

**ENVIRONMENTAL-RISK (E-RISK) LONGITUDINAL TWIN STUDY
CONCEPT PAPER FORM**

Proposing Author: Timothy Matthews

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Proposed co-authors: Candice L. Odgers, Joanne Newbury, Helen L. Fisher, Andrea Danese, Terrie E. Moffitt, Avshalom Caspi

Provisional Paper Title: Neighbourhood characteristics and feelings of loneliness among 18 year-olds in England

Date: 3rd August 2017

Objective of the study and its significance:

Loneliness is defined as a form of 'social pain' that arises when individuals perceive the quality or quantity of their social connections to be wanting (Cacioppo & Hawkley, 2009). This applies to shortcomings not only in dyadic social relationships, but also in the relationships between an individual and larger social entities, such as local communities (Hawkley et al, 2005). These relationships are embedded within, and are shaped by, a wider social structural context which includes features of the neighbourhood environment, such as urbanicity, crime, inequality and social cohesion (Berkman et al, 2000). For instance, high levels of crime in an area could undermine trust between neighbours and lead them to feel alienated from each other, while high social cohesion could foster stronger feelings of trust and belongingness. To the extent that the characteristics of a neighbourhood influence, for better or worse, the social ties that form between its residents, this may have implications for the extent to which they feel lonely. Furthermore, while the correlates of loneliness have been widely studied among the elderly, loneliness is particularly common among younger adults, and merits greater investigation among this age group (Matthews et al, in preparation). The proposed study aims to make a novel contribution to the literature by investigating how aspects of the neighbourhoods people live in relate to their feelings of social disconnection, using a nationally-representative cohort of young adults.

Research question 1: Mapping loneliness among young adults in England

The UK charity Campaign to End Loneliness (2015) has called for 'loneliness maps' to be published, in order to help identify where the loneliest members of society are located. The first aim of this study will be to visualise the geographic distribution of loneliness among 18-year-old E-Risk participants living in England, in order to determine if high rates of loneliness are endemic to particular regions. Using mapping software and study participants' home postcode data, I will generate a 'heat map' of the country, graphically representing the average rates of loneliness by area. I will also generate higher-fidelity heat maps showing the distribution of loneliness across individual municipalities within London, and within any loneliness 'hotspots' identified by the nationwide analyses.

Research question 2: Loneliness and neighbourhood characteristics

Among the elderly, loneliness is correlated with living in a rural area (Savikko et al, 2005). However, this should be considered within the context of other life changes that are common in later life, such as widowhood and declining physical mobility. These changes could act in concert with physical isolation to shape loneliness in a manner that is particular to this stage of the lifespan. For younger people, on the other hand, the antecedents of loneliness may be quite different from those among older people (Qualter et al, 2015), and thus the association with rurality may not hold true among young adults. Therefore, one of the objectives of this study will be to examine the distribution of loneliness across rural versus urban neighbourhoods in a sample of young adults. Intuitively, urban areas with larger populations might be expected to offer more opportunities for building social connections. However, other features of the neighbourhood could also increase loneliness irrespective of urbanicity. For instance, a study of deprived urban neighbourhoods in Glasgow (Kearns et al, 2015) found that reported feelings of loneliness in these areas were associated with higher rates of antisocial behavior and low collective efficacy. Therefore, in this study I will also test associations between loneliness and a range of neighbourhood characteristics, such as social cohesion, social control and neighbourhood disorder.

Although neighbourhood characteristics may exert an effect on individuals' feelings of loneliness, it is also possible that loneliness itself may dispose individuals to perceive their neighbourhood in a more negative light. Loneliness is associated with biases in cognition including negative appraisals of social interactions and exaggerated vigilance for threat (Cacioppo & Hawkey, 2009). It is possible, therefore, that individuals who feel alienated from those around them may evaluate the closeness or safety of their neighbourhood in a negatively-biased manner. If this is the case, self-report data on neighbourhood characteristics could be misleading. Therefore, I will use measures from multiple sources, including objective data such as annual crime statistics, rather than relying only on self-reported neighbourhood perceptions. I will also look at twin pairs discordant for loneliness, to investigate whether the lonelier twin has more negative perceptions of their neighbourhood than their non-lonely co-twin who lives in the same neighbourhood.

