HUM/MUS

UK/BRAZIL
Healthy Urban Mobility

MOBILIDADE URBANA SAUDÁVEL

SUMMARY OF KEY FINDINGS AND RECOMMENDATIONS

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Introduction

Since the initiation of the World Health Organization (WHO) Healthy Cities movement more than thirty years ago there have been increased efforts to understand how the urban environment affects health and how it can produce more equitable health benefits. A key concern is the way in which the physical fabric of cities affects urban mobility and how this relates to health and wellbeing. Built environmental design supportive of walking and cycling ('healthy urban mobility') could help to promote moderate physical activity as part of daily travel routines. This, in turn, could help to delay biological ageing and age-related conditions and improve overall health and wellbeing.

Upper-middle income countries in the Global South are experiencing a rapid growth in private motorization. This coupled with the lack of value placed on walking and cycling is having a significant impact on the urban poor and low-income groups who are more likely to rely on walking and cycling to meet their daily travel needs. In high income countries in the Global North, despite efforts to encourage people to walk and cycle more, the trend is towards a decrease in physical activity. This decrease is associated with more widespread private car use and greater mechanisation in the home, workplace and public places.

The implementation of healthy urban mobility as part of the broader Healthy Cities concept presents serious challenges in both the Global South and Global North and requires different approaches towards its realisation in different cultural and political contexts. The focus of the Healthy Urban Mobility project was to understand the impact of personal (im)mobility on health and wellbeing in low and middle income communities in Brazil and in the UK. It also sought to explore the potential of participatory approaches in supporting and developing healthy urban mobility and tackling health inequalities and injustice.

The project was a collaboration between three universities in Brazil (University of Brasília, Federal University of Rio Grande do Sul and Federal University of Santa Catarina) and Oxford Brookes University in the UK. This report provides an overview of the project and summarises key insights from research data and recommendations towards realising healthy urban mobility in different global contexts. Full evidence will be made available in a series of forthcoming publications. A compendium of more detailed, context specific reports - by country, city and neighbourhood - are also available at **www.hum-mus.org**

Study objectives & guiding questions

There were two principal objectives of the collaborative research. First, to understand the impact of everyday (im)mobility on health and wellbeing within different social groups living in different neighbourhoods in Brazil and the UK; second, to explore the potential for participatory mobilities planning with local communities to support and develop solutions for healthy urban mobility in Brazil and the UK.

We developed eight research questions to guide our research and achieve these objectives:

1. How is urban mobility accessed by different socio-economic groups in different urban settings?

2. What is the experience of mobility among different socio-economic groups using different mobilities and moving through different urban settings?

3. What meanings are attributed to different ways of moving by different socio-economic groups in different urban settings?

4. How do different settlement types and associated ways of moving impact individual and community health and wellbeing?

5. What are the benefits and challenges of involving residents and stakeholders in the co-production of research and policy outcomes?

6. To what extent is the methodological framework developed applicable to a range of contexts in the Global North and Global South?

7. What are the implications of 'seeing from the south' for conceptualizing urban mobilities on a global scale?

8. What are the implications for the planning and design of neighbourhoods and cities promoting healthy mobility?

In the following Key Insights sections we respond to these questions:

Key Insights 1 addresses question 1

Key Insights 2 addresses questions 2 and 3

Key Insights 3 addresses questions 3 and 4

Key Insights 4 addresses question 5

Key Insights 5 addresses questions 6 and 7

Finally, we address question 8 in Key Recommendations and conclude with Suggested Policy Interventions. First, however, we discuss our approach and methods and provide information on the character of our geographical areas of focus.

Case study areas

The study focused on three low and middle-income neighbourhoods in each of three Brazilian cities: Brasília (Federal District), Florianópolis (State of Santa Catarina), Porto Alegre (State of Rio Grande do Sul) and two low/middle-income neighbourhoods in Oxford (Southern England, UK). These were chosen because of their different spatial and demographic characteristics and the challenges they are facing in relation to promoting healthy urban mobility. Given the intense research approach and time required in the field, researchers were based at Universities within case cities to allow convenient access to neighbourhoods.

