

Well London: Results of a community engagement approach to improving health among adolescents from areas of deprivation in London

Caroline Frostick, Paul Watts, Gopalakrishnan Netuveli, Adrian Renton and Derek Moore

University of East London

Author Note

Caroline Frostick, Institute for Health and Human Development, University of East London

Paul Watts, Department of Health and Bioscience, University of East London

Gopalakrishnan Netuveli, Institute for Health and Human Development, University of East London

Adrian Renton, Institute for Health and Human Development, University of East London

Derek Moore is now at the Department of Psychology, Surrey University.

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Correspondence concerning this article should be addressed to Caroline Frostick, The Institute for Health and Human Development, University of East London, Stratford Campus, London E15 4LZ

Contact: c.frostick@uel.ac.uk

Abstract

This paper reports findings among adolescents of the impact of *Well London*, a programme of wellbeing interventions delivered across 20 deprived neighbourhoods of London using a community engagement model. 1,254 adolescents were surveyed from matched intervention and control areas. There was no significant intervention effect on the main outcome measures: unhealthy eating; physical activity and mental health. Factors influencing the results may include the possibility that the communities defined by the cluster randomised controlled trial (CRCT) were not an accurate reflection of the adolescent's natural community, and interactions within the school environment in particular could have led to a dilution of effect.

Introduction

The relationship between social deprivation and health inequality has become increasingly apparent, particularly in high income countries (Marmot, 2010; Buck & Frosini, 2012). In recent years there has been a move towards a more collaborative approach in implementing health interventions which utilise the skills and resources available within communities themselves (NICE, 2008; Foot & Hopkins, 2010). It has been suggested that community engagement models for delivering health interventions can have a wider impact beyond the intervention itself by increasing the control people have over their environments (Wallerstein, 2002; O'Mara-Eves, Brunton, McDaid, Oliver, Kavanagh, Jamal, Matosevic, Harden & Thomas, 2013) and enhancing social support networks which can in turn can lead to a buffering effect against the causes of poor health (Elliot, Byrne & Shirani, 2012; Ozbay, Johnson, Dimoulas, Morgan, Charney & Southwick, 2007). However, community engagement interventions are acknowledged to be difficult to evaluate because of their size, complexity, speed of roll-out and their (usually) limited duration. There is therefore, little evidence for the effectiveness of the community engagement approach and a need for more good quality evaluation (Elliot, Byrne & Shirani, 2012; Milton, Attree, French, Povall, Whitehead & Popay, 2011).

Interventions to regenerate areas of deprivation are not new; early examples included the implementation of Peter Hall's Enterprise Zones (Green, 1991) in areas like Canary Wharf in London (UK) and the Evansville Enterprise Zone in Indiana (USA). While these were primarily targeted at stimulating the local economy by attracting new business, other Area-Based Initiatives (ABI's) in the UK, focussed more on developing communities in terms of health and wellbeing. Health Action Zones in the 1990's and The New Deal for Communities

(initiated by the Labour government in 1998) were two such schemes that predicated the Well London Programme in the UK. The New Deal for Communities, implemented in 39 areas achieved statistically significant improvement in 32 of their 36 core indicators (including crime, education, health, community and physical environment). However, as far as the authors are aware none of these have been evaluated with the rigour of the Well London Programme.

The Well London Programme used a co-production approach, where members of the community were included on an equal basis with professionals and volunteers in the conception, development and delivery of the interventions. The term co-production was originally used by American academic Elinor Ostrom in the 1970's to highlight a lack of recognition of service users in service delivery. The co-production approach "challenges the assumption that service users are passive recipients of care and recognises their contribution in the successful delivery of a service" (Cahn, 2000 cited in Realpe & Wallace, 2010 p.10). They have grown in popularity in the UK as a way of individualising health services and the Well London Programme was an early adopter of the approach. Key principles identified as underlying the Well London programme included: building a collaborative relationship with local communities; discovering what is unheard; privileging community knowledge and experience; and working with whole systems (Sheridan, Adams-Eaton, Trimble, Renton & Bertotti, 2010). Interventions were rolled out over a 3 year period (including 3 months of community engagement) in each of the 20 communities, although individual start dates were staggered.

As part of the community engagement process, local residents were invited to community cafes and asked for their views on the types of intervention that they thought would benefit

their area the most. This is a similar approach to Community Based Participatory Research (CBPR), an orientation to research that focuses on “relationships between academic and community partners, with principles of co-learning, mutual benefit, and long-term commitment.” (Wallerstein & Duran, 2006 p.312). CBPR is often used as a way of promoting health interventions in communities, for example, in addressing health disparities in cancer in the US (Simonds, Wallerstein, Duran & Villegas, 2013).

The 20 boroughs of London in which the Well London areas of deprivation were located represent a rich diversity of cultures and ethnicities. The more centrally located boroughs tended to be more diverse, while others were more likely to represent one or two ethnicities in greater numbers. The difficulties of accessing minority and ethnic communities in health interventions of this sort are well known (Netto, Bhopal, Lederle, Khatoon, & Jackson, 2010), and the community engagement process of the Well London project was prioritised as key to the development of the interventions in each area. Local volunteers were active in recruiting a representative mix of residents for the community cafes, offering language support and childcare in the form of a crèche. In terms of the adolescent evaluation, it was not possible given the resources available, to offer specific language support to participants. However, the majority had good enough English language skills that they could fill in the questionnaire unaided and in several cases friends helped to translate.

