# A healthy lifestyle programme for 8-9 year olds – Study Protocol

**BACKGROUND**

Well-being is an outcome of how one lives, defined as *‘optimal psychological functioning and experience’* (Ryan and Deci, 2001, pg142). The United Kingdom (UK) Governments announcement to include well-being as a marker of health within the nation (Cameron, 2010) and Healthy Ireland’s new Health and Wellbeing Framework (Department of Health, 2013) highlights the importance of positive wellbeing to society. To aid in the development of effective policy and practice, behavioural science research can investigate effective ways to positively influence children’s well-being.

Children’s well-being is multifaceted (Pollard and Lee, 2003) and influenced by a myriad of factors that includes behaviours and social environments. Studies suggest that physical activity can positively influence markers of well-being including self-esteem (Ekeland, Heian, Hagen and Coren, 2005), anxiety and depression (Larun et al., 2009; Parfitt, Pavey and Rowlands, 2009; Biddle and Asare, 2011), emotional distress (Ahn and Fedewa, 2009) happiness (Holder, Coleman and Sen, 2009) and HRQOL (Breslin et al., 2012). Further, physical activity settings that support children’s psychological needs for autonomy, competence and social relatedness can positively influence children’s well-being (Gagne, Ryan and Bargmann, 2003; Reinboth, Duda and Ntoumanis, 2004; Gillison et al., 2006; Standage et al., 2012; Pople, Rees and Main, 2015).

The consistent evidence linking a positive relationship with physical activity and health has resulted in guidelines from the World Health Organisation (WHO) that recommend children to engage in 60 minutes of moderate-to-vigorous physical activity (MVPA) per-day (WHO, 201). However, studies consistently demonstrate that the majority of children are not active enough to achieve optimal health benefits. Pooled accelerometer data on 20, 971 children (aged 4-18) (Ekelund et al., 2012) found the average time spent in MVPA was 31 minutes. In the UK context, the average percentage of children (aged 7-8) participating in 60 minutes of (MVPA) per day is 51%, with Northern Irish children having the lowest levels of activity across the UK at approximately 40%. Further, Breslin and Brennan (2012) found that 21% of children of low SES were meeting the WHO’s guidelines. Research is warranted to design effective behaviour change strategies to increase children’s physical activity.

The school setting provides an opportune environment for including lifestyle behaviour change as there is less chance of poor adherence to a programme and a large number of children can be reached in a single setting (Kriemler et al 2011; van Sluijs et al 2008; Dobbins et al 2008; Brown et al 2009). Further, interventions underpinned by a behavioural theory are more likely to be effective (Michie and Abraham, 2004; van Sluijs and Kriemler, 2016). As such, social cognitive theory has been identified as a leading theory for promoting and increasing physical activity in children and has been effective at significantly increasing physical activity with children from low SES in Northern Ireland (Breslin et al., 2012).

School-based physical activity interventions have shown mixed success at improving children’s well-being (Larun et al., 2006; Ekeland et al., 2009). Systematic reviews have reported a small effect size in favour of physical activity reducing depression and anxiety (Larun et al., 2006) and a moderate effect size showing increases in self-esteem, at least in the short term (Ekeland et al., 2009). Potentially, the small effect sizes may be due to the low number of interventions conducted, the low quality research designs and measurement inconsistencies (Biddle & Asare, 2011). Well-being has been shown to be inconsistently measured in studies (Pollard & Lee, 2003). Applying a child-centred well-being measure that reflects the perceptions of children’s well-being has been recommended by Ben-Arieh (2005) in order to overcome such limitations.

The proposed intervention for the current study: Sport for LIFE:AI (Sport is for Living, Integration, Fun and Education: All Island) was based on a previous successful school-based healthy lifestyle intervention Sport for LIFE (SFL) that was conducted in 2012 with children from low SES in Northern Ireland (Breslin et al., 2012). The programme Sport for LIFE was a 12-week physical activity and healthy eating programme designed to promote an active lifestyle and the importance of eating a healthy balanced diet. It was based on other effective school-based physical activity and nutritional interventions (Gorely, Nevill, Morris, Stensel & Nevill, 2009) and used Social Cognitive Theory (SCT) as a framework to develop the programme’s content. The intervention was effective at significantly increasing physical activity with children from low SES in Northern Ireland (Breslin et al., 2012). In addition, the inconsistency in the measurement of well-being will be addressed by using a multi-dimensional measure of well-being developed from a child’s perspective.