The cities and neighbourhoods we investigated

Source: Google Earth

Brasília

Varjão

Vila Planalto

Super Quadra Sul 409/410

Source: Google Earth

Florianópolis

Saco Grande

Jardim Atlântico

Costeira do Pirajubaé

Source: Google Earth

Porto Alegre

Menino Deus

Tronco

Cruzeiro

5 km

Source: Google Earth

Oxford

Barton

Rose Hill

5 km
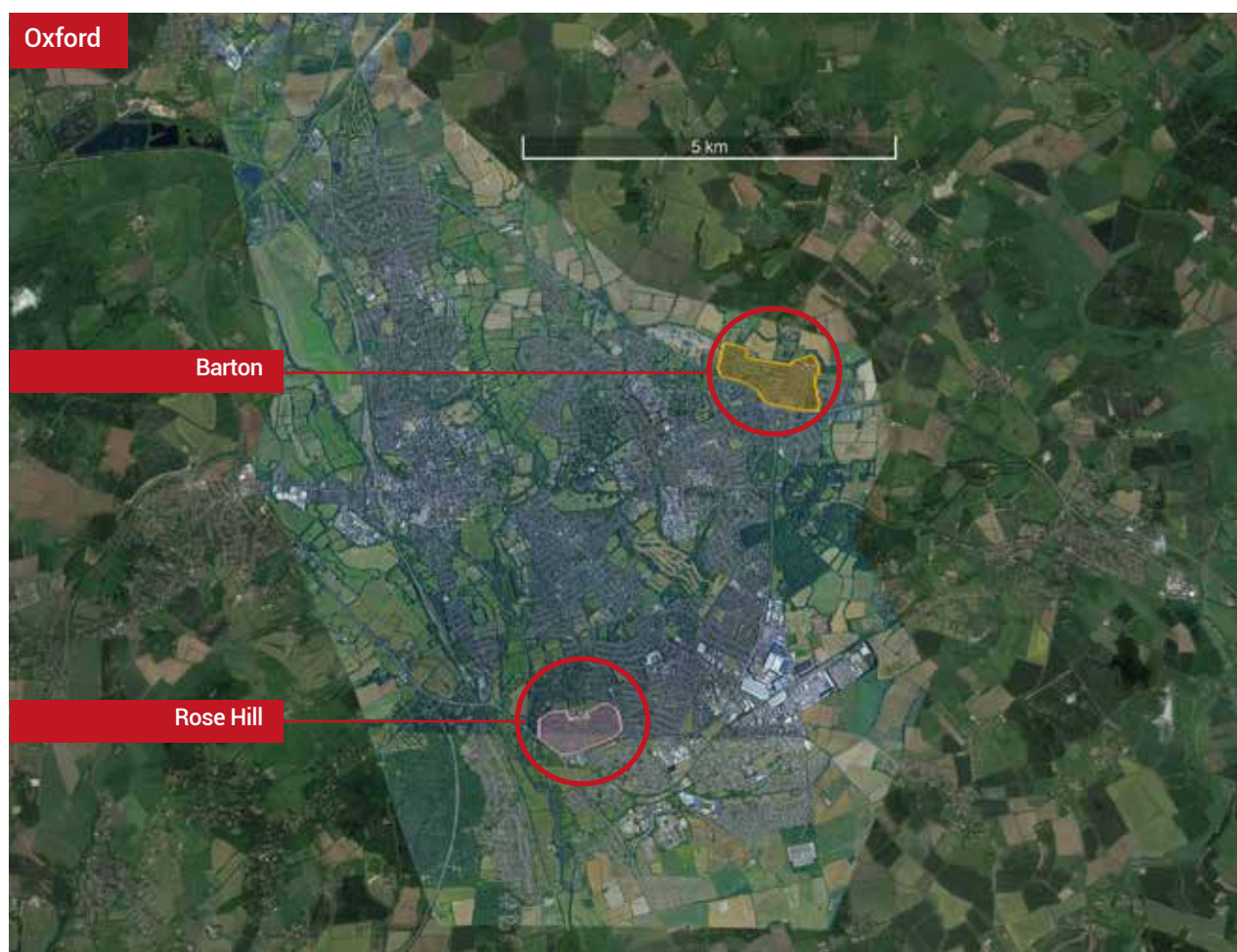
Source: Google Earth
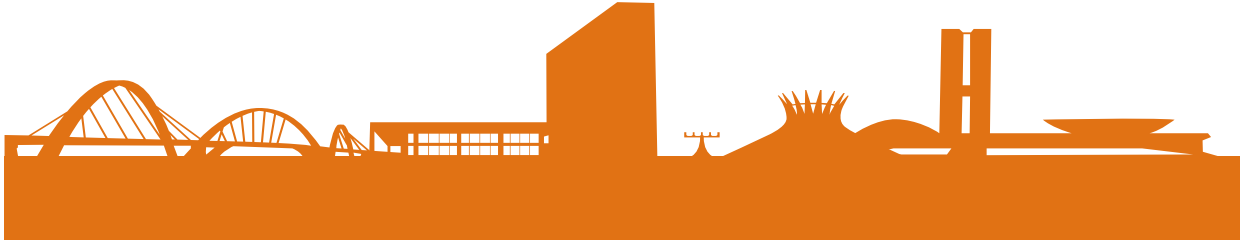
BRASÍLIA[1] (POPN. 2.5M)

