Journal of Sports Science 2 (2014) 181-188
doi: 10.17265/2332-7839/2014.04.002

Evaluation of a School-Based Intervention to Promote Physical Activity and Sport among Young People Aged 11-13 in East London, UK

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Abstract: Due to the alarming increase in overweight/obesity among adolescents in the UK and in response to low levels of PAS (physical activity and sport), initiatives have been developed to promote PAS in vulnerable groups. The purpose of this study is: (1) to evaluate the effect of one such PAS initiative on 11-13 (n = 913) years old young people's PAS patterns and participation; (2) to assess young peoples' expectations and perceived benefits of the program; and (3) to make evidenced based recommendations for future interventions. Socio-demographic data, PAS data and perceptions of the program were assessed via questionnaire. Anthropometric data (height, weight, waist circumference) were also measured. Wilcoxon signed-rank tests were used to test for significant differences between baseline and follow-up PAS data. McNemar chi-square tests were used to test for significance between baseline and follow-up expectations data. Wilcoxon signed-rank tests showed a reduction in total PAS (from 39% to 7%) from baseline to follow-up but five sports not currently offered through the national PE (physical education) curriculum (badminton, basketball, volleyball, cricket and rowing) saw an increase in participation. Young people's perception of the program was positive, with a significant increase in those reporting the program helped them "be more sporty" and "be more healthy" (both significant at $P < 0.05$). While overall PAS did not increase, sports offered outside of those available as part of the national curriculum for PE were more popular; strengthening the case for further research and supporting the current trend of extending the sports available through PE in schools and school sports to positively contribute to increase in PAS. Future interventions should consider the target population more carefully in the design and implementation of such programs by offering culturally responsive PAS programs.

Key words: Physical activity, sedentary time, ethnicity, adolescent health.

1. Introduction

Overweight and obesity among adolescents in the UK has become a major public health issue in recent years [1]. Engagement in PAS (physical activity and sport) is known to be independently associated with reduction of excessive weight and risk for related diseases [2]. Other various documented benefits from participation in PAS for young people include cognitive development, social inclusion, self-esteem and lifelong participation [3]. Research shows that participation in PAS decreases throughout adolescents [4]. Therefore PAS are important behaviors to promote among young people [3]. The aftermath of the London 2012 Olympic and Paralympic Games has seen an influx of PAS programs to maintain the Games legacy. Initiatives to increase PAS among young people have been implemented, and the Olympic park has been used extensively for PAS events offered to the general public. Many community and school schemes to increase PAS participation amongst young people have also been introduced [5].

Once such intervention is the NECaSP (Newham's Every Child a Sportsperson) school-based program in which all Year 7 students (aged 11-13) in a borough in East London, UK, were given the opportunity to participate in PAS.

The NECaSP program sought to address social inequalities within PAS framed within the SET (social ecological theory) of PAS. SET indicates that PAS

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behaviors and patterns are the result of complex interactions between individual characteristics (e.g., genetics, economic status, psychological factors) and the social (e.g., networks and support, families and siblings), environmental (e.g., schools, facilities, crime, safety), and policy contexts in which individuals live [6]. The NECaSP program aimed to influence the participation in PAS by providing support on each level as set out by SET: removing financial barriers by providing PAS in schools (individual), including all students in the same year group (social), providing support in schools and to community sports clubs (environmental), and altering and improving (as this study will show) PE (physical education) curriculum provision (policy). Thus, this paper provides a comprehensive evaluation of the NECaSP project framed within the SET. More specifically, the aim of the paper is to: (1) evaluate the effect of the NEcaSP project; (2) to assess young peoples' expectations and perceived benefits of the program; and (3) to make evidenced based recommendations for future interventions.