The Well London Adolescent Survey presents the results amongst adolescents from a cluster-randomised controlled trial (CRCT) of a community engagement programme of health and wellbeing interventions delivered in deprived neighbourhoods of London. The Adolescent Survey was part of a wider evaluation of the Well London Programme including the parallel adult quantitative and qualitative surveys (Phillips, Bottomley, Schmidt, Tobi, Lais, Yu,

Lynch, Lock, Draper, Moore, & Clow, 2014; Derges, Clow, Lynch, Jain, Phillips, Petticrew, Renton, & Draper, 2014). Baseline data were collected for both adults and adolescents prior to the implementation of the health interventions to confirm that the intervention and control groups were balanced and well-powered (Phillips, Renton, Moore, Bottomley, Schmidt, Lais, Yu, Wall, Tobi, Frostick & Clow, 2012).

Why adolescents?

Adolescents are an often forgotten group assigned to either adult or child categories. The protective nature of youth means that adolescents often exhibit good health and any emotional or behavioural problems are dismissed as part of normal development (Toumbourou, Patton, Sawyer, Olsson, Webb-Pullman, Catalano & Godfrey, 2000).

However, adolescents from low socio-economic backgrounds are often “more likely to engage in health-risk behaviours, and are more exposed to risk factors such as poor nutrition, low levels of exercise and limited access to good quality services” (Hagell & Coleman, 2012 p5). There has been an increasing interest in how best to engage adolescents in their community (Checkoway & Gutierrez, 2006) and facilitate their role in community change in order to improve wellbeing (Wang, 2006). Adolescence represents a final opportunity to intervene, and the evaluation of the effectiveness of early health interventions that have the potential to lead to the adoption of healthy lifestyles, is therefore of great importance.

One criticism often levelled at research carried out at the community level is that residents’ definitions of what constitutes their community may differ significantly from commonly used administrative definitions such as postal areas (Coulton, Korbin, Chan & Su, 2001). This can be particularly true of adolescents who may spend the bulk of their time at schools that are based a considerable distance from their home, and research indicates that adolescent

perceptions of their neighbourhood may differ considerably from their parents (Burton, Price-Spratlen & Spencer, 1997). It has been well documented that peers and teachers, as well as parents, exert a strong influence on adolescent behaviour and research has found perceived peer support to be the most influential factor on the adoption of prosocial goals and behaviour in adolescence (Wentzel, 1997). Well London differed from other evaluations of community health interventions in that it recognised the value of collecting data directly from adolescents themselves, as opposed to via parents and carers. In this study, schools were involved in the recruitment and data collection stages of the evaluation, but were not recognised specifically for their important role as part of the adolescent's community (Osterman, 2000) which may ultimately have contributed to the null findings.

Well London's primary aims of increasing mental wellbeing, levels of physical activity and healthy eating, feature widely within the literature, as do themes of community engagement. However, with interest in the use of co-production techniques in the implementation of health interventions increasing in the UK, this study has much to contribute to the existing data in terms of the rigour of the evaluation and the learning derived from the evaluation process.

Method

The Intervention

Well London is a multi-component, community-engagement programme for improving mental well-being, healthy-eating and healthy physical-activity in multiply deprived communities. The programme was funded by the Big Lottery Fund and comprised 14 interlinked projects delivered between Oct 2007 and March 2011. An area-based community engagement model was used to target a range of interventions, delivered by multiple

agencies, aimed at improving healthy eating, healthy physical activity and mental health outcomes.

The main aims of the Well London programme were to:

1. Improve mental wellbeing by increasing user-involvement in the design and running of projects, developing preventative approaches for common mental health problems, tackle stigma to change community perspectives of mental health and positively promote mental health;
2. Increase levels of physical activity by focussing on the most sedentary individuals, promoting incorporation of physical activity into daily routines and improving the ability of communities to organise and run activities that provide opportunities to take part in physical activity;
3. Increase levels of healthy eating by increasing access to healthy foods and increasing knowledge of healthy foods and improving food skills. (Phillips, Bottomley, Schmidt et al., 2014).

Community consultations took place within each intervention LSOA and projects were adapted to community preferences in line with current best practice. (Hawe, Shiell & Riley, 2010; Craig, Dieppe, Macintyre, Michie, Nazareth & Petticrew, 2008). Individual projects were developed from a number of over-arching themes (see Appendix 1). Below is an example of some of the projects developed in one particular area (LSOA); Greenwich Common:

Table 1

Examples of the intervention in the Greenwich Common LSOA.

Project theme	Description	Examples in the Greenwich Common LSOA
Healthy Spaces	Improving the quality of local public spaces.	The Barnfield Estate Arts Project.
Be Creative, Be Well	Supporting and promoting cultural activities, social networks and social capital.	‘Stream’ a community song and music project.
Eatwell	Improving access to healthy food.	Community feasts held.
DIY Happiness	Activities based around positive psychology theory designed to reduce stress and promote psychological resilience.	A ten-week flower arranging course.
Changing Minds	Raising awareness of mental health issues.	Food and mood sessions.
Activate London	The promotion of local activities.	Women only gym sessions.

