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**The ORiEL (Olympic Regeneration in East London) Study: evaluating the
impact of urban regeneration on young people and their families**

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Sponsor

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The ORiEL Study: evaluating the impact of urban regeneration on young people and their families

1. Aims/Objectives:

The objective of the proposed project is to answer the *primary research question*:

1. What is the impact of urban regeneration on the social determinants of health (employment), health behaviours (physical activity) and health outcomes (mental health and wellbeing) of adolescents and their parents?

Underpinning this objective are the following *secondary research questions*:

2. What are the wider socio-environmental and health impacts of urban regeneration in terms of benefit status, educational attainment, social cohesion/capital, diet, smoking, alcohol use and obesity?
3. How are socio-economic and health impacts distributed by age, sex, ethnicity and education?
4. What are the effects on health and health behaviours of specific components of the regeneration programme?
5. Are socio-economic and health impacts sustained over time?

2. Background:

Health follows a social gradient, with those further up the socio-economic scale experiencing better health (1;2). In the UK, health inequalities have persisted over the past decade with the mortality gap between the most advantaged and disadvantaged groups standing at around 8 years (3). Policies and interventions that tackle the wider socio-economic and environmental determinants of poor health have been promoted by UK governments as important components of strategies to improve health and wellbeing, and reduce health inequalities (2-4). In recent years large-scale programmes that tackle entrenched social and environmental deprivation through improvements in living conditions have become an increasing feature of the policy landscape. Such interventions have usually taken the form of large-scale urban regeneration and neighbourhood renewal programmes which have good potential to tackle health inequalities as they directly influence the wider social, economic and environmental determinants of physical and mental health (5). In the last 20 years alone spending on such schemes in the UK has reached £11 billion (6). Many of these schemes are area-based, and thus involve the targeting of places that are considered to be in the greatest social and economic need. Such initiatives target areas of multiple deprivation and commonly comprise investment in the key socio-economic and environmental determinants of health, for example employment, housing, education, income, and welfare. Much of this occurs through infrastructural improvements to the built environment such as better transport links, provision and upgrading of retail space, creation of green space, parks and public areas and improving housing. General improvements in aesthetics and safety via neighbourhood re-design through lighting, furniture, public art, pedestrian zones and the

amelioration of environmental stressors such as graffiti; litter and noise are also common components of regeneration programmes.

Despite continuing large-scale public investment, recent systematic reviews identify a dearth of evidence of the effectiveness of urban regeneration programmes in improving health and wellbeing, and alleviating health inequalities (7-9). The evidence that does exist is weak with mixed findings. In the UK, studies investigating the health impacts of urban regeneration are rare and highly variable in terms of study quality and reported outcomes, and primarily exist in the grey literature. Although some studies with health indicators have reported improvements (e.g. mortality rates) (10), previous research also suggests the possibility of negative effects (11). Evaluations have tended to focus on short-term socio-economic outcomes (such as impacts on employment, education, income and housing quality) and have failed to investigate the links to health outcomes. These socioeconomic evaluations have also been mixed, with the reporting of both positive and negative effects on socioeconomic factors, making it difficult to speculate as to the direction and nature of plausible health impacts (11-13). Most studies are focused on adults: evaluations of the impact of urban regeneration on young people and their families represent an important gap in the evidence, as adolescence may be a critical point for the emergence of health inequalities in later life.

The proposed study focuses on urban regeneration specifically associated with the 2012 Olympics which might be criticised on the grounds of external validity. However, the components of the proposed regeneration programme are common to the majority of urban regeneration programmes elsewhere (e.g. improvements in facilities, services, housing and built infrastructure). This represents an opportunity for a great deal of wider learning to be gained around about the range and nature of positive and negative impacts and the causal pathways between urban regeneration and health by linking specific individual components of regeneration to changes in specific outcomes and behaviours. Overall, the literature is clear: robust evaluations of the impact of urban regeneration programmes on the social determinants of health, and on health and behaviours have rarely been undertaken. Similarly, there has been little work on how impacts vary across population sub-groups. Thus there is clear need to undertake an evaluation of the impact of urban regeneration on health and health inequalities. In this study we propose to assess the health impacts of urban regeneration in a sample of young people and their families in East London.

3. Need:

The recent Marmot Review of Health Inequalities (2) has the creation of healthy and sustainable places and communities, the creation of fair employment and good work for all, and the enabling of children and young people to maximise their capabilities and opportunities as key policy objectives to improve health and reduce health inequalities.