Capital of Brazil and located in the Federal District of Brazil. Among Brazilian cities, ranked 9th in terms of the Human Development Index (HDI, 2010). Travel mode share: Walking 24%, cycling 2%, public transportation 31%, private car 35%, and others 8%.

Super Quadra Sul 409/410 (SQS 409/410) is a middle-income neighbourhood and is comprised of two of the 118m x 118m 'super square' modernist neighbourhood units that make up the core of the city of Brasília. Like all super squares, they are directly linked to the city's major road system. There are open green spaces surrounding the buildings and shops and activities are closeby concentrated on local (open) commercial malls. Cycle infrastructure has recently been added to the existing networks of footways.

Varjão is a low-income neighbourhood and semi-formal housing area surrounded by highways. The area is close to tracts of natural vegetation. Varjão is in a separate administrative region within the Federal District. It is distant from the city centre and has a higher degree of informality. Infrastructure provision is precarious.

Vila Planalto is a low-to-middle-income neighbourhood and the remnant of a settlement built to house workers who constructed Brasília in the 1960s. It is relatively close to the centre of Brasília but separated by busy highways. This makes it difficult to access jobs and specialized goods and services.

Super Quadra Sul

Varjão

Vila Planalto

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[1] We use the term Brasília in the same way as the Brazilian Institute of Geography and Statistics (IBGE) which considers Brasília the same as the Federal District.

FLORIANÓPOLIS (POPN. 500K)

Capital of the state of Santa Catarina. Among Brazilian cities, ranked 3rd in terms of the Human Development Index (HDI, 2010). Travel mode share: Walking 11%, cycling 4%, public transportation 34%, private car 41% and others 10%.

Costeira do Pirajubaé is a low-income informal settlement that sprawls up a hillside. The street network comprises scattered pavements and staircases. The community is separated from the nearby coast by the coastal highway. Housing is precarious and there are only a few services in the area, clustered at the flat portion next to the highway.

Jardim Atlântico is a low-to-middle income neighbourhood located on a hill on the mainland. Routes towards the only bridge linking the mainland to the island can become congested presenting challenges for accessing the city. The area has a gridded street layout with informal and formal housing and few services in the area.

Saco Grande is a low-to-middle-income neighbourhood, similar to Costeira in that it spreads up a hill but is more urbanized and has flatter sections at the foot of the slope that are laid out in a regular grid. There is a mix of housing from large condominiums to scattered informal constructions on the hillside. The area is served by a large shopping mall.

Saco Grande

Jardim Atlântico

Costeira do Pirajubaé

PORTO ALEGRE (POPN. 1.5M)

Capital of the state of Rio Grande do Sul. Among Brazilian cities, ranked 28th in terms of the Human Development Index (HDI, 2010). Travel mode share: Walking 23%, cycling 1%, public transportation 36%, private car 36% and others 4%.