*Note*¹ LSOA= Lower Super Output Area

During phase 1 of the programme, 20 areas of deprivation in London developed and implemented 14 inter-linked projects and interventions were delivered subsequently in a further 9 neighbourhoods in 9 additional boroughs during phase 2 of the project. More information on individual projects can be found on the Well London website <http://www.welllondon.org.uk>.

Trial design

The delivery of interventions occurred at the neighbourhood (LSOA) level and in order to capture any indirect effects, a Cluster Randomised Controlled Trial (CRCT) design was used. Rather than evaluating the effects on individuals as an RCT would, CRCTs work with groups of individuals or clusters and are often used in the evaluation of complex interventions. The UK census Lower Super Output Area (LSOA), comprising 5-10 streets, was used as the unit

of intervention delivery and analysis. The mean number of residents in an LSOA is 1,500 people, with 800 to 1,000 residential addresses; the mean population, at the 2001 census, of the LSOAs included in the Well London CRCT is 1,700 (range, 1,373 to 3,312). The composition in terms of housing of the LSOAs included in this study could vary widely with some LSOAs comprised of one large estate of council housing only, while others were made up of private residential properties next door to flats or smaller council estates. Interventions were delivered in 20 LSOAs within 20 London boroughs, with a matched control LSOA in each borough. All 4,765 LSOAs in London were ranked by the English Indices of Multiple Deprivation (IMD) (2004). The IMD scores LSOAs on a number of criteria including crime, barriers to housing, education, employment, income and health. The London boroughs containing the most deprived 11% were chosen and within these boroughs, the four most deprived LSOAs were identified. One of these four was then randomly allocated as the intervention LSOA and one as the control LSOA with the proviso that they were not next to each other within the borough. A baseline survey carried out in the classroom environment was used to measure outcomes before the interventions, and again after the interventions had been carried out. The trial registration is: ISRCTN68175121 and more details of the trial design and analysis plan can be found in the baseline survey paper (Phillips, Renton, Moore, et al. 2012) and the protocol paper (Wall, Hayes, Moore, et al., 2009). Study Objectives (Phillips, Renton, Moore et al., 2012):

1. To assess the effect of *Well London* for improving healthy-eating, physical activity and mental well-being in communities receiving the intervention (not just in individuals who directly engaged with the programme);

2. To assess the effect of *Well London* on the on the social characteristics of communities and physical characteristics of neighbourhoods;
3. To assess the above effects in population subgroups defined by age, gender, ethnicity, employment status and educational attainment.

Data collection

Data collection for the post-intervention phase of the evaluation took place between March 2011 and February 2013. The 11-16 year old participants all resided in one of the 40 intervention or control LSOA's and were recruited and surveyed through local secondary schools. Schools were targeted on the basis of having 10 or more students from a *Well London* LSOA, using information from the National Pupil Database (NPD) (2009).

Surveying took place in 45min sessions, within school hours and students completed the questionnaire independently under the supervision of a researcher together in a classroom. Parents were given the opportunity to withdraw their child via an opt-out consent form beforehand, and adolescents were asked for their consent to participate in the research on the day of the survey. Very few parents and children refused to take part. The majority of the children who did not participate were unavailable due to exams, other school activities or were absent on the day (Frostick, Phillips, Renton & Moore, 2016).¹

Description of schools and participants

The adolescent participants were aged between 11 and 16 years and attended 67 state secondary schools across the 20 London boroughs. These were both mixed and single-sex

¹ All procedures were subject to ethical review by the University of East London Ethics Committee.

and included academies, faith schools and community schools. Although participants accessed the survey via their school; they were recruited at the area (LSOA) level. In some cases schools had participants from only one LSOA and other schools had participants from several different LSOA's, both control and intervention. There was some overlap of participants between the baseline and post-intervention data collection as many of the same schools were involved in both data collection time points. There were also many changes occurring in the state school system in the period between baseline and post-intervention data collection (e.g. many became academies or took part in the Building Schools for the Future programme) which may have had an effect on the school's ethos, management and catchment area. Most of the schools were also taking part in other wellbeing interventions (e.g. the Healthy Schools initiative) concurrently (Frostick, Phillips, Renton et al., 2015).

Sample size

The original sample size calculations are published in a trial design paper (Wall, Hayes, Moore, et al., 2009) together with updated power calculations, based on the between-cluster coefficients of variation estimated from the baseline survey (Phillips, Renton, Moore et al., 2012). These sample calculations were based on baseline between cluster variation and the trial was powered to detect a 14% decrease in the negative mental health SDQ score due to effect of intervention. The randomisation procedure used to select neighbourhoods (LSOA's) of deprivation was as follows:

1. The 20 London boroughs containing the most deprived 11% of LSOAs were identified;
2. Within each of these 20 boroughs, the four most deprived LSOAs (based on the IMD) were identified;

3. Local authorities and health professionals were asked to select two LSOAs, which were not geographically contiguous, from the four identified in their borough;
4. Random allocation was used to assign one of the LSOAs to the intervention and the other became the control site (Phillips, Renton, Moore et al., 2012).