2. Methods

Data presented in this paper were collected as part of an outcome evaluation of short-term effects of the NECaSP conducted in East London, UK. East London is known for its diversity and deprivation [7]. NECaSP aims to increase PAS amongst young people and enable them to adopt healthy lifestyles via sporting participation. This program provides the opportunity for schools to engage in collaboration with sports clubs, community sporting environments and curriculum that meet the needs of adolescents [8]. The program included three phases: (1) an introductory day in schools that included the opportunity for pupils to experience a range of PAS; (2) a one-day "taster" coaching session in a local leisure institution where young people were coached on five sports by coaches from local sports clubs, and (3) a school curriculum intervention during which young people had the opportunity to engage in a 6-week after school program on a sport of their choosing (20 sports available to choose from).

2.1 Participants

All secondary schools (n = 17) in East London were invited to participate in the program. Sixteen schools participated in the program at some stage. Six schools (37.5%) participated in all three stages. A convenience sample of three schools is included in this analysis. All young people aged 11-13 from these three schools were invited to participate in this study (n = 1,497). Eligibility requirements for participation included: being enrolled in Year 7, able to physically engage in the program, and informed consent from both parents and students. A final sample of n = 557 at baseline and n = 356 was obtained. The overall response rate was 63.91%. Ethical approval for this study was obtained from the University of East London Research Ethics Committee.

2.2 Measures

Participants were invited to complete a questionnaire on socio-demographic variables, PAS participation and expectations of the program at baseline (beginning of the program) and follow-up (within one week of program completion). Anthropometric data were obtained at baseline.

2.2.1 Socio-demographic and Anthropometric Variables

Participants were invited to have anthropometric measurements taken by a trained researcher according to set protocols. These included height in mm with a Seca Leicester stadiometer, weight in kg using Seca 899 digital scale, and waist circumference in cm. BMI (body mass index) was computed (weight in kg/height in m^2) and participants classified into categories based on sex-specific and age-specific cut points as defined by the World Health Organization [9]. Categories were defined as underweight≤(5th percentile), healthy weight (10th percentile-75th percentile), overweight (85th-90th percentile), and obese≥(95th percentile) [9]. Socio-demographic information obtained via

questionnaire included sex, age, ethnicity, and residential postcode. Residential postcode was used to establish IMD (Index of Multiple Deprivation) scores for each participant as a measure of socio-economic status. IMD is commonly used in the UK as an indicator of socio-economic status and is a relative measure of deprivation based on seven domains of deprivation: income, employment, health and disability, education, crime, housing and services, and living environment [10].

2.2.2 Physical Activity and Sport Variables

Data on PAS participation were obtained via questionnaire. Questions were adapted from Physical Activity Questionnaire for Older Children and the Physical Activity Questionnaire for Adolescents [11]. Questions included how often participants were active during PE (physical education) classes, lunchtime, after school, evenings, weekends, and in their free time and answer choices were on a scale of 1 (none) to 5 (5 or more times in the past week). Total PAS and ST (sedentary time) during and after school were calculated as summary variables. Frequency rather than duration was assessed for PAS and ST because children at this age are known to have low reliability in recalling time spent in PAS [12]. Questions on participation in specific sports delivered by the program were included. At baseline and follow-up participants were asked to recall their activities in the past seven days. Finally, young people were asked to recall participation in sports clubs.

2.2.3 Expectations of the Program

The baseline questionnaire included questions on what participants expected to gain from the program. The follow-up questionnaire included questions on what participants felt they gained from taking part in the program and were based on the baseline questionnaire.

2.3 Data Analysis

Descriptive statistics (means, standard deviations and percentages) were calculated for all variables. Data for outcome measures was ordinal therefore, nonparametric statistical tests were used to investigate data for significant differences from baseline to follow-up. Wilcoxon signed-rank tests were used to test for significant differences between baseline and follow-up PAS. McNemar chi-square tests were used to test for significance between baseline and follow-up expectations data. All statistical analyses were conducted using PASW 22.0 (Quarry Bay, Hong Kong).