Cruzeiro is a low-to-middle-income, socially and spatially mixed neighbourhood resembling a patchwork of slums and formal low-income housing estates. The more formal areas are characterised by gated houses and condominiums and a higher proportion of car ownership. Urban density is fairly high but land use diversity is low. The street layout varies between regular grids and sinuous fragmented networks. The 2014 Football World Cup led to the demolition of some 1,600 family homes in order to accommodate the expansion of 'Tronco Avenue' to the football stadium. After the World Cup, infrastructure works were not completed leaving the neighbourhood with discarded infrastructure.

Menino Deus is a middle-income neighbourhood and perhaps the closest to the idea of a 'walkable city' in the Brazilian context. It is characterised by mixed-use, dense areas located close to, and well connected with the city centre and to other amenities. In recent years, the neighbourhood has witnessed an influx of younger people who are replacing traditional family units. The neighbourhood continues to be a desirable place to live despite problems with traffic congestion.

Tronco is an informal low-income neighbourhood that lies in a deep valley between two sloping hillsides close to Cruzeiro, however it is less socially and spatially mixed. The fabric is very dense and has high pedestrian connectivity, yet the road network is very fragmented and full of dead-end streets. The diversity of land use is low and there are serious infrastructure issues. Despite being fairly central to the city, the area feels like an enclave, embedded in the formal city but poorly connected with it.

Cruzeiro

Menino Deus

Tronco

OXFORD (POPN. 150K)

Relatively low levels of deprivation but certain areas of city are in the most 20% deprived areas in the UK. Travel mode share: Walking 15%, cycling 15%, public transportation 16%, private car 42% and others 12%.

Barton is a suburban low-income housing estate built in the 1940s as public housing and is located 5 km east of the city centre. The neighbourhood lies on an incline just outside the Oxford ring-road on the city's eastern edge which makes leaving the estate on foot or by cycle quite challenging. Two underpasses provide pedestrian routes under the ring-road linking to a cycle track. There are some small shops, a school, a sports centre, a swimming pool, and a community centre in the neighbourhood. A frequent bus service connects Barton to the city centre.

Rose Hill is also a suburban low-to-middle-income housing estate built in the 1920s and located 4 km southeast of the city centre on a hill. On its boundary lies the River Thames to the west and the Oxford ring-road to the south. There is a primary school, two local shops and new community centre located on the estate. A frequent bus service operates between Rose Hill and the city centre. There is only one access point by road to the estate but multiple links via footpaths and alleyways to neighbouring areas such as the ring-road separated cycle path and the River Thames path.

Barton

Rose Hill

Summary of the characteristics of the built environment of the case study areas

	SETTLEMENT PLANNED OR INFORMAL	DISTANCE FROM CENTRE (KM)	NO. HOUSEHOLDS (000'S)	RELATIVE INCOME	DENSITY	LAND USE DIVERSITY	DESIGN CONNECTIVITY	WALKABILITY*	TOPOGRAPHY
Brasília SQS 409/410	Planned	4.1	1.1	Middle	High	Moderate	Moderate	High	Flat
Brasília Varjão	Mixed	8.9	2.4	Low	Low	Moderate-high	Moderate	Moderate	Hilly
Brasília Vila Planalto	Mixed	6.5	1.9	Low-middle	Low	Moderate-high	Moderate	Moderate-high	Flat
Florianópolis C. Pirajubaé	Informal	5.4	2.9	Low	Low	Low	Low	Low	Hilly
Florianópolis Jardim Atlântico	Mixed	5.1	2.1	Low-middle	Low	Low	Low	Low	Hilly
Florianópolis Saco Grande	Mixed	7.5	2.2	Low-middle	Low	Low	Low	Low	Hilly
Porto Alegre Cruzeiro	Mixed	4.6	3.4	Low-middle	Moderate	Low	Moderate	Moderate	Hilly
Porto Alegre Menino Deus	Planned	2.7	6.8	Middle	High	High	High	High	Flat
Porto Alegre Tronco	Informal	5.0	2.0	Low	Moderate	Low	Moderate	Moderate	Hilly
Oxford Barton	Planned	4.7	1.5	Low	Low	Low	Low	Low	Hilly
Oxford Rose Hill	Planned	3.7	1.3	Low-middle	Low	Low	Low	Low	Hilly

*Using adaptation of Frank et al. (2010) walkability index.