Statistical analysis

Unadjusted effect-estimates of the outcomes were calculated by comparing intervention and control groups. We also calculated adjusted effect estimates to test for the effect of imbalances in the distribution of some participant characteristics between the intervention and control LSOAs despite randomisation (Saqib, Saqib & Ioannidis, 2013). We also performed subgroup analysis to obtain the effect of the intervention on participants by their school year, gender and ethnicity. All analyses were conducted in STATA version 13.1.

Unadjusted analysis: For the continuous outcomes we considered the differences in means between the control and intervention group. The mean difference between intervention and control clusters for continuous outcomes were tested by paired t-test.

Adjusted analysis: Effect estimates adjusted for covariates (borough, school year, gender, ethnicity and the mean of the baseline measurements for the LSOAs) were calculated in a two-stage process as described by Hayes and Moulton (2009). In the first stage, a linear regression model was fitted to the individual-level outcome measures, including the variables listed above and an indicator for the matched pairs of LSOAs, but no indicator for intervention/control status. In the second stage, the LSOA-specific means for each outcome measure were extracted from the regression model and used to calculate an adjusted effect estimate. This adjusted effect estimate was then used in a paired t-test to test for differences between the intervention and control LSOAs.

Subgroup analyses: The effect of the intervention was estimated in subgroups defined by school year (5 categories), gender (two categories) and ethnicity (8 categories). Linear regression was used to test for heterogeneous effect of the intervention across subgroups.

Measures

Mental health: The Strengths and Difficulties Questionnaire (Goodman, 1997) is a well-validated measure of psychological distress and has been used previously in studies of ethnically mixed samples of adolescents. The SDQ is made up of five scales: emotional problems, conduct problems, hyperactivity, peer relationship problems and pro-social behaviour. The scores for each (with the exception of the pro-social scale) are added together to generate a total SDQ score. The higher this score, the higher the level of measured distress.

Physical Activity: This was evaluated using the PAQ-A (Kowlaski, Crocker, & Faulkner, 2007), a well-validated tool for measuring physical activity in adolescents. Participants were asked about the type and frequency of their physical activity and their answers were measured on a 5-point Likert scale of increasing participation. The higher the score, the higher the level of physical activity.

Unhealthy eating: The three questions used to measure the unhealthy eating score were: How often in the last week did you eat a) chips, b) sweets or chocolate and c) soft drinks containing sugar? The questions were adapted from similar questions used in the RELACHS study (Stansfeld, Haines, Booy, Taylor, Viner & Head, 2003). Respondents completed a Likert scale to indicate the frequency of consuming each of these items (scores: 1, 'hardly ever'; 2, 'once or twice a week'; 3, '3-4 times a week'; 4, 'almost every day'; 5, 'every day without exception'). The unhealthy eating score was calculated as the mean response across these three

items, resulting in a scale with possible values ranging from '1' indicating very low consumption, through to '5' indicating daily consumption of these items.

Results

Findings from the baseline survey showed that the sociodemographic characteristics and main outcome measures reported by respondents were broadly similar in the intervention and control neighbourhoods. These baseline findings have been reported in more detail elsewhere (Phillips, Renton, Moore et al., 2012). The follow-up surveys were completed by 1254 respondents (44.7% were from the intervention neighbourhoods and the remaining 55.3% came from the control areas). There were a slightly higher proportion of female respondents in the intervention neighbourhoods (Table 1). Other sociodemographic characteristics reported by respondents at follow-up were broadly similar in the intervention and control neighbourhoods.

Table 2

Distributions of sociodemographic characteristics and main outcome measures in the intervention and control neighbourhoods at follow-up.

Variables	Intervention		Total
	LSOAs	Control LSOAs	
Gender	N (%)	N (%)	N (%)
Male	254 (45.3)	360 (52.0)	614 (49.0)
Female	305 (54.4)	329 (47.5)	634 (50.6)
Missing	2 (0.4)	4 (0.6)	6 (0.5)
School Year	N (%)	N (%)	N (%)
Year 7	136 (24.2)	174 (25.1)	310 (24.7)
Year 8	138 (24.6)	170 (24.5)	308 (24.6)
Year 9	115 (20.5)	166 (24.0)	281 (22.4)
Year 10	102 (18.2)	128 (18.5)	230 (18.3)
Year 11	70 (12.5)	55 (7.9)	125 (10.0)
Missing	0 (0.0)	0 (0.0)	0 (0.0)
Ethnicity	N (%)	N (%)	N (%)
White	148 (27.4)	161 (24.4)	309 (25.8)
Black	199 (36.9)	219 (33.2)	418 (34.9)
South Asian	91 (16.9)	133 (20.2)	224 (18.7)
Other	63 (11.7)	101 (15.3)	164 (13.7)
Mixed	39 (7.2)	45 (6.8)	84 (7.0)
Always lived in the UK	N (%)	N (%)	N (%)
Yes	432 (77.0)	515 (74.3)	974 (75.5)
No	113 (20.1)	153 (22.1)	266 (21.2)
Missing	16 (2.9)	25 (3.61)	41 (3.3)
	N, Mean (SD)	N, Mean (SD)	N, Mean (SD)
Family Affluence Scale	537, 3.23 (1.3)	670, 3.55 (4.9)	1207, 3.41 (3.8)

*Note*¹: SD = Standard Deviation

Table 3

Unadjusted and adjusted mean differences in main outcome measure between the intervention and control neighbourhoods

