**The Belfast Mobility Project**

**Overview**

The Belfast Mobility Project has examined how divisions between and within communities affect residents’ spatial mobility patterns in the ‘post-conflict’ city. Employing GPS tracking technology and a bespoke mobile phone app to collect data, the project has investigated how sectarian segregation and mixing emerge as the dynamic outcome of individuals’ routine movements as they travel through the city, using its streets, amenities and public spaces in different ways. Employing questionnaire methods, the research has also explored how social and psychological factors impact on Belfast residents’ self-reported use of everyday spaces over time. Below we describe the two data sets that we have uploaded onto the Reshare website. The first data set (file name: ‘BMPGPStrackingdata’) is derived from our GPS tracking methodology and records the amount of time that Catholic and Protestant participants spend in different types of spaces at different times of the day. The second data set (file name: ‘BMPSurveydata’)is derived from a questionnaire survey designed to explore participants’ attitudes towards use of spaces beyond their own communities and to measure some social psychological factors that might impact on such attitudes, including intergroup contact, prejudice, realistic and symbolic threat and group identity.

**Data set 1: GPS Tracking of participants’ time spent and destinations across ingroup, outgroup and shared spaces over time**

**Participants**

One hundred and eighty one participants, who were recruited using a door-to-door sampling method in five neighbourhoods in north Belfast, feature in this data set (Filename: ‘BMPGPStracking’ data). Each neighbourhood comprised Catholic and Protestant housing estates whose residents live close to one another but are divided by both material and symbolic boundaries (see Figure 1 below). This sample consisted of 90 Catholics and 91 Protestants (MAge = 40.8 years), of whom 113 were women.



Figure 1: The five sites from which participants were sampled, namely (1) Ballysillan/Ligoniel, (2) Glandore/Skegoneill, (3) Tiger’s Bay/New Lodge, (4) Ardoyne/Glenbryn, and (5) Greater Whitewell

**Data collection procedure**

Participants downloaded a bespoke GPS tracking application, the ‘Belfast Pathways’ app, onto their mobile smart phones. This app operated in the background of their device’s functioning and was self-launching, ensuring that it would continue to track movements even if the device was rebooted. It included a pause function that allowed participants to discontinue tracking at any time.

The Belfast Pathways app collected GPS data points at 4-second intervals for a period of up to two weeks when participants’ moved outdoors beyond their home spaces (tracking when participants entered buildings was unreliable and was not a focus of our analysis). The fields registered in each data point were: latitude, longitude, accuracy, and a timestamp. Data were stored temporarily on the mobile device and then uploaded onto a central server when the mobile device was next in contact with WiFi. This ensured that participants were not charged for data uploads. At the end of the two week period, participants were contacted and reminded to delete the Belfast Pathways app from their mobile phones.

The amount of usable data collected from each participant varied widely. Some registered relatively few GPS data points, others many 1000s of points. Some participants rarely left their homes or, if they did, stayed outside for a brief period of time within a restricted radius; others roamed longer and more widely. In addition, some data proved unusable because participants left our defined study area of North Belfast and the city centre. Data collection was also hampered by technical problems on several mobile devices, which limited the number of usable tracking points gathered.

Notwithstanding these challenges, our tracking methodology generated a raw data corpus of just under 1000 hours on participants’ outdoor movements in north Belfast and the city centre, including data on 4791 destinations. Derived from over 20 million GPS tracking points, these data were ‘cleaned’ (see below) and then integrated into a Geographic Information System (GIS) for further analysis.

**Data preparation and capture within the SPSS database**

Raw GPS data were cleaned to remove tracking points that were redundant (e.g. multiple points in close proximity) or fell beneath our accuracy threshold (e.g. through ‘scatter’ created when tracking continued indoors). Track destinations were then marked as polygons using information derived from various sources, notably Ordnance Survey Northern Ireland maps, Google Street View, and local knowledge. Individual pathways, stops and home spaces were derived using procedures developed by Bohte & Maat (2009) and refined by members of our team (see Davies et al., 2016).

To quantify the activity space patterns and explore how they might shaped by factors such as community identity, gender and time of day, we constructed a GIS in which different areas in north Belfast were defined as: (1) predominantly Protestant; (2) predominantly Catholic, and (3) shared. Here we relied on evidence from the 2011 census, which classifies census output areas of north Belfast in terms of their local demography, defining an area or facility as Protestant if the surrounding local population is more than 65% Protestant and as Catholic if that population is more than 65% Catholic. In effect, as Figure 1 above indicates, many such areas have a higher proportion of a given community, and often they have long established sectarian boundaries. We defined as shared areas where neither community was numerically predominant (i.e. >65%) or where the area or facility in question was designed or located, in principle, to be shared. The latter included some parks and other public spaces, the city centre, major arterial roads, natural landscapes, large retail outlets on the outskirts of north Belfast, industrial areas, and several supermarkets. In defining a space as Protestant, Catholic or shared we also took into account established local knowledge. For example, in some areas, even ostensibly public spaces have longstanding sectarian boundaries. Alexandra Park in the heart of north Belfast, for instance, is notoriously divided into Catholic and Protestant sections by a 3 metre high peace wall, with the two sections being linked by gate that is open during the daytime.