3. Results

3.1 Individual Characteristics

Descriptive statistics can be seen in Table 1. Total sample size was $n = 913$; $n = 557$ at baseline and $n = 356$ at follow-up. Age, waist circumference, BMI, BMI category, sex, IMD quintile, and ethnicity were investigated for differences in the baseline sample and the sample of follow-up participants. There were no significant differences between baseline and follow-up samples for these variables, indicating that the samples were similar. Mean age was 11.44 ± 0.50 and 11.44 ± 0.53, mean waist circumference was 72.82 ± 10.84 and 72.59 ± 10.84 and mean BMI was 20.28 ± 4.31 and 20.07 ± 4.24 for baseline and follow-up samples. The majority of both samples were categorized as having a healthy weight according to BMI (62.70% and 67.20% at baseline and follow-up). Nearly 10% of both samples were overweight and nearly 17% were obese. Most participants (83%) were found to be in the two most deprived IMD quintiles. The three most commonly reported ethnicities for baseline and follow-up samples were Asian Pakistani (9.70%, 11.80%), Black African (15.60%, 13.20%), and Asian Bangladeshi (22.80%, 26.10%).

3.2 PAS during and after School (Social and Environmental Contexts)

39.0% met recommended levels of PAS of moderate to vigorous activity most days per week at baseline, while only 6.8% met these guidelines at follow-up. At

Table 1 Descriptive statistics.

	Full baseline sample (n = 557)		Sub-sample at follow-up (n = 356)	
	Mean (SD)	% (n)	Mean (SD)	% (n)
Age	11.44 (0.50)		11.44 (0.53)	
Waist	72.82 (10.84)		72.59 (10.84)	
BMI	20.28 (4.31)		20.07 (4.24)	
BMI category				
Underweight		5.70 (32)		6.20 (22)
Healthy weight		62.70 (349)		67.20 (227)
Overweight		9.90 (55)		9.50 (32)
Obese		17.60 (98)		16.90 (57)
Sex				
Male		52.80(294)		54.80(200)
Female		43.30 (263)		43.50 (155)
School				
A		32.73 (182)		42.40 (151)
B		46.52 (259)		29.80 (106)
C		20.75 (113)		27.20 (97)
IMD quintile				
1(Least deprived)		0.20 (1)		0.30 (1)
2		0.40 (2)		0.60 (2)
3		0.50 (3)		0.80 (3)
4		14.50 (81)		12.70 (45)
5(Most deprived)		83.70 (466)		85.10 (303)
Ethnicity				
White English		8.40 (47)		8.10 (29)
White British		0.90 (5)		0.60 (2)
White Irish		0.40 (2)		0.60 (2)
White-other		12.20 (68)		10.40 (37)
Asian Indian		7.70 (43)		7.90 (28)
Asian Pakistani		9.70 (54)		11.80 (42)
Asian Bangladeshi		22.80 (127)		26.10 (93)
Asian Chinese		0.70 (4)		0.30 (1)
Asian-other		4.30 (24)		4.20 (15)
Mixed-Black/Asian/White		3.60 (20)		3.40 (12)
Mixed-other		2.20 (12)		1.70 (6)
Black African		15.60 (87)		13.20 (47)
Black Caribbean		4.10 (23)		4.45 (16)
Black-other		3.90 (22)		3.10 (11)
Arab		1.80 (10)		2.50 (9)
Other		1.60 (9)		1.70 (6)

baseline 5.6% of participants reported being sedentary after school while at follow-up 9.95% reported being sedentary after school. None of the participants reported were sedentary during school at baseline or follow-up.

For total PAS during school, Wilcoxon sign-rank tests indicated activity levels were significantly lower at follow-up (Mdn = 2.00), when compared to baseline (Mdn = 4.00), z = -2.596, $P < 0.05$, r = -0.14. No significant differences were seen for after school total PAS, during school ST, or after school ST. PAS during PE was significantly lower at follow-up (Mdn = 3.00),

compared to baseline (*Mdn* = 4.00), z = -3.466, $P < 0.05$, r = -0.19. No other significant differences were seen. Investigation of PAS by day of the week revealed a significant difference in PAS levels on Sunday. At follow-up (*Mdn* = 3.00) activity levels on Sunday were significantly higher than at baseline (*Mdn* = 2.00), z = -2.095, $P < 0.05$, r = -0.11. No other significant differences were seen for daily PAS levels.