Unadjusted Results							
Outcome	Intervention LSOAs		Control LSOAs		Difference		
	Mean	(95% CI)	Mean	(95% CI)	Mean (SE)	P - Value	
Physical Activity	2.70	(2.52, 2.87)	2.67	(2.56, 2.77)	-0.03	0.09	0.77
Strengths and Difficulties	12.17	(11.30, 13.03)	12.06	(11.60, 12.53)	-0.10	0.44	0.82
Unhealthy Eating	2.78	(2.64, 2.92)	2.88	(2.80, 2.97)	0.10	0.07	0.13

Results adjusted for borough, school year, gender, ethnicity and baseline means for LSOAs							
Outcome	Intervention LSOAs		Control LSOAs		Difference		
	Mean	(95% CI)	Mean	(95% CI)	Mean (SE)	P - Value	
Physical Activity	2.64	(2.61, 2.66)	2.68	(2.64, 2.72)	0.04	0.02	0.07
Strengths and Difficulties	12.17	(12.07, 12.27)	12.20	(12.04, 12.37)	0.03	0.09	0.69
Unhealthy Eating	2.86	(2.86, 2.89)	2.88	(2.85, 2.90)	0.02	0.02	0.28

Outcomes

Unadjusted and adjusted measures of intervention effects. There were no statistically significant differences in the main outcome measures between the intervention and control groups at follow-up. The mean differences between in the main outcome measures are shown in Table 2. Analyses adjusted for borough, school year, gender, ethnicity and the mean of the baseline measurements for the neighbourhood also showed no statistically significant differences in outcome measures between intervention and control neighbourhoods (Table 3).

Subgroup analysis. Subgroup analyses did not show any evidence of differences in the main outcome measures between intervention and control neighbourhoods by school year, gender or ethnicity.

Discussion

The *Well London* Programme used a community engagement model to implement wellbeing initiatives across 20 of the most deprived areas (LSOA's) in London (Wall, Hayes, Moore et al., 2009) Drawing on the strengths, skills and expertise of local people is becoming an increasingly popular way of implementing health interventions and there is a need for rigorous evaluation of these projects.

Similarly to the adult evaluation (Phillips, Bottomley, Schmidt et al., 2014), the post-intervention Well London Adolescent Survey found no significant difference between the intervention and control areas for any of the outcome measures. This is in contrast to results from the qualitative evaluation (Derges, Clow, Lynch et al., 2014) which concluded that there were improved wellbeing and social outcomes for people who were *directly* engaged with the programme. This supports the underlying theory of empowerment and transformation but not the extended benefits to the wider community.

Other than an absence of actual effect, there could be several factors influencing the results of the adolescent evaluation. In the adult outcomes paper, Phillips, Bottomley & Schmidt (2014) discuss the possible effects of high population churn leading to a reduction of direct effect and of individuals moving out of the area as a direct consequence of the intervention before the evaluation took place. The diverse ethnic communities represented in the 20 London boroughs may not have been accessed effectively at either the community engagement stage, intervention delivery stage or evaluation stage of the project, and this may have contributed to the null findings. However, previous research into adolescents from similar areas in London concluded that social class operates in a similar way for all ethnic groups with no

specific mitigating “ethnic effect” (Rothon, 2007). This is supported by the sub-group analysis which found no difference in the findings by ethnicity.

Other contributing factors could be sampling bias and questionnaire imprecision. In the adolescent survey there were higher numbers of younger children taking part as the older year groups at school tended to be caught up in preparation for exams and mock exams. Many of the schools felt it was inappropriate for the older children to miss classes to complete the survey for these reasons and the older children were more likely to withdraw consent on the day. An 11-16yr old group presents a wide range of ability to measure accurately with a questionnaire, and there was a balance to be achieved in the choice of validated measures that were used in the adolescent survey between sensitivity, and the potential to capture more data from the older, more able children (at the risk of losing some of the younger ones through lack of comprehension). Participants with English as a second language sometimes also struggled to complete the questionnaire and there were limited resources available to work one-to-one with these children. Although all participants were ensured confidentiality before they agreed to take part, the fear of disclosing sensitive information (e.g. drug and alcohol use) could also have played a part. There was also limited time and resources to roll out the interventions and as there were different interventions in different areas it was not always clear at what type of intervention at what level might have an effect.

Phillips, Bottomley, Schmidt et al. (2014) also make the point that the geographical communities measured may not necessarily map neatly onto actual communities in these areas. This is particularly true for adolescents as their school community may be much more diverse than the local population suggests. Students often travel away from where they live to go to school (for example in the case of faith schools) and this in turn could have led to a

dilution effect of the interventions as adolescents from other areas may have taken part with their more local friends. Although the adolescents were recruited on the basis of their postcode, the survey was carried out in their school environment. While some of the schools were located within a particular LSOA and only had pupils from that LSOA attending, in many cases, particularly within the smaller and more centralised London boroughs, there were a mixture of participants from several different LSOA's and these could be both control and intervention areas. It is therefore highly likely that participants were spending time with friends outside of their home LSOA and potentially in other areas involved in the project. In the process evaluation of the Well London Project (Phillips, Bottomley, Schmidt et al., 2014) two-thirds of participants were found to live outside the trial neighbourhood.