The project is thus timely and policy relevant, both in terms of the context of long-term regeneration plans in the Thames Gateway region, and for ongoing and future regeneration programmes in urban areas elsewhere in the UK and internationally. The project will provide robust and generalisable evidence for the range and nature of the health impacts of large-scale urban regeneration programmes on families, and the distribution of these impacts across population sub-groups as defined by indicators of social position (e.g. ethnicity, employment status, education and family composition).

Findings will help inform and optimise non-NHS social, economic and urban policies and interventions to improve health at the local and national level.

4. Methods:

a. Setting

The study will take place in the London Boroughs of Newham (intervention site) and Tower Hamlets, Hackney and Barking and Dagenham (comparison sites) in the east of London. The boroughs have an ethnically diverse combined population of 1.25 million (14) but are relatively disadvantaged compared to the London average. This setting is a good candidate for research of this type as area-based urban regeneration programmes, which influence the socio-economic and environmental determinants of health, may be particularly beneficial for relatively disadvantaged communities with degraded infrastructure (9).

b. Design

The study will comprise of two main elements:

1. A **longitudinal controlled quasi-experimental study** (adolescents) with a controlled repeat cross-sectional study with nested cohort study (parents). The study will compare changes in socio-economic status (SES), health behaviour and health outcomes in adolescent school pupils in year 7 (aged 11-12), and their parents, resident in an area receiving large-scale urban regeneration (London Borough of Newham). This intervention group will be contrasted with comparison groups living in similar areas not receiving urban regeneration of this magnitude (London Boroughs of Tower Hamlets, Hackney and Barking & Dagenham). Three waves of longitudinal and repeat cross-sectional data collection are proposed (pre-intervention baseline and two follow-ups).
2. An **in-depth longitudinal qualitative study** of family experiences of and attitudes towards regeneration in the intervention area (Newham) and influences on SES, health behaviours and health outcomes. The study will comprise of a sub-group of approximately 20 families that reflects the diversity of the questionnaire survey sample.

The study been granted ethics approval from Queen Mary University of London (QMREC2011/40) and approval to enter schools has been granted from each London Borough. Consent will be obtained from each school to contact the parent(s) of participating pupils and to invite them to take part in the study using bilingual fieldworkers.

c. Data collection

Recruitment

Participants will be recruited through secondary schools in two ways; i) school-based enrolment of adolescents aged 11-12 (year 7) and ii) recruitment of parents through surveyed adolescents. Data will be collected from a random sample of 6 secondary schools in the intervention site (Newham) and a random sample of 18 secondary schools in the comparison sites (Barking & Dagenham, Hackney, Tower Hamlets). Recruitment through schools will be a robust method of conducting a survey of this nature, maximising the response rate to the study for both pupils and parents. Other methods, such as telephone and postal surveys have shown declining response rates in recent years,

especially in disadvantaged areas (15) making a school based approach the most effective method of enrolment.

Existing strong links with secondary schools in each of the intervention and comparison sites will be used to invite schools to participate by letter, email, telephone, and a site visit (if requested). Mixed ability classes within each school will be randomly allocated to the study. All adolescents in each class will be provided with accessible information about the study and invited to participate, with the survey undertaken in the classroom during school hours.

Proposed Outcome Measures

Child completed psychological scales

- Short Moods and Feelings Questionnaire (SMFQ)

The MFQ is a 32-item questionnaire based on DSM-III-R criteria for depression (16). An 11 item subscale, based on the discriminating ability between the depressed and non-depressed, was developed as a short form alternative (SMFQ). Each item is to be rated on a 3 point scale: "true", "sometimes true", and "not true" with respect to the events of the past two weeks. Both parent- and child-report forms are available.

- Warwick-Edinburgh Mental Well-Being Scale (WEMWBS)

Newly developed scale for assessing positive mental health (mental well-being) (17). A 14 positively worded item scale with five response categories. It covers most aspects of positive mental health (positive thoughts and feelings) currently in the literature, including both hedonic and eudaimonic perspectives. The scale has been validated in adolescents (18) and cross-culturally within Pakistani and Chinese subgroups (19).

- Multidimensional Scale of Perceived Social Support (MSPSS)

The Multidimensional Scale of Perceived Social Support (PSSS) is a validated 12-item instrument designed to assess perceptions about support from family, friends and a significant other (20).

- Strengths and Difficulties Questionnaire (SDQ)

The Strengths and Difficulties Questionnaire (SDQ) is a brief behavioural screening questionnaire about 3-16 year olds (21). It asks about 25 attributes which cover emotional symptoms, conduct problems, hyperactivity and inattention, peer relationship problems and prosocial behaviour. A self-completed reported version with amended questioning has been validated for use in 11 to 16 year olds (22).