Significant differences between baseline and follow-up data on individual sports are reported in Table 2. Five sports saw an increase in participation from baseline to follow-up. These were badminton, basketball, volleyball, cricket and rowing. Skipping, tag, jog/running, dance, ice hockey, and netball saw a reduction in participation levels from baseline to follow-up. Sports that saw no change from baseline to follow-up were walking for exercise, cycling, football, hockey, and swimming.

3.3 PE Provision (Policy Context)

Table 3 summarizes McNemar chi-square tests results for expectations of the program. For the "be more sporty" and "be more healthy" questions, tests showed a significant difference from baseline to follow-up, with follow-up percentages (38.5%, 42.4%) higher than at baseline (37.3%, 40.9%). Although none of the other choices were significantly different, the percentage of participants choosing "be more physically active", "learning about health and sport", and "spend time with friends" were higher in the follow-up compared to baseline.

A quarter of participants reported that they maintained participation in a new club or activity in the past seven days and 27.9% in the last month as a result of the program. 66.3% reported that they would maintain participation in sports clubs or activity as a result of the program. 44.6% of those who responded indicated that they will or have already joined a sports club in their community. Participants were able to write in which new sports they participated in and wanted to maintain (n = 108). These included football (20.20%), basketball (11.00%), cricket (6.80%), swimming

Table 2 Significant differences in sport participation from baseline to follow-up.

Sport	Baseline median score	Follow up median score	z-statistic	Significance level	Effect size
Badminton	1	2	-3.07	$P < 0.05$	-0.17*
Basketball	2	3	-4.42	$P < 0.05$	-0.24*
Volleyball	1	2	-5.59	$P < 0.05$	-0.3*
Cricket	1	2	-2.17	$P < 0.05$	-0.12*
Rowing	1	2	-3.98	$P < 0.05$	-0.21*
Skipping	2	1	-2.69	$P < 0.05$	-0.14
Tag	2	1	-2.86	$P < 0.05$	-0.15
Jog/run	3	2	-3.26	$P < 0.05$	-0.17
Dance	2	1	-3.34	$P < 0.05$	-0.18
Ice hockey	2	1	-2.22	$P < 0.05$	-0.12
Netball	2	1	-3.38	$P < 0.05$	-0.18

*Significant increase in participation from baseline to follow-up.

Table 3 McNemar's chi-square test for baseline and follow-up expectations of the NECaSP programme.

Expectation	Percentage saying YES at baseline (n)	Percentage saying YES at follow-up (n)
Be more physically active	52.2% (617)	54.3% (176)
Learn about health and sport	31.2% (369)	33% (107)
Learn to play a sport	31.2% (356)	30.2% (98)
Be more sporty	38.5% (456)*	37.3% (121)
Be more healthy	42.4% (502)*	40.9% (130)
Spend time with friends	19.9% (236)	21.9% (71)

*$P < 0.05$.

(3.40%), futsal (2.90%) and rugby (2.00%) as the most commonly reported. When probed for reasons why they would maintain participation in a new sports club or activity, participants responded with answers including: being fit, being healthy, being sporty, because it is fun, and to experience new things.

7.1% (n = 25) of participants at follow-up indicated that they did not gain anything from the program. When prompted to provide further clarification why they would not engage in or maintain a new sports club or activity, the most popular answers were (n = 180): do not want to travel (3.00%), they do not like sport (2.70%), too busy (2.30%) and already do a sport (1.30%). 64.2% indicated that their school helped them to maintain participation in a sports club. When asked how the school helped, the most common answers were: offered a variety of clubs, introduced to new sports, by doing more sports during PE, by giving encouragement by making it fun, and by showing how to play a new sport. Football (5.90%), cricket (2.00%) and cheerleading (1.30%) were the sports most commonly reported by participants as new clubs that they have or will join in their communities (n = 102).