It is not just the geographical location and catchment area of the schools that may have had an effect. References to community in the academic literature often focus on the relationships and interactions of individuals within a community, as well as geographical proximity and emphasise a sense of belonging and shared values (Osterman, 2000). McMillan and Chavis (1986) describe four elements that make up a community including membership, influence, integration and fulfilment of needs (McMillan & Chavis, 1986). A sense of belonging and having your needs fulfilled (particularly basic needs for autonomy, competence and relatedness) has been shown to positively affect overall experience of wellbeing and health (Ryan, 1995). Within these definitions, the school community, which can be distinct in its norms and values from the area in which the school itself is located, must therefore be considered to be at least as influential as the geographical area in which its members live.

Kandel (1986) highlights the strong adolescent sub-cultures that have emerged in adolescence with the onset of lengthening schooling and reduced responsibility to become part of the

labour force. The influence of the school community is often not considered beyond its role as a learning environment with the emphasis on achieving qualifications, however, adolescents today spend most of their time at school interacting with their peers rather than their parents. Studies show the key role that peer groups in particular play in influencing both behaviour (Fitzgerald, Fitzgerald & Aherne, 2012) and psychological wellbeing (Resnick, Bearman, Blum, Bauman, Harris, Jones, Tabor, Beuhring, Sieving, Shew, & Ireland, 1997). This can be the case even when individuals do not experience their membership of the school community as supportive. Previous findings by Osterman (2000) suggest that multiple dimensions of behaviour may be influenced by the experience of feeling accepted at school, but that schools “adopt organisational practices that neglect and may actually undermine students’ experience of membership in a supportive community.” (Osterman, 2000 p.323). A systematic review looking at peer effect on levels of physical activity in adolescents, found not just a positive association with peer support, peer acceptance and peer norms; but also a negative association with peer victimisation (Fitzgerald, Fitzgerald & Aherne, 2012). In the case of psychological wellbeing, there is evidence that the school environment can be responsible for more variance in emotional distress and violence among students than the family context (Resnick, Bearman, Blum et al., 1997). It is thought that peers are more likely to influence adolescents through modelling, while parental influence is thought to be more strongly exerted through norms (Biddle, Bank & Marlin, 1980).

While associations between SES and health behaviours do exist in adolescence, they may not be as robust as those found in adulthood (Hanson & Chen, 2007); and some of the positive effects of school community have been shown to be strongest among schools with the most disadvantaged populations (Battistich, Solomon, Kim, Watson, & Schaps, 1995). With this in

mind, future health interventions at the community level would do well to recognise the critical role schools play in the development of adolescents' positive (and negative) experiences of community, and the influence this may have on their subsequent engagement, motivation and participation in positive health behaviours.

References

- Battistich, V., Solomon, D., Kim, D. I., Watson, M., & Schaps, E. (1995). Schools as communities, poverty levels of student populations, and students' attitudes, motives, and performance: A multilevel analysis. *American Educational Research Journal*, 32(3), 627-658.
- Biddle, B. J., Bank, B. J. & Marlin, M. M. (1980). Parental and peer influence on adolescents. *Social Forces*, 58(4), 1057-1079.
- Buck, D. & Frosini, F. (2012). Clustering of unhealthy behaviours over time: Implications for policy and practice. London: The Kings Fund. Retrieved from: <http://www.kingsfund.org.uk/publications/clustering-unhealthy-behaviours-over-time>
- Burton, L. M., Price-Spratlen, T. & Spencer, M. B. (1997). On ways of thinking about measuring neighborhoods: Implications for studying context and developmental outcomes for children. *Neighborhood poverty*, 2, 132-144.
- Cahn, E. S. (2000). *No more throw-away people: The co-production imperative*. Cited in Realpe, A. and Wallace, L. (2010). What is co-production? The Health Foundation, London p.10. Retrieved from: http://personcentredcare.health.org.uk/sites/default/files/resources/what_is_co-production.pdf
- Checkoway, B. N. & Gutierrez, L. M. (2006). Youth participation and community change: An introduction. *Journal of community practice*, 14(1-2), 1-9.
- Corporation S: Stata Statistical Software, release 11. In *Book Stata Statistical Software, release 11* (Editor ed.). City: Stata Corporation LP; 2009.
- Coulton, C. J., Korbin, J., Chan, T. & Su, M. (2001). Mapping Residents' Perceptions of Neighborhood Boundaries: A Methodological Note. *American Journal of Community Psychology*, 29(2), 371-383.
- Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I. and Petticrew, M. (2008). Developing and evaluating complex interventions: the new Medical Research Council guidance. *British Medical Journal*, 337, 1655.
- Derges, J., Clow, A., Lynch, R., Jain, S., Phillips, G., Petticrew, M., Renton, A. & Draper, A. (2014). 'Well London' and the benefits of participation: results of a qualitative study nested in a cluster randomised trial. *British Medical Journal open*, 4(4), 3596.

Elliot, E. Byrne, E. & Shirani, F. (2012). *Connected Communities: A review of theories, concepts and interventions relating to community-level strengths and their impact on health and wellbeing*. London: Arts and Humanities Research Council.

English Indices of Deprivation. Retrieved from: <https://data.gov.uk/dataset/index-of-multiple-deprivation>

Fitzgerald, A., Fitzgerald, N. & Aherne, C. (2012). Do peers matter? A review of peer and/or friends' influence on physical activity among American adolescents. *Journal of adolescence*, 35(4), 941-958.