Child completed physical activity measures

- SPEEDY questionnaire (modified Y-PAQ).

The Sport, Physical activity and Eating behaviour: Environmental Determinants in Young (SPEEDY) questionnaire has been developed in collaborative study with the Departments of Health Policy and Practice and Environmental Sciences at the University of East Anglia in Norwich and the MRC Epidemiology Unit in Cambridge. The questionnaire assesses accumulated time spent physically active and taking part in sedentary behaviours. Estimates of total physical activity are comparable with previous population-based studies

in a similar age group in Britain and other European countries (23).

Parent completed psychological scales

- Parental mental health and well-being be assessed by self-completion of the SMFQ, WEMWBS and MSPSS scales described above.

Parent completed physical activity measures

- “Recent Physical Activity Questionnaire” (R-PAQ).

This instrument has demonstrated validity for ranking individuals according to their time spent at vigorous-intensity activity and overall energy expenditure (24). The scale, developed by the MRC Epidemiology Unit, describes the extent of physical activity around the house, travel to work patterns, and determines recreational physical activity energy expenditure over the previous four weeks.

Parental Employment

- Self reported current or previous occupation.

Employment status will be assessed by standardised questions used at the 2011 Census for England (25). Individual occupations will be coded to SOC2010 classifications which may be further coded to the standard National Statistics Socioeconomic Classification System (NSSEC) (26). Further measures of household socioeconomic circumstances will be assessed, such as household overcrowding, housing quality, frequency of holidays, computer and car ownership and benefits receipts.

d. Data analysis

Quantitative Study

A *cross-sectional analysis* of baseline data will assess the impact of self-reported demographic, socio-economic and environmental correlates of physical activity and mental wellbeing in adolescents and parents, using multi-level regression models that account for the clustered nature of our sample by including school as a random effect.

We will compare:

- (i) differences in associations between intervention and comparison sites and schools, and
- (ii) differences in the factors influencing outcomes, namely employment, mental health and well-being and physical activity energy expenditure.

We will also investigate whether accessibility (density and distance) to health promoting environmental resources (e.g. green space, leisure facilities, food retail outlets, cycle paths) from either home (adolescents and parents) or school (adolescents) is related to specific health behaviours. For distance metrics we will calculate network distance from the population weighted centroid of the point of origin unit postcode to the nearest relevant environmental resource in a geographic information system (GIS). Where outcome measures are highly skewed we will transform, or divide into groups, as appropriate and model using multivariate logistic mixed models.

The main aim of the *longitudinal and repeat cross-sectional analyses* will be to assess the effect of regeneration on primary outcomes (employment, physical activity and mental

wellbeing). This will be done by investigating pre-post changes in outcomes between baseline (wave 1) and follow-up (wave 2). Change is defined as within-individual or between wave change in a specific outcome in the intervention area minus the within-individual or between wave change in the outcome in the comparison areas. In non-randomized studies such as this there is potential for differences between intervention and comparison groups at baseline. If differences are observed we can adjust for these differences by using appropriate baseline individual socio-demographic confounders. We will also consider propensity score analyses. Primary outcomes will be assessed at wave 3 to investigate whether changes at wave 2 have been sustained. To investigate effects on health inequalities we will undertake a stratified analysis to assess whether any impacts on primary outcomes are socially patterned by sub-groups of individuals. We will assess whether the differences in the social patterning outcomes have changed over time compared to baseline. Finally, we will also map and describe individual changes in objective and subjective accessibility to environmental resources over time (e.g. access to cycle paths, green space, food retailing, sport and recreation facilities, crime, social capital/cohesion) and whether this is related to individual changes in physical activity and mental wellbeing controlling for demographic and socio-economic factors. Analysis of secondary outcomes (benefit status, educational attainment, social capital/cohesion, diet, smoking, alcohol use) will be undertaken in a similar manner.

Qualitative Study

Interviews will be tape recorded, anonymised and transcribed and analysed using the framework methodology (27) and NUDIST N6 software. Our analytical technique will be inductive (going from observed instances to the development of a model or interpretation in a rigorous manner) (28). Data analysis will be developed along principles outlined by Harding and Gantley (29), specifically the data will be managed in the first instance by mapping key concepts derived from the transcripts ('charting') (29) and extracting emergent themes from the transcripts. Transcripts will be analysed iteratively and emergent themes and concepts revisited and refined. Particular attention will be paid to discordant voices or dissonant cases i.e. elements of the transcript that do not readily accommodate a theme but which are notable for future analysis. The emergent themes together will form the basis of analytical interpretation.