Therefore the purpose of the proposed clustered randomised controlled trial is to determine whether the programme Sport for LIFE:AI could improve physical activity, well-being and attitudes towards nutrition in 8-9 year old children from socially and economically disadvantaged areas of Northern Ireland and the Republic of Ireland. Sport for LIFE:AI is the first ‘All island’ (Northern and Republic of Ireland) collaboration between academic institutions aimed at promoting physical activity to children from disadvantaged areas in a school setting. It is predicted that children receiving the Sport for LIFE-All Island school based healthy lifestyle intervention will increase their physical activity, well-being and nutritional attitudes and behaviours when compared to a control group who will not receive the programme.

**METHODS**

**Participants**

A school-based controlled trial of primary school children aged 8-9 years from areas of social disadvantage will be conducted. Children from primary schools from areas of low socio-economic status in Northern Ireland and the Republic of Ireland across the four regions (i.e. Ulster, Munster, Leinster and Connacht) will be invited to participate in the study as an intervention or wait-list control condition. Schools will be identified using the Northern Ireland Statistics and Research Agency’s Northern Ireland Multiple Deprivation Measure 2010 (NIMDM). Each school’s postcode will be entered into the NIMDM web page. The postcode relates to a Super Output Area (SOA) and a SOA score and rank are provided. The SOA rank ranges from 1 (most deprived) to 890 (least deprived). The overall multiple deprivation score is based on seven indices of deprivation including; income, employment, health and disability, education skills and training, proximity to services, the living environment and crime. All scores are from the period 2007-2009. Schools with the highest ranking (most deprived) will be invited to participate. Furthermore, schools will also be identified from a list compiled by the University of Ulster’s Widening Access and Participation Sub-committee (WAPSC) (WAPSC, 2009). This list was used to select schools for the original Sport for LIFE project (Breslin et al., 2012). In the Republic of Ireland schools identified by the Department of Education’s Delivering Equality of Opportunity in Schools (DEIS) programme will be invited to participate. The criteria for a DEIS school include: lone parenthood, local authority accommodation, Travellers, large families (five or more children) and pupils eligible for free books.

After school selection is conducted a letter will be sent to selected school Principals inviting their schools to take part in the study. With their consent children and parents/guardians will be then be recruited through the appropriate class teacher(s). Letters, consent and assent forms will be given to children through the class teachers to take home to their parents/guardians for completion, and to then return to their teacher in advance of data collection, an opt in approach will be adopted as this ensures parents are fully aware of their child’s participation in the study (see appendix 4 and in the Cork region appendix 12).

**Design**

A 2 (groups) x 4 (measurement points) clustered randomised controlled trial will be implemented. Schools will be randomly assigned to either an intervention or control group. Is it the intention to match the intervention with an associated control school from the same area allowing a pairwise comparison. The sample size will be a total of 766 children: 383 in the intervention and 383 in the control groups. The inclusion of the control group will allow us to evaluate the changes in physical activity, sedentary behaviour, nutrition and wellbeing as a result of the programme. The intervention group will receive the SFL:AI intervention for a period of 12 weeks, control schools will be asked to continue as normal. At baseline, mid-point (6 week), post intervention (week 13) and follow-up (3 months later) the measures detailed below will be taken with both groups. The intervention will not replace normal Physical Education classes but will be in addition to these classes.

**Measurement Tools**

*Assessment of Physical Activity*

Actigraph accelerometers will be used to obtain information on the number of steps taken, and the frequency, intensity and duration of physical activity and sedentary behavior participated in daily by children involved in the programme. Physical activity will also be assessed by using two self-report questions (HPA, 2006, Breslin et al, 2012).