Participatory planning, Oxford

Approach and methods

A hoped for outcome of the Healthy Urban Mobility project was to suggest, and where possible, trial, alternative approaches to planning for health, as advocated by Rydin et al. (2012) viz: encourage city governments to understand and work with a wide range of residents and stakeholders; attend to health inequalities within urban areas, particularly in relation to the built environment and mobility, and verify how this affects health and wellbeing; use novel research methods to assess and to actively involve communities in dialogue and mutual learning; and, propose action at an urban scale. To this end, a multi-method approach was used comprising five specific research components. This took advantage of the range of expertise among the team members in fields of urban planning, transport studies, public health and environmental psychology.

1. **Spatial mapping** to understand the physical and built environment context in which mobility takes place

2. **Social survey** to capture mobility and health and wellbeing profiles in the selected case study areas

3. **Biographic interviews** to understand the role of past experiences of mobility and the rationale behind selected modes of mobility i.e. 'mobile trajectories'

4. **Micro-ethnographies** through mobile observation and interview to capture contemporary everyday experience of being (im)mobile

5. **Participatory methods** to involve the local community in identifying problems and co-producing solutions for healthy urban mobility and community wellbeing.

Spatial mapping of the nine different neighbourhoods in Brazil and the two in Oxford consisted of the investigation of built environment 'macro' and 'meso' attributes that are considered to influence walking and cycling. These attributes include density, diversity and design (Cervero & Kockelman, 1997). Density (of residential properties and people) functions as a potential generator of movement, producing or attracting journeys. It is closely linked with diversity which is the degree of mixed land use within a given area. Design refers to the configuration of the street network and its ability to connect points of departure and destinations. These built environment characteristics together with, topography, public transport provision and other infrastructure services and composite 'walkability' indicators were added to a GIS database. Network buffers of 400 metres (equivalent to an average distance walked in 5 minutes) were created around each survey respondent's home and used to generate indicators of connectivity to everyday services on foot and by cycle. These were then used together with self-report data from the social survey to investigate the relationship between spatial attributes, mobility and health.

For the **social survey** a questionnaire was designed to gather data on characteristics of households; perceptions of the neighbourhood (including places to walk and cycle); attitudes to walking and cycling; travel behaviour; quality of life; physical activity; and health and life habits. All instruments used in the survey were validated in both languages (Portuguese and English), tested and adjusted before being administered in the host language. A random sample of addresses was selected for each neighbourhood. A team of interviewers called door-to-door to administer the surveys and attempted to contact an adult (aged 18+) at each household at different times of the day on at least three separate occasions. The aim was to achieve a sample of approximately 400 respondents in each neighbourhood totalling around 1200 in each city.

Summary of socio-economic characteristics of survey respondents

	CITY / NEIGHBOURHOOD														
	BRASÍLIA				FLORIANÓPOLIS				PORTO ALEGRE				OXFORD		
	TOTAL	SQS 409/410	VARJÃO	VILA PLANALTO	TOTAL	C. DO PIRA-JUBAÉ	JARDIM ATLÂN-TICO	SACO GRANDE	TOTAL	CRUZEIRO	MENINO DEUS	TRONCO	TOTAL	BARTON	ROSE HILL
Sample size	1107	325	433	349	1084	345	335	404	1105	358	388	359	272	137	135
Female (%)	64	64	70	57	70	71	71	68	66	67	61	72	60	59	62
Age (ave. yrs)	42	46	37	44	54	53	54	54	45	44	55	45	46	46	45
White Ethnicity (%)	30	48	19	29	80	85	76	79	63	53	85	48	71	76	65
Ave. Monthly Income*	3656	6056	1561	3350	2186	1839	2172	2547	2940	1492	5815	1512	19%	19%	19%

*Notes: At the time of survey in 2017, the minimum salary in Brazil was R$937 (approx. UK£200) per month. Average monthly income for the Oxford locations is given in percent of respondents earning £1,000 per month or less. Median monthly income in the UK in 2017 was approx. £2260.