Foot, J. & Hopkins, T. (2010). *A glass half full: how an asset approach can improve community health and well-being*. London: Improvement and Development Agency. Retrieved from: http://www.local.gov.uk/c/document_library/get_file?uuid=bf034d2e-7d61-4fac-b37e-f39dc3e2f1f2

Frostick, C., Phillips, G., Renton, A. & Moore, D. (2016). The Educational and Employment Aspirations of Adolescents from Areas of High Deprivation in London. *Journal of youth and adolescence*, 45(6), 1126-1140.

Goodman, R. (1997). The strengths and difficulties questionnaire: a research note. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 38, 581-586.

Green, R. E. (1991). *Enterprise zones: New directions in economic development* (Vol. 126). Sage Publications, Inc.

Hagell, A. & Coleman, J. (2012). *Adolescent health in the UK today: where next?* Association for Young People's Health (AYPH). London. http://www.ayph.org.uk/publications/278_Adol%20health%20in%20the%20UK%20today%2019%20June%202012.pdf

Hanson, M. D. & Chen, E. (2007). Socioeconomic status and health behaviors in adolescence: a review of the literature. *Journal of behavioral medicine*, 30(3), 263-285.

Hawe, P., Shiell, A. & Riley, T. (2010). Complex interventions: how "out of control" can a randomised controlled trial be? *British Medical Journal*, 340, 185.

Hayes, R.J. & Moulten, L.H. (2009). *Cluster randomised trials*. Boca Ranton, Florida: Chapman & Hall.

Kandel, D. B. (1986). Processes of peer influences in adolescence. In *Development as action in context*, Springer Berlin Heidelberg, 203-227.

Kowlaski, K.C., Crocker, P.R.E. & Faulkner, R.A. (2007). Validation of the Physical Activity Questionnaire for Older Children. *Paediatric Exercise Science*, 9, 174-86.

Marmot, M. (2010). Fair Society, Healthy Lives –Strategic Review of Health Inequalities in England post-2010. London: The Marmot Review.

McMillan, D. W. & Chavis, D. M. (1986). Sense of community: A definition and theory. *Journal of Community Psychology*, 14, 6-23.

Milton, B., Attree, P., French, B., Poval, S., Whitehead, M., & Popay, J. (2011). The impact of community engagement on health and social outcomes: a systematic review. *Community Development Journal*, 043.

NICE (National Institute for Clinical Excellence) (2008). *Community engagement to improve health*. Retrieved from <https://www.nice.org.uk/guidance/NG44>

National Pupil Database (2009). Retrieved from: <https://www.gov.uk/government/collections/national-pupil-database>

Netto, G., Bhopal, R., Lederle, N., Khatoon, J. & Jackson, A. (2010). How can health promotion interventions be adapted for minority ethnic communities? Five principles for guiding the development of behavioural interventions. *Health Promotion International*, 25(2), 248-257.

O'Mara-Eves, A., Brunton, G., McDaid, D., Oliver, S., Kavanagh, J., Jamal, F., Matosevic, T., Harden, A. & Thomas, J. (2013). Community engagement to reduce inequalities in health: a systematic review, meta-analysis and economic analysis. *Public Health Research*, 1(4).

Osterman, K. F. (2000). Students' need for belonging in the school community. *Review of educational research*, 70(3), 323-367.

Ozbay, F, Johnson, D.C., Dimoulas, E., Morgan, C. A., Charney, D. & Southwick, S. (2007). Social support and resilience to stress: from neurobiology to clinical practice. *Psychiatry*, 4, 35-40.

Phillips, G., Bottomley, C., Schmidt, E., Tobi, P., Lais, S., Yu, G., Lynch, R., Lock, K., Draper, A., Moore, D. and Clow, A. (2014). Well London Phase-1: results among adults of a cluster-randomised trial of a community engagement approach to improving health behaviours and mental well-being in deprived inner-city neighbourhoods. *Journal of epidemiology and community health*, jech-2013.

Phillips, G., Renton, A., Moore, D.G., Bottomley, C., Schmidt, E., Lais, S., Yu, G., Wall, M., Tobi, P., Frostick, C. and Clow, A. (2012). The Well London program—a cluster randomized trial of community engagement for improving health behaviors and mental wellbeing: baseline survey results. *Trials*, 13(1), 105.

Phillips, G., Bottomley, C., Schmidt, E., Tobi, P., Lais, S., Yu, G., Lynch, R., Lock, K., Draper, A., Moore, D. and Clow, A. (2014). Measures of exposure to the Well

London Phase-1 intervention and their association with health well-being and social outcomes. *Journal of epidemiology and community health*, 68(7), 597-605.

Resnick, M.D., Bearman, P.S., Blum, R.W., Bauman, K.E., Harris, K.M., Jones, J., Tabor, J., Beuhring, T., Sieving, R.E., Shew, M. and Ireland, M. (1997). Protecting adolescents from harm: findings from the National Longitudinal Study on Adolescent Health. *Journal of the American Medical Association*, 278(10):823-832.

Rothon, C. (2007). Can achievement differentials be explained by social class alone?: An examination of minority ethnic educational performance in England and Wales at the end of compulsory schooling. *Ethnicities*, 7(3), 306–322.
DOI:10.1177/1468796807080231

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of personality*, 63(3), 397-427.