Statistical analyses:

Research Question 1

The Maptitude software (<http://www.caliper.com/maptovu.htm>)* allows location-based statistical data to be visualized in map form. I will use this to generate a national 'heat map', in which areas with higher mean levels of loneliness are shaded darker. The analysis will be restricted to England, due to Welsh-resident participants being concentrated in only a small number of counties, and also due to the limited number of E-Risk study participants in Scotland, Northern Ireland and non-UK countries.

As the precise X,Y coordinates of study members' neighbourhoods constitute personally identifying information, they will not be merged with any phenotypic data such as loneliness. Instead, these coordinates will be used to identify the general area in which study members live (e.g. borough/local authority, county, region). Having reduced the location data to these broader categories, the original X,Y coordinates will be omitted when building the working datafile.

As a first step, the map will be divided into the 9 government regions of England (North East, North West, Yorkshire and the Humber, East Midlands, West Midlands, East of England, South East, South West and London). Subject to sufficient spread of participants across the country, I will then narrow the level of analysis to individual counties. I will also produce 'zoomed-in' maps of London and areas with high concentrations of loneliness, plotting the data across more fine-grained geographical units (e.g. boroughs or local authorities).

* Note: We are happy to consider other mapping software if co-authors have their own suggestions.

Research Question 2

Associations between loneliness and neighbourhood characteristics will be analysed using linear regression with loneliness as the dependent variable. Due to the high co-occurrence of loneliness with depression and anxiety, symptoms of these disorders will be included as covariates along with gender and parental socioeconomic background. I will also control for adolescent violence victimization, to determine if the associations between neighbourhood characteristics and loneliness are independent of problems with

dyadic social relationships.

As some neighbourhood characteristics were measured at age 12 and others at 18, all analyses will be restricted to a subset of individuals who lived in the same home at both these ages. However, participants living outside of England will be included. As an additional analysis, loneliness will be compared in UK versus non-UK residents, to test whether moving away from one's country of birth is associated with differences in feelings of loneliness.

Finally, as all E-Risk participants have a same-age and same-sex sibling, which may be protective against loneliness, I will test whether living together vs living apart from the co-twin is associated with differences in loneliness, and control for this variable in all analyses.

Variables Needed at Which Ages (names and labels):

Study: E-Risk

Age 5

ATWINID

BTWINID

SAMPSEX

SESWQ35

ZYGOSITY

RORDERP5

Age 18 (derived variables)

LONELYE18 Loneliness – Elder

LONELYE18 Loneliness – Younger

MDESXE18 Depression symptom scale – Elder

MDESXY18 Depression symptom scale – Younger

GADSXY18 Anxiety symptom scale – Elder

GADSXY18 Anxiety symptom scale – Younger

NEIGBRHDE1218 Twin living at same address between 12-18

VCTZVIOLCE18 Overall violence victimization – Elder

VCTZVIOLCY18 Overall violence victimization – Younger

VCTZCONCE18 Crime victimization – Elder

VCTZCONCY18 Crime victimization – Younger

VCTZPERCE18 Peer victimization – Elder

VCTZPERCY18 Peer victimization – Younger

NEIGHBOURHOOD DATA (derived by Candice L. Odgers & colleagues):

Age 12:

Population density

Systematic observations (neighbourhood disorder, decay, dangerousness, street safety, green space)

Residents' reports (social control, cohesion, neighbourhood disorder)

Composite variables (deprived, dangerous, dilapidated, disconnected & sum score)

Age 18:

Perceived social control (from interview booklet) – ET & YT

Perceived social cohesion (from interview booklet) – ET & YT

Perceived neighbourhood disorder (from interview booklet) – ET & YT

Urbanicity

Antisocial behavior

Violent crime

Total crime

Area of residence e.g. borough/local authority, county, region (obtained via X,Y coordinates of neighbourhood locations)

References cited:

Berkman, L. F., Glass, T., Brissette, I., & Seeman, T. E. (2000). From social integration to health: Durkheim in the new millennium. *Social Science & Medicine*, *51*(6), 843-857.