Synthesis of quantitative and qualitative data: Conducting a mixed methods study has the potential for contradictions in terms of findings. We will not privilege one type of data over another but explore the contradictions as they arise. The data generated from both elements of the project will be subject to an interpretative synthesis using a narrative summary approach (30). Narrative summary involves the 'selection, chronicling and ordering of evidence to produce an account of the evidence' (30). This may include the straightforward description of findings through to more reflexive accounts of the available data. Complex narratives can explore dynamic processes, offering explanations that emphasise temporal and dependent nature of events – essential in a longitudinal study. Such an approach is flexible and theory-led, can deal effectively with large amounts of data and can triangulate different types of evidence. Narrative summary can 'integrate' qualitative and quantitative data through juxtaposing diverse and seemingly contradictory findings side-by-side and can generate higher-order data and focus attention on critical nuances and tensions.

5. Contribution of existing research:

Pathways between socio-economic and physical regeneration components and primary outcomes.

Specific pathways by which components of the regeneration programme can be linked to specific **primary** outcomes are supported by the following evidence:

- a) **Employment.** Employment status is associated with health for both individuals and families (31). Unemployment is associated with worse mental health (32;33), all-cause mortality (34), limiting long-term illness (35;36) and alcohol use and smoking (37). A recent review also suggests that even when employed, job type/grade (occupation) also has a role in shaping health (and health inequalities) through a variety of mechanisms including position in the hierarchical occupational system; psychosocial job stressors (such as demand, control and reward) and precarious employment such as contract, temporary and shift work (38). In addition there is emerging evidence that women may be impacted differently by adverse working conditions, and possibly more negatively, than men (38).

Components of the regeneration programme that may positively impact on employment status include jobs created in a variety of occupations and grades in the retail, service, business and construction sectors, associated with the Stratford City and Olympic Park developments. These will include 30,000 temporary jobs related to construction and up to 50,000 permanent jobs as a result of facilities developed in the area (39). Currently 24.6% of the 3,315 jobs created in construction have gone to local residents (39) indicating substantial employment opportunities for local residents.

- b) **Physical activity.** Environmental factors that have been shown to negatively influence physical activity include limited access to recreational facilities, such as parks and green space, sports facilities, pavements/sidewalks, bicycle/walking trails (40;41) and environmental characteristics that promote car use and discourage walking and cycling, such as poor road connectivity and 'walkability', lack of access to public transportation and safety associated with traffic and crime (40;42;43).

Components of the regeneration programme that will plausibly impact positively on physical activity include: improving access to, and upgrading the quality of, green space, increased public transportation (rail and bus links) and active travel (walking and cycling paths) options, and the provision of new formal and informal sporting and leisure facilities in the Olympic Park.

Changes that might negatively affect physical activity include perceptions of increases in traffic volumes, noise and pollution (from road and other construction).

- c) **Mental health and wellbeing.** Objective and subjective features of residential environments are associated with psychological well-being. These features include noise, urban design and maintenance, density, escape facilities, and social participation (44;45). These have been operationalised as social isolation, neighbourhood disorganisation, crime and violence, lack of housing, access to

leisure and recreational facilities, attachment to community networks, and social participation and inclusion (46). In addition features such as neighbourhood 'greenness' and local social interaction have also been implicated (47).

Components of the regeneration programme that will plausibly impact on these objective and subjective risk factors include improved housing and neighbourhood environment (aesthetics), perceptions of safety, social cohesion, improved access to transport, civic and green space, involvement in sports, skills and cultural programmes, and employment.