4. Discussion and Conclusions

The main findings from this evaluation indicate that the program increased sport participation among 11-13 years old for five sports (badminton, basketball, volleyball, cricket and rowing). We hypothesize several reasons for this success. Sports that saw an increase are those that are not typically on offer as part of the national curriculum syllabi for PE. Therefore, young people can increase participation in PAS if provided alternative curriculum to the ones offered, which are currently based on competitive games and skills development [3].

A high percentage of this sample (64.2%) indicated that school helped them to maintain participation in a sports club. As such, schools are an important mechanism for guidance and a key component in environmental level of the SET of PAS. Furthermore, participants who engaged in PAS after school reported higher levels of PAS than those who participated in PAS during school hours.

On the whole, analyses indicate that there was no increase in the overall PAS of participants. In fact, the data show a decrease in levels of PAS at follow-up. There are several possible explanations for this drop in PAS levels. It is likely that such a small and unrepresentative sample may not show improvements in PAS levels and may not be generalized to the Year 7 population as a whole. The timing of data collection is also an important factor. Baseline data were collected during much cooler months of the year, while follow-up data were collected during the much warmer (at times 30°) weather in which participants may not engage in activity because it is too hot.

Moreover, follow-up data were collected during the religious month of Ramadan. It is known that 3.1% of females in the baseline sample wore a headscarf indicating they are practicing Muslims, although a full accurate number of the total Muslims observing Ramadan during the follow-up data collection period is unavailable. It has been suggested [13] that many Muslim girls face barriers to PE and PAS participation. Research identifies areas of tension between the cultural practices of Islam and PE in schools in western contexts [14]. Participation in PAS has been seen as a distraction from higher-order pursuits in religious and familial duties [15].

4.1 Limitations and Strengths

There are some limitations in this research. Firstly, these convenience samples cannot be assumed to be representative of all 11-13 year olds in East London. Data indicate that there may have been recall bias by participants who completed both baseline and follow-up questionnaires, especially for ST as few reported being sedentary after school and none during school. Caution should be used when interpreting these results as self-report methods of measuring PAS and ST are known to suffer from recall bias [16]. Recall

bias can be avoided in the future through the use of objective measures such as pedometers or accelerometers [17].

There are also important strengths to this study. This study evaluated a PAS intervention program in a group of adolescents that can be considered "hard to reach" [14] and marginally represented in research studies. Many of the participants are from deprived backgrounds with diverse cultures, languages and ethnicities. As such, this paper provided further insights into the PAS participation of diverse young people in East London. This paper has provided valuable data on the PAS engagement of young people from ethnic minority backgrounds documenting that levels of inactivity and obesity and overweight are similar to those nationally [18]. Finally, this paper has contributed to the ongoing debate in the UK, and globally, on the effect of the London 2012 Games by providing insights on the patterns of PAS participation of young people through an informed school sport program supported by the Legacy of the Games.

5. Recommendations for the Future

In summary, notwithstanding the limitations of this study, the NECaSP program was found to increase participation in sport among adolescent Year 7 students in East London. While this has not yet translated into overall increases in PAS, it is a positive result and as such warrants further investigation. It is evident that sports offered outside those available as part of the National Curriculum for PE were more popular, strengthening the case for further research and supporting the current trend of extending the sports available through PE in schools and school sports. This paper has contributed to the ongoing debate on reforming provision of PE and school sport by attending to local needs and the needs of students that live in deprived, ethnically diverse contexts. Finally, this study suggests that schools are still an appropriate vehicle for delivery of PAS interventions and should be utilized fully. Nevertheless, a more innovative approach to curriculum development is required to meet the needs of diverse students. Future interventions should carefully consider the target population in design and implementation. Since East London is known for its superdiverse communities, more attention must be paid to how to engage superdiverse adolescents.

Acknowledgments

Any views expressed in this article are those of the authors. This study was funded from a grant from activeNewham. We would like to thank the field researchers and participants for participating in this study.

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