Using this GIS as an analytic resource, we then constructed an SPSS database that enabled exploration of the patterning of time spent in different kinds of activity spaces and the locations of participants’ destinations. This database also allowed exploration of variations across community (Catholic/Protestant), time of day (morning, afternoon, evening) and gender (male-female). More specifically, this data set is organised as an SPSS spreadsheet with the following variable labels:

**SPSS variables in data set 1**

ParticipantID: The number used to identify individual participants whose movements were tracked

TimeIGMorn: Time spent in ingroup spaces in the morning

TimeIGAfter: Time spent in ingroup spaces in the afternoon

TimeIGNight: Time spent in ingroup spaces in the evening

TimeITTot: Total amount of time spent in ingroup spaces

TimeSharedMorn: Time spent in shared spaces in the morning

TimeSharedAfter: Time spent in shared spaces in the afternoon

TimeSharedNight: Time spent in shared spaces in the evening

TimeSharedTot: Total amount of time spent in shared spaces

TimeOGMorn: Time spent in outgroup spaces in the morning

TimeOGAfter: Time spent in outgroup spaces in the afternoon

TimeOGNight: Time spent in outgroup spaces in the evening

TimeOGTot: Total amount of time spent in space

DestIGMorn: Number of destinations located within ingroup spaces visited in the morning

DestIGAfter: Number of destinations located within ingroup spaces visited in the afternoon

DestIGNight: Number of destinations located within ingroup spaces visited in the evening

DestIGTot: Total number of destinations located within ingroup spaces

DestSharedMorn: Number of destinations located within ingroup spaces visited in the morning

DestSharedAfter: Number of destinations located within ingroup spaces visited in the afternoon

DestSharedNight: Number of destinations located within ingroup spaces visited in the evening

DestSharedTot: Total number of visited destinations located within shared spaces

DestOGMorn: Number of destinations located within outgroup spaces visited in the morning

DestOGAfter: Number of destinations located within ingroup spaces visited in the afternoon

DestOGNight: Number of destinations located within ingroup spaces visited in the evening

DestOGTot: Total number of visited destinations located within outgroup spaces

Community: Whether the participant tracked identified as either Protestant or Catholic

Gender: Whether the participant tracked identified as Male or Female

Age: Each participant’s age in years

**Notes:** For Catholic residents ‘outgroup spaces’ referred to Protestant areas and ‘ingroup spaces’ referred to Catholic areas; for Protestant residents the opposite applied. Time of day was defined as: (1) morning (7am to 12pm); afternoon (between 12pm to 6pm) and evening (between 6pm and 7am). Note also that this data set does not include data on mobility patterns that fell outside our defined study area of north Belfast and the city centre (e.g. when participants went to visit friends or relatives in other towns).

**Data set 2: Questionnaire survey**

**Participants**

Participants in the deposited data set were recruited using door-to-door sampling conducted in the same five areas of north Belfast that featured in Study 1, as indicated in Figure 1 above. They comprised 246 residents who self-identified as Protestant, 242 as Catholic,) and 291 were female and 197 male (MAge = 44.9 years). The majority of the sample came from lower socioeconomic brackets in terms of annual household income, with 40% earning less than £10000 per annum and another 28% earning between £10000 and £20000, a distribution that fits with the broader demographics of this economically deprived area of the city.

**Measures**

Participants completed a questionnaire measuring their positive and negative contact experiences, perceptions of realistic and symbolic threat, anxiety about intergroup contact, and willingness to use activity spaces outside their own ethno-political community. The full questionnaire has been filed with this data set (File name: ‘BMPquestionnaire’).

**Questionnaire survey variables in the deposited SPSS data set (file name: ‘BMPSurveydata’) include:**

*Section 1:*

*Gender, Community Membership, Neighbourhood* are all measured as nominal variables

Age was originally measured as an interval variable but transformed into an ordinal variable in the data file, featuring age bands (e.g. 16 to 25 years etc.). This transformation was undertaken to remove potential threats to respondents’ anonymity given the other information collected in the survey.

*Residential Time:* The time a resident has lived in his/her current home is measured in years

*Residential status* measured as dummy coded nominal variables, i.e. (a) I own my own home, (b) I rent my home privately, (c)I rent home through the Housing Association, (d) I rent my home through the Housing Executive, and (e) Other.

*Annual Income* is measured via series of dummy coded ordinal variables as indicated in the questionnaire, ranging from (a) Less than £10000 a year to (g) More than £60000 per year.