Saquist, N., Saquist, J. & Ioannidis, J. P. A. (2013). Practices and impact of primary outcome adjustment in randomized controlled trials: meta-epidemiologic study. *British Medical Journal*, 347, 4313.

Sheridan, K., Adams-Eaton, F., Trimble, A., Renton, A. & Bertotti, M. (2010). Community engagement using World Café: The Well London Experience. *Groupwork*, 20(3), 32-50.

Simonds, V.W., Wallerstein, N., Duran, B. & Villegas, M. (2013). Community-Based Participatory Research: Its Role in Future Cancer Research and Public Health Practice. *Preventing Chronic Disease*, 10.

Stansfeld, S., Haines, M., Booy, R., Taylor, S., Viner, R., Head, J., Bhui, K., Hillier, S., Isenwater, W., Choudhry-Dormer, S. & Brentnall, S. (2003). Health of young people in East London: The RELACHS study 2001. *The Stationary Office, London*.

Toumbourou, J., Patton, G., Sawyer, S., Olsson, C., Webb-Pullman, J., Catalano, R., Godfrey C. (2000). Evidence-based Health Promotion: Resources for Planning No. 2 Adolescent Health. *Centre for Adolescent Health, Victorian Department of Human Services, Australia*.

Wall, M., Hayes, R., Moore, D., Petticrew, M., Clow, A., Schmidt, E., Draper, A., Lock, K., Lynch, R. and Renton, A. (2009). Evaluation of community level interventions to address social and structural determinants of health: a cluster randomised controlled trial. *BMC public health*, 9(1), 207.

Wallerstein, N. (2002). Empowerment to reduce health disparities. *Scandinavian Journal of Public Health Supplement*, 59, 72-7.

Wallerstein, N. B. & Duran, B. (2006). Using community-based participatory research to address health disparities. *Health promotion practice*, 7(3), 312-323.

Wang, C. C. (2006). Youth participation in photovoice as a strategy for community change. *Journal of community practice*, 14(1-2), 147-161.

Well London: communities working together for a healthier city. Retrieved from: <http://www.welllondon.org.uk/>

Wentzel, K. R. & Caldwell, K. (1997). Friendships, peer acceptance, and group membership: Relations to academic achievement in middle school. *Child Development*, 68(6), 1198-1209.

Appendix 1. Description of Well London Projects

Project title	Project description	Delivery lead
Heart of the Community Projects		
CADBE	Consultation, assessment, design, brokerage, enterprise - includes community cafe needs assessments and appreciative inquiry workshops for design of suite of intervention projects that comprised the initial community engagement activities	University of East London
Training Communities	Training on a variety of topics to support delivery of the other Well London projects by residents in the LSOAs eg. facilitation, community engagement.	South London and Maudesley NHS Mental Health Trust
<i>Well London</i> Delivery Teams	Training for local volunteers in each LSOA to act in a similar role to NHS Health Trainers - to support people to develop healthier lifestyles through signposting to increase uptake of local services and peer support; the delivery team also act as advocates in interactions with local service providers	London Sustainability Exchange & Central YMCA
Youth.comUnity	Engaging young people to be actively involved in decision-making in their local community and in transforming the community to improve health and wellbeing - youth ambassadors were recruited and trained in each LSOA	Central YMCA
Wellnet	Well London learning network for communities and professionals in London to share practice ideas and experience of delivering community-led interventions for improving health and wellbeing - it is not limited to delivery partners or areas involved in Well London	London Sustainability Exchange
Active Living Maps	Maps of facilities and opportunities for healthy activities/lifestyle e.g. Maps show sports facilities, parks, allotments - made for each LSOA and delivered in paper format to all residents	Groundwork London
Themed Projects		

Eatwell	Healthy cooking classes (Cook and Eat) and Community Feasts to provide engaging education about healthy eating and good nutrition	London Sustainability Exchange
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Project title	Project description	Delivery lead
Buywell	Working with local retail outlets and with local community members to improve access to affordable healthy food that is sustainably produced	London Sustainability Exchange
Activate London	Range of activities for both young people and adults to engage in physical activity; this involves one or more of: signposting to existing local facilities and activities, capacity building by providing training to residents to run physical activity sessions in the LSOA, or direct delivery of e.g. taster sessions and courses and joint initiatives with residents and other providers	Central YMCA
Be Creative, Be Well	Arts activities are used to engage residents in the LSOAs in a process of change to improve, health, wellbeing, community cohesion and the environment; uses intercultural and intergenerational approaches	Arts Council England
Changing Minds	Recruits and trains local residents who have direct experience of mental ill health to deliver awareness training in the LSOAs to reduce stigma and discrimination	South London and Maudesely NHS Mental Health Trust
DIY Happiness	Uses humour, creativity and positive psychology approaches to increase psychological resilience; workshops of 8 participants, targeted at women	South London and Maudesely NHS Mental Health Trust
Healthy Spaces	Improve physical environments through development of community gardens and allotments and redevelopment of greenspaces and greenery	Groundwork London
Mental Wellbeing Impact Assessment	Local residents are trained to understand, assess and demonstrate the impact of projects, activities and organisations in the LSOA on mental wellbeing	South London and Maudesely NHS Mental Health Trust