6. Plan of Investigation:

| Year | 2011 | | | | 2012 | | | | 2013 | | | | 2014 | | | | 2015 | | | |
|----------------------------|------|---|---|---|------|---|---|---|------|---|---|---|------|---|---|---|------|---|---|--|
| Quarter | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | | |
| Set-up | | | | | | | | | | | | | | | | | | | | |
| Ethical Approval | ■ | ■ | ■ | | | | | | | | ■ | | | | | | | | | |
| Study Materials | | ■ | ■ | | | | | | | | ■ | | | | | | | | | |
| Pilot (Survey) | ■ | ■ | | | | | | | | | ■ | | | | | | | | | |
| Data Collection | | | | | | | | | | | | | | | | | | | | |
| School Survey | | | ■ | ■ | ■ | | | | | | | ■ | ■ | ■ | | | | | | |
| Parent Survey | | | ■ | ■ | ■ | | | | | | | ■ | ■ | ■ | | | | | | |
| Environment Data | | | ■ | ■ | ■ | | | | | | | ■ | ■ | ■ | | | | | | |
| Qualitative Study | | | | | | | | | | ■ | | | | | ■ | | | | | |
| Data Input/Analysis | | | | | | | | | | | | | | | | | | | | |
| Data entry | | | ■ | ■ | ■ | | | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | |
| Data transcription | | | | | | | | | | | ■ | ■ | ■ | | | ■ | ■ | ■ | | |
| Data cleaning | | | | | | | | | | | | | | | | | | | | |
| Data analysis | | | | | | | | | | | | | | | | | | | | |
| Outputs | | | | | | | | | | | | | | | | | | | | |
| Writing | | | | | | | | | | | ■ | ■ | ■ | | | | | | ■ | |
| Feedback | | | | | | | | | | | | | | | | ■ | | | | |
| Final report (NIHR) | | | | | | | | | | | | | | | | | | | ■ | |
| Main papers | | | ■ | ■ | | | | | | | ■ | ■ | | | | | | | ■ | |
| Management | | | | | | | | | | | | | | | | | | | | |
| Staff meeting | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Study meeting | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Steering ctte meeting | | | ■ | | | | | | | | ■ | | | | | ■ | | | ■ | |
| Staffing | | | | | | | | | | | | | | | | | | | | |
| Staff (2 x Quant) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | |
| Staff (Field) | | | ■ | ■ | ■ | | | | | | | ■ | ■ | | | ■ | ■ | | | |
| Staff (Qual) | | | | | | | | | | | | | | | | | | | | |

INTERVENTION

7. Project Management:

The team has expertise in public health, statistics, epidemiology, psychology and geography and has qualitative and quantitative methodological experience in the prospective evaluation of complex social interventions, the conduct of large-scale cohort studies and cluster-randomised trials. Team members have previously collaborated through a range of research and policy projects.

- **Steven Cummins** is a geographer with training in epidemiology/public health. He has expertise in the socio-environmental determinants of health and the prospective evaluation of natural experiments.
- **Charlotte Clark** is an environmental psychologist with experience in applied environmental psychology and environmental epidemiology. Her research focuses on how the environment affects mental health, well-being and quality of life and has extensive experience of managing longitudinal studies of adolescents and undertaking complex statistical analyses of longitudinal data (RANCH, RELACHS).
- **Stephen Stansfeld** is an epidemiologist and psychiatrist with experience of directing cohort studies in adults (Whitehall II) and children (RANCH, RELACHS) in London. His research concerns social and physical environmental factors and social inequalities in mental health and cardiovascular disease.
- **Neil Smith** is a social epidemiologist with expertise in social determinants of health inequalities in ethnic minority populations. He has extensive project management experience of Government scientific research programmes.
- **Dan Lewis** is a Geographic Information Science specialist skilled in the spatial analysis of healthcare provision aimed towards the reduction of health disparities at local levels.
- **Mark Petticrew** is a public health researcher with experience in evaluating the health effects of complex social interventions and evidence synthesis using narrative approaches. These include evaluations of complex interventions such as housing and tobacco interventions.
- **Sandra Eldridge** is a biostatistician with expertise in the design of cluster RCTs. She has a particular interest in methods to evaluate complex community interventions using pragmatic trials.
- **Stephanie Taylor** works in public health in east London and has extensive expertise of longitudinal school based epidemiological research in children and adolescents (Ten Towns Study, RELACHS), and experience in mixed methods research.
- **Adrian Renton** is a public health physician and statistical epidemiologist. He is lead advisor to NHS London on developing an evaluation framework for the Health Legacy of London 2012 and is currently carrying out study on physical activity, diet and mental health in 50 of the most deprived estates in London (Well London).
- **Derek Moore** is a developmental psychologist and his work spans from infancy through to adolescence. Current projects include the ELAS feasibility study exploring language problems in babies born into low SES families and the evaluation of Well London with Renton.
- **Trish Greenhalgh** is trained in social and political sciences, and medicine, and is an internationally respected qualitative researcher with particular expertise in the evaluation of complex interventions to improve health, and the 'realist' synthesis of diverse quantitative and qualitative data.

8. Service users/public involvement:

Members of stakeholder groups have already been involved in this project at the planning stage. The project team convened a meeting with the Olympic leads with the London boroughs associated with the proposed project and Directors of Public Health at Newham PCT, Tower Hamlets PCT and the Healthy Urban Development Unit at Greater London Assembly and NHS London. We aim to continue the involvement of these key stakeholders as participants and observers in the Study Steering Committee. The study has been recommended by the Association of Directors of Children's Services and we have the support and active engagement of all Borough councils involved in the study.

The research design includes a qualitative component which ensures that the experiences and views of local members of the public who live near the regeneration site will be captured and reported. This will help contextualise the findings from the quantitative survey.

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