*Assessment of subjective health and wellbeing*

KIDSCREEN- 27 will be included to assess subjective health and wellbeing (Ravens-Sieberer et al., 2007). KIDSCREEN- 27 is considered valid and reliable and is suitable for use with children aged 8-9 years.

*Youth Physical Activity Promotion Model*

The *Youth Physical Activity Promotion (YPAP)* (Rowe, [Raedeke](http://www.researchgate.net/researcher/9726707_Thomas_D_Raedeke), [Wiersma](http://www.researchgate.net/researcher/13895156_Lenny_D_Wiersma), & [Mahar](http://www.researchgate.net/researcher/5330853_Matthew_T_Mahar), 2007) assesses seven separate components of children’s perceptions of themselves in the context of taking part in physical activity and exercise. These include: Physical Self-Worth; Liking of Games and Sports; Peer Acceptance; Perceived Physical Competence; Fun of Physical Exertion; Parent Encouragement; Liking of Vigorous Exercise. The YPAP is suitable for use with children aged 8-9 years and includes suitable internal consistency shown through Confirmatory Factor Analysis (Rowe et al, 2007)

*Assessment of Nutrition*

Children’s dietary patterns, attitudes, behaviours and environment associated with healthy eating will be assessed using an Australian Child Nutrition Questionnaire (Wilson, Magarey & Mastersson, 2008) which has been slightly modified to reflect foods and beverages commonly found in Ireland.

**Delivery of Programme**

A 12 week SFL-AI physical activity and healthy eating programme will be delivered

for one hour a week (i.e 12 hours of instruction in total) during curricular time, but not including PE time. It aims to highlight the social, physical and psychological benefits of healthy eating and participating in sport and physical activity. In addition the programme will transfer university knowledge and expertise in sport and physical activity through programme delivery and the development of a range of learning resources (DVD, website and teaching resource cards and equipment) which use sport and physical activity as a stimulus for learning.

The programme will reflect the requirements of the respective National Curricula for Northern Ireland and the Republic of Ireland and will be delivered by the trained student outreach officer in partnership with the classroom teacher. The programme will include a range of games and activities requiring basic fundamental movement skills appropriate for children aged 8-9 year that can be transferred to lifestyle behaviour.

The educational themes of the 12 week programme consist of the following:

|  |  |
| --- | --- |
| **Week** | **Teaching Theme** |
| 1 | Introduction: What is Physical Activity? What is Health? |
| 2 | Heart Health |
| 3 | 60 minutes A Day of Active Play |
| 4. | Mr & Ms Muscles 1 |
| 5. | Mr & Ms Muscles 2 |
| 6 | Inside – Out  Physical Activities for indoors and outdoors |
| 7. | Eat Smart |
| 8. | Drink Smart |
| 9. | Eat 4 Energy |
| 10. | Eat Smart, Move More |
| 11. | Feel Good |
| 12 | Team Building and Review  What is Physical Activity? What is Health? |

*Table 1: 12 week Sport For Life All Island themes*

**Procedure**

On receiving consent and assent from the parents and children, a team of 4-5 researchers will arrive at the school on a prearranged time convenient for the school, the following general schedule will be used:

9:30-:9:45 Children briefed on the project

9:45-10:15 Sections A of the questionnaire will be completed

10:15-10:30 Break

10:30-11:00 Section B of the questionnaire will be completed

11:00-12:00 Height and weight measurements taken

12:00-12:15 Accelerometers distributed

**Piloting**

The assessment tools (questionnaires) and accelerometers will be piloted on an appropriate cross-sample of children representing the main demographic variables (e.g. gender, age, socio-economic status, location, etc.). The assessment tools will also be shown to teachers to assess their face validity and usability.

**Fieldwork**

Fieldwork will take place at two week intervals at each of the four time points.