Cacioppo, J. T., & Hawkley, L. C. (2009). Perceived social isolation and cognition. *Trends in Cognitive Sciences*, *13*(10), 447-454.

Hawkley, L. C., Browne, M. W., & Cacioppo, J. T. (2005). How can I connect with thee? Let me count the ways. *Psychological Science*, *16*(10), 798-804.

Kearns, A., Whitley, E., Tannahill, C., & Ellaway, A. (2015). Loneliness, social relations and health and wellbeing in deprived communities. *Psychology, Health and Medicine*, *20*(3), 332-344.

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Qualter, P., Vanhalst, J., Harris, R., van Roekel, E., Lodder, G., Bangee, M., Maes, M., & Verhagen, M. (2015). Loneliness across the life span. *Perspectives on Psychological Science*, *10*(2), 250-264.

Savikko, N., Routasalo, P., Tilvis, R. S., Strandberg, T. E., & Pitkälä, K. H. (2005). Predictors and subjective causes of loneliness in an aged population. *Archives of Gerontology and Geriatrics*, *41*(3), 223-233.

Data Security Agreement

Provisional Paper Title	Neighbourhood characteristics and feelings of loneliness among 18 year-olds in England
Proposing Author	Timothy Matthews
Today's Date	3 rd August 2017

Please keep one copy for your records

(Please initial your agreement)

- TM I am current on Human Subjects Training (CITI (www.citiprogram.org) or training in human subject protection through my post or courses.
- TM My project is covered by Duke or King's IRB OR I have /will obtain IRB approval from my home institution.
- TM I will treat all data as "restricted" and store in a secure fashion.
- TM I will not share the data with anyone, including students or other collaborators not specifically listed on this concept paper.
- TM I will not post data online or submit the data file to a journal for them to post. Some journals are now requesting the data file as part of the manuscript submission process. The E-Risk Study cannot be shared because the Study Members have not given informed consent for unrestricted open access. Speak to Terrie or Avshalom for strategies for dealing with data sharing requests from Journals.
- TM Before submitting my paper to a journal, I will submit my draft manuscript and scripts for data checking, and my draft manuscript for co-author mock review, allowing three weeks.
- TM I will submit analysis scripts and new variable documentation to project data manager after manuscript gets accepted for publication.
- TM I will return all data files to the Data Manager after the project is complete. Collaborators and graduates of DPPP may not take a data file away from the DPPP office. The data remains the property of the Study and cannot be used for further analyses without express, written permission.
- TM I will ensure geographical location information, including postcodes or geographical coordinates for the E-Risk study member's homes or schools, is never combined or stored with any other E-Risk data (family or twin-level data)

Signature: Timothy Matthews

CONCEPT PAPER RESPONSE FORM

A. To be completed by the proposing author

Proposing Author: Timothy Matthews

X I have read the E-Risk data-sharing policy guidelines and agree to follow them

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Potential co-authors: Candice Odgers, Joanne Newbury, Helen Fisher, Andrea Danese, Terrie E. Moffitt, Avshalom Caspi

Potential Journals: TBC

Intended Submission Date (month/year): Late 2017/Early 2018

Please keep one copy for your records and return one to Louise (louise.arseneault@kcl.ac.uk)

B. To be completed by potential co-authors:

Approved Not Approved Let's discuss, I have concerns

Comments:

Please check your contribution(s) for authorship:

- Conceptualizing and designing the longitudinal study
- Conceptualizing and collecting one or more variables
- Data collection
- Conceptualizing and designing this specific paper project
- Statistical analyses
- Writing
- Reviewing manuscript drafts
- Final approval before submission for publication
- Acknowledgment only, I will not be a co-author

Signature:

