rolling out the intervention sequentially to trial participants. In Year 1 of the research, 4 intervention schools and 2 control schools participated. In Year 2 (academic year 2014/15), 3 additional intervention schools and one extra control school were recruited (see Fig. 1). The research team envisage that intervention schools will maintain involvement with 'Project Spraoi' and new schools will be offered the intervention annually. Yet, this arrangement is dependent on school interest and procurement of research funding. Where possible, schools acting as control schools for a period of 2 years will be invited to become an intervention school.

This paper proposes that in Year 3 of the research (2015–2016), the project will grow to include a representative sample of Cork schools, which will be stratified by school location, gender and socio-economic status and will be drawn from schools who have expressed a willingness to implement the 'Project Spraoi' intervention. The sample size necessary to detect changes in minutes in moderate to vigorous physical activity (MVPA) is based on previous studies [36–38]. Sample sizes are calculated to detect a mean difference of 10 min per day of school day MVPA, between intervention and control groups at the end of the intervention period. A standard deviation of 12 min is used [38,39]. Using G × Power 3.1.9.2 software, an ANCOVA with 5% level of significance and power of 80%, yielded a sample size of 48 participants (24 per group) per cohort (Senior Infants (5–7 year olds) and Fourth Class (9–11 year olds)), per school. To allow for possible drop outs, at least 54 participants (27 per group) will be recruited, per school. In year 1 of the study, 6 schools will be included in the study.

Prior to the commencement of the intervention, one of the lead researchers visited each principal and/or lead teacher at a participating school and the full outline of the study explained; along with the distribution of information sheets and consent forms. The consent form required all participating Senior Infant and Fourth Class children in each school and their parent/s/guardian/s to consent to having each of the physical measurements taken and to wear an accelerometer at baseline and follow-up. The research team chose these two age groups to be tested as part of the evaluation, based on children of these age ranges being at the advent of important ages for forming and understanding health habits. Cork Institute of Technology's Research Ethics Committee granted approval of the study (September 2013).

2.2. Development of intervention and evaluation framework

'Project Spraoi' is based on a New Zealand (NZ) health promotion intervention 'Project Energize' (www.projectenergize.org.nz), which was first implemented in 2004 and is currently delivered to all 244 primary and intermediate schools in the Waikato District Health Board region of NZ. 'Project Energize' has reported positive impacts on prevalence figures for overweight and obesity, physical fitness and nutritional behaviour among NZ children [40, 41].

Project Spraoi differs to Project Energize in four main ways. Firstly, Project Spraoi is based in the northern hemisphere, where although similarities in temperate climate with New Zealand are noted, there are distinct cultural, economic and educational differences between the two countries. Necessary adjustments have therefore been made to the planning, delivery and evaluation of the intervention in Ireland, which need to be assessed for effectiveness.

Secondly, the Project Spraoi intervention is primarily a research-led programme, receiving internal funding from the host institution, Cork Institute of Technology. As a result, the Energizers are all postgraduate researchers, who deliver both the intervention in their school/s and act as the primary data gathers for the evaluation. This is not the case in New Zealand. Project Energize is an externally funded health promotion intervention, delivered by a team of employed Energizers who work for District Health Boards. Although it continues to inform the planning and delivery of the programme, the research arm of their intervention has always existed as a separate entity.

Due to financial and methodological constraints, it has not been possible to ensure that each Project Spraoi Energizer refrain from being involved in the evaluation data collection process for their school/s, which could lead to bias. Yet, steps have been put in place to ensure that each Energizer has minimal interaction with their intervention school at the time of evaluation. They are also only instructed to gather data of an anthropometric nature from their intervention school/s at the time of data collection. All evaluation tools that could require one to one interaction e.g. questionnaires and teacher/principal/child feedback, are administered by a researcher who has no connection with the school being analysed.

Thirdly, although Project Spraoi has the same overarching aims