**Sample, data handling, validation and analysis**

A priori sample size was calculated using G\*POWER for mixed Analysis of Variance. Using the a priori assumptions of 2 groups measured across 4 time points, p = 0.05, *f* = 0.05, and a Power of 80%, the original G\*POWER calculation yielded a minimum total sample size of 644 participants. This effect size was selected based on the changes in encouraging healthy attitudes and behaviour to nutrition reported in the previous SFL intervention (Breslin et al., 2012) as it was smaller than the reported effects sizes for physical activity and sedentary behaviour. To allow for an attrition rate of 19% (observed in the SFL 2011/12 research) a total sample size of 766 will be the intended number of children recruited for this study. Based on the mean number of recruited children per school (16 in the SPL; 16 in SFL-AI) between 32 schools in total will be invited to take part in the programme.

Once the data have been collected, the data from each participant will be encoded to ensure that each participant cannot be identified and to maintain confidentiality. The data will be exported, fully labeled, to SPSS. Data validity and reliability checks will be performed before the final analysis by the statistician on the project team.

Specific statistical analysis comparing trends between variables will be conducted (e.g., Chi square, correlation, t- test, ANOVA) to compare pre, mid post and follow-up scores.

All questionnaires will be stored in a locked filing cabinet at each of the institutions involved in the study. An electronic SPSS dataset will be stored on a password protected computer by the lead researcher.

##### Project Schedule

We propose the below project schedule. Our proposed project schedule is designed to ensure that a full evaluation of the progamme is completed in terms of the outcomes achieved, implementation and sustainability issues

The proposed schedule is:-

June 2014 Pilot testing

September, 2014 Full sample (pupils & teachers in Ulster and Leinster intervention group and Connacht and Munster control group), pre test data collection

December, 2014 Full sample (pupils & teachers in Ulster and Leinster intervention group and Connacht and Munster control group), post test data collection.

January , 2015 Full sample (pupils & teachers in Munster and Connacht intervention group and Connacht and Munster control group), pre test data collection

April, 2015 Full sample (pupils & teachers in Munster and Connacht intervention group and Connacht and Munster control group), post test data collection.

May– August 2015 Data analysis and evaluation of the programme

December 2015 Delivery of final report to The Coca-Cola Foundation

Jan-June 2016 Preparation of peer reviewed publications

**REFERENCES**

Abbott, R, A., Davies, P, S. (2004). Habitual physical activity and physical activity intensity: their relation to body composition in 5.0–10.5-y-old children. *European Journal of Clinical Nutrition*, *58,* 285–91.

Ben-Arieh, A. (2005). Where are the children? Children’s role in measuring and monitoring their well-being. *Social Indicators Research, 74,* 573–596. doi: 10.1007/s11205-004-4645-6

Brennan, D., & Breslin, G.(2011) Promoting Physical Activity in Disadvantaged Groups: Ulster Sports Outreach Sport For Life. *A case study for the World health Organization.*

Breslin, G & Brennan, D. (2012) A healthy lifestyle intervention delivered by aspiring PE teachers to children from social disadvantage: study protocol and preliminary findings *Child Care and Practice, 18* (3), 1-19.

Breslin, G., Brennan, D., Rafferty, R., Gallagher, A, M., & Hanna, D (2012). The effect of the ‘Sport for LIFE’ school based intervention on physical activity, sedentary behaviour, nutrition attitudes and behaviours in 8-9 year old children. *Archives of Disease in Childhood,* doi:10.1136/archdischild-2011-301108

Breslin G., Gossrau-Breen, D., McCay, N., Gilmore, G., MacDonald, L. & Hanna, D.

(2012). Physical Activity, Gender, Weight Status, and Wellbeing in 9- to 11-Year-Old

Children: A Cross-Sectional Survey. *Journal of Physical Activity and Health,* *9,* 394 –

401.

Brown, T. and Summerbell, C. (2009).Systematic review of school-based interventions

that focus on changing dietary intake and physical activity levels to prevent childhood

obesity. *Obesity Reviews,* 10:110-141

Childs E, de Wit H. (2014) Regular exercise is associated with emotional resilience to acute stress in healthy adults. Front Physiol. 5:161.

Van Sluijs, E. M., McMinn, A. M. and Griffin, S. J. (2008). Effectiveness of interventions to promote physical activity in children and adolescents: systematic review of controlled trials. *Br J Sports Med,* 42: 653-7.