*Section 2: Contact between Communities*

*Positive contact* between communities: Items 2.1, 2.2, 2.5, 2.7 and 2.9 measure frequency of experiences of positive contact on a seven point scale ranging from Never (1) to Very often (7). Higher scores here indicate higher levels of experienced positive contact. **In the SPSS file these items are labelled PosCont2.1, 2.2 etc.**

*Negative Contact* between communities: Items 2.3, 2.4, 2.6, 2.8 and 2.10, measure frequency of experiences of negative contact on a seven point scale, ranging from Never (1) to Very often (7). Higher scores here indicate higher levels of experienced negative contact ***In the SPPS file, these items are labelled NegContact2.3 etc.***

*Section 3: Intergroup Community Attitudes*

Measured outgroup attitudes on a series six semantic differential scales (e.g. Disrespect-Respect), using measuring ranging from 1 to 7. In each case, higher scores indicate more positive outgroup attitudes. **In the SPSS data file, these items are labelled OGattitude 3.1, 3.2 etc.**

*Section 4: Community Identity*:

Four items measure strength of community identity on 5 point Likert scales, ranging from1 (Strongly Agree) to 5 (Strongly Disagree). Higher scores here indicate higher levels of identification**. In the SPSS data file, these items are labelled Ident4.1, 4.2 etc.**

*Section 5: Realistic Threat*

Realistic threat is measured on 5 point Likert scales, ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). Higher scores here indicate higher levels of Realistic Threat. Note that Responses on items 5.1, 5.2., 5.4 and 5.5 have been reverse coded in the SPSS spreadsheet. **In the SPSS data set, these items are labelled Realthreat 5.1, 5.2 etc.**

Section 6: Symbolic Threat

*Symbolic Threat* is measured on 5 point Likert scales, ranging from 1 (Strongly Agree) to 5 (Strongly Disagree). Higher scores here indicate higher levels of Symbolic Threat. Note that Responses on items 6.1, 6.2, 6.3 and 6.4 have been reverse coded in the SPSS spreadsheet**. In the SPSS spreadsheet, these items are labelled Symthreat6.1, 6.2**

*Section 7: Contact Anxiety*

*Contact Anxiety* is measured on a 7 point scale, ranging from Not at all (1) to Extremely (7). Higher scores here indicate higher levels of anxiety about contact with members of the other religious community. Note that items 7.3, 7.5 and 7.6 have been reverse coded in the SPSS spreadsheet. **In that spreadsheet, the relevant items are labelled Contanx7.1, 7.2 etc.**

*Section 8: Activity Space Attitudes:*

Items 8.1 though to 8.6 measure respondents’ willingness to use activity spaces beyond their own communities and in nearby outgroup spaces and facilities. All items are measured using 5 point Likert scales, ranging from (1) Strongly Agree to (5) Strongly Disagree, with higher scores indicated a greater willingness to use other group or shared spaces**. In the SPSS data file, these items are labelled Facaccess8.1, 8.2 etc.**

*Section 9: Peace walls*

Item 9.1 measures participants’ perceived *residential proximity to the nearest peace wall* on an 8 point ordinal scale, ranging from Less than 100 yards to More than 700 yards (coded as 800 in the spreadsheet). **In the SPSS spreadsheet this variable is labelled walldistance9.1.**

Items 9.2 to 9.5 measure participants *attitudes towards government proposals to dismantle the peace walls* using 5 point Likert scales, ranging from (1) Strongly Agree to (5) Strongly Disagree. High scores here indicate greater support for dismantling peace walls, with items 9.2 and 9.5 reverse-coded in the SPSS spreadsheet**. In the SPSS spreadsheet, these items are labelled wallatt9.2, 9.3 etc.**

Items 9.6 a to d measure the *perceived functions of current peace walls* in Belfast using 5 point Likert scales, ranging from (1) Strongly Agree to (5) Strongly Disagree. All items have been reverse coded so that higher scores mean that a participant more strongly perceives a given function (e.g. that peace walls help people feel safer, keep communities apart etc.). Note that all four of these items have been reverse coded in the SPSS spreadsheet**. Note also that in the SPSS data file, these items are labelled Wallfunc9.6a, b etc.**

*Section 10: Belfast city centre*

Items 10.1 to 10.5 measure *perceptions of the degree to which Belfast city centre is now an inclusive space where members of both communities feel they belong*, using 5 point Likert scales, ranging from (1) Strongly Agree to (5) Strongly Disagree. Higher scores here indicate higher levels of perceived inclusivity and collective belonging in the city centre. As such, items 10.1, 10.2, 10.3 and 10.5 have been reverse coded in the spreadsheet***. Note that in the SPSS data file these items are labelled CCent10.1, 10.2 etc.***

Finally, note that missing data is coded as ‘9999’ in the SPSS file containing the questionnaire data.