Cameron, D. (2010). PM speech on well-being: A transcript of a speech given by the

Prime Minister on well-being on 25 November 2010. Number10.gov.uk The Official site

of the Prime Minister. Retrieved 12 November 2011 from:

[www.number10.gov.uk/news/speeches-and-transcripts/2010/11/pm-speech-on-well-being-57569](http://www.number10.gov.uk/news/speeches-and-transcripts/2010/11/pm-speech-on-well-being-57569)

Cheung, S.Y., Mak, J.Y. & Chan, J. (2008). Children’s physical activity participation and

psychological wellbeing. *Research Quarterly for Exercise and Sport, 79 (1),* A30.

Danner FW. (2008). A national longitudinal study of the association between hours of TV viewing and the trajectory of BMI growth among US children. *J Pediatr Psychol* *33,* 1100–7.

Department of Educaiton and Science (2005) DEIS: An Action Plan for Educational Inclusion. Available at: http://www.education.ie/en/Publications/Policy-Reports/deis\_action\_plan\_on\_educational\_inclusion.pdf

Department of Health (2013). Improving Children and Young People’s Health Outcomes: a system wide response. https://www.gov.uk/government/uploads/system/uploads/attachment\_data/file/214928/9328-TSO-2900598-DH-SystemWideResponse.pdf Accessed 12th March 2014.2013). Hi Healthy Ireland: A Framework for improved health and wellbeing 201

Dobbins, M., DeCorby, K., Robeson, P., Husson, H. and Tirilis, D.(2009). School-based PA programs for promoting physical and fitness in children and adolescents aged 6-18 years. *Cochrane Database of Systematic Reviews*. 1

Ekeland, E., Heian, F., Hagen, K., & Coren, E. (2005). Can exercise improve self-esteem in children and young people? A systematic review of randomised controlled trials. *British Journal of Sports Medicine, 39(11),* 792-798. doi: 10.1136/bjsm.2004.017707

Fattore, T., Mason, J., & Watson, E. (2007). Children’s conceptualisation(s) of their well-

being. *Social Indicators Research, 80,* 5–29.

Franks, P. W., Hanson, R. L., Knowler, W. C., Sievers, M. L., Bennett, P. H. and Looker, H. C. (2010). Childhood obesity, other cardiovascular risk factors, and premature death. *N Engl J Med,* 362: 485-493.

Fries E, Dettenborn L, Kirschbaum C (2009) The cortisol awakening response (CAR): facts and future directions. Int J Psychophysiol. 72(1):67-73.

Friedli, L. (2009). *Mental Health, resilience and inequalities*. World Health Organisation,

Denmark . Available at:

<http://www.euro.who.int/data/assets/pdf_file/0012/100821/E92227.pdf>

Gorely, T., Nevill, M.E., Morris, J.G., Stensel, D.J., & Nevill, A. (2009). Effect of a school-based intervention to promote healthy lifestyles in 7-11 year old children. *International Journal of Behaviour Nutrition & Physical Activity, 6(5*). doi:10.1186/1479-5868-6-5

Gortmaker, S, L., Must, A, Sobol, A. M, *et al*. (1996).Television viewing as a cause of increasing obesity among children in the United States, 1986–1990. *Arch Pediatr Adolesc Med*;150:356–62.

Gunnell, D. J., Frankel, S. J., Nanchahal, K., Peters, T. J. and Davey Smith, G. (1998). Childhood obesity and adult cardiovascular mortality: a 57-y follow-up study based on the Boyd Orr cohort. *Am J Clin Nutr,* 67: 1111-1118.

Heijsman SM, Koers NF, Bocca G, van der Veen BS, Appelhof M, Kamps AW. 2012. Non-invasive measurement of adrenal response after standardized exercise tests in prepubertal children. J Pediatr Endocrinol Metab. 25:471-8.

Kaplow JB, Shapiro DN, Wardecker BM, Howell KH, Abelson JL, Worthman CM, Prossin AR. 2013. Psychological and environmental correlates of HPA axis functioning in parentally bereaved children: preliminary findings. J Trauma Stress. 26:233-40.

Kriemler, S., Meyer, U., Martin, E., van Sluijs, E., Anderson, L.B. and Martin, B.W. (2011).Effect of school-based interventions on physical activity and fitness in children and adolescents: A review of reviews and systematic update. *Br J Sports Med, 45,* 923-930.

Larun, L., Nordheim, L. V., Ekeland, E., Hagen, K. B., & Heian, F. (2006). Exercise in prevention and treatment of anxiety and depression among children and young people. *Cochrane Database Systematic Review, Jul 19*(3), CD004691. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/16856055

Law R, Hucklebridge F, Thorn L, Evans P, Clow A. (2013) State variation in the cortisol awakening response. *Stress 16*(5):483-92.

Martikainen S, Pesonen AK, Lahti J, Heinonen K, Feldt K, Pyhala R, et al. 2013. Higher levels of physical activity are associated with lower hypothalamic-pituitary-adrenocortical axis reactivity to psychosocial stress in children. J. Clin. Endocrinol. Metab. 98, E619–E627.

Mills A, Patel S & Crawley H.(1994).Food Portion Sizes. Ministry of Agriculture, Fisheries and Food. Food Standards Agency.

Northern Ireland Statistics and Research Agency’s Northern Ireland Multiple Deprivation Measure (2010) (NIMDM) web page, accessed 20th February 2014. (<http://www.ninis.nisra.gov.uk/mapxtreme_deprivation2010/default.asp>)

Paffenbarger, R. S., Jr., Hyde, R. T., Wing, A. L. and Hsieh, C. C. (1986). Physical activity, all-cause mortality, and longevity of college alumni. *N Engl J Med*, 314:605-613.

Pollard, E.L., & Lee, P.D. (2003). Child well-being: a systematic review of the literature. *Social Indicators Research, 61*, 59-78. doi.org/10.1023/A%3A1021284215801

Ravens-Sieberer, U., Auquier, P., Erhart, M., Gosch, A., Rajmil, L., Bruil, J., et al. (2007). The KIDSCREEN-27 Quality of Life measure for children and adolescents: Psychometric results from a cross-cultural survey in 13 European Countries. *Quality of Life*

*Research, 16,* 1347–1356.

Research Agency’s Northern Ireland Multiple Deprivation Measure (2010). (<http://www.ninis.nisra.gov.uk/mapxtreme_deprivation2010/default.asp>)

Rees, G., Bradshaw, J., Goswami, H., & Keung, A. (2008). *Understanding children’s*

*well-being: A national survey of young people’s well-being.* London: The Children’s

Society.

Rowe, D, A.,  [Raedeke](http://www.researchgate.net/researcher/9726707_Thomas_D_Raedeke), T. D., [Wiersma](http://www.researchgate.net/researcher/13895156_Lenny_D_Wiersma), L.D, & [Mahar](http://www.researchgate.net/researcher/5330853_Matthew_T_Mahar), M.T. (2007). Investigating the

youth physical activity promotion model: internal structure and external validity evidence

for a potential measurement model. *Pub Med 19*(4), 420-35.

Tomson, L. M., Pangrazi, R. P., Friedman, G., & Hutchinson, N. (2003). Childhood

depressive symptoms, physical activity and health related fitness. *Journal of Sport and Exercise Psychology, 25(4),* 419-439.

Ulrike S, Reinhold L, Dirk H. 2013. Major depression in young girls is related to altered cortisol awakening response. *Eur Child Adolesc Psychiatry*. 22:379-84

Widening Access and Participation Sub-committee (2009). University of Ulster, Northern Ireland.

Wilson, A.M., Magarey, A.M., & Mastersson N. (2008). Reliability and relative validity of a child nutrition questionnaire to simultaneously assess dietary patterns associated with

positive energy balance and food behaviours, attitudes, knowledge and environments

associated with healthy eating. *International Journal of Behavioural Nutrition & Physical Activity,*5:5.

World Health Organization (2000). *Obesity: Preventing and Managing the Global Epidemic. Report of a WHO consultation.* Geneva: WHO.

World Health Organization (2006). *Basic Documents Constitution of the World Health*

*Organisation*, (45th ed.). WHO: Geneva.