Sample for the biographical interviews and mobile 'go-along' interviews

	Biog interview Participants	Go-along participants			
		Walk	Cycle	Other*	Total
Brasília	25	20	3	2	25
Florianópolis	28	11	3	8	22∆
Porto Alegre	22	9	8	3	20∆
Oxford	24	13	8	3	24
Total	99◊	53	22	16	91

*Public transport, taxi and mobility scooter.
∆6 participants in Florianópolis, and 2 in Porto Alegre, elected not to participate in go-alongs.
◊ Approx. 60% female.

This was close to being achieved in all three Brazilian cities (Brasília n=1107; Florianópolis n=1084; Porto Alegre n=1105), however, the response was considerably lower for Oxford (n=272). The age of participants ranged between 18 and 101 years (M=47.8; SD=17.6). The sample of respondents was broadly representative of the population in each neighbourhood, however, females and older respondents were over represented.

Biographical semi-structured interviews were conducted with 99 participants across case study areas and were audio recorded (Lanzendorf, 2010; Chatterjee et al., 2013). Participants were encouraged to complete a life history grid where they could detail key events across their life course (e.g. changes in housing location, education, work, mobility, health, etc.) The grid was then used in the semi-structured interview as a stimulus to discuss past, present and

Year of birth: 196?	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Residence (Location)					WARRINGTON →	→	→	2001 2004 OXF RH EXETER 2 YRS	→ RH
Household (Other residents)							W. MARTAL PARENTS → AM 1993 1967 96 SPLIT '87 DAUGHTER '93 SON	NIGHT SHELTER	PARTNER
Education or work (Paid / unpaid)					YR5/6 YRS FITTINGS + DEC	1990–92 WORST DRINKING MARTAL 1996 REHAB		NOT WORKING
Activities / hobbies / leisure					BOXING RUGBY LEAGUE	SUBCULTURE BOXING GYM R.L.! →		2X 5–10MINS WOLK DOG
Transport (Commuting and moving around the local area: on foot, by bicycle, car, bus etc)			CYCLED 65		MOTORCYCLES →	CAR → 98 96 PASSED TEST	BUS → BUS CENTRE DOCTORS WALKING JEFFRY RD GTD BY COWLEY CTR APARATUS IN FT UG WALK DEPENDENT ON 15MINS TAXI/BUS TAXI/RELY COMINS	ROWNLOUSE
Health					1992 MERCURY RECOVERY	1998 DRUG ADDICTION 2009 METHADONE 2008 LEG ULCER 2016 PTSD DIAGNOSIS		

PLATE IN   ARTHRITIS
LEG

Example of life history grid used in biographical interviews

anticipated future engagement with respect to walking and cycling. Around 75 hours of audio recorded interview material was generated and transcribed. This approach enabled a broad understanding of how people engaged with walking and cycling throughout their lives and the influence of family and wider social relations.

Participants who took part in the biographical interviews were invited to take part in a **mobile observation and interview** while undertaking a regular, self-selected journey either on foot or by cycle in their neighbourhood[2]. Ninety-one individuals agreed to do so. Observation focused on how people performed their journey and was also video recorded using an action camera and played back after the journey as part of a video elicitation interview. The video elicitation interviews were audio recorded and focused on participants' embodied experience of the journey and the rationale behind mobility behaviour and interactions. Around 60 hours of audio and visual data was recorded, summarised (i.e. 'gisted') and transcribed. Jensen's 'Staging Mobility' concept (Jensen, 2013) was used as a broad framework to structure the research approach and subsequent analysis of video and interview transcripts. The focus was, therefore, on how mobility takes place *in situ* in physical settings that are 'staged from above' (i.e. shaped by planning, design, regulation and institutions) and how it is actually 'staged from below' by individual embodied performance and social interactions.

Participatory methods varied taking into account the different contexts in the UK and in Brazil, and, specifically, between neighbourhoods within each city. The aim was to involve residents and stakeholders in co-producing proposals for healthy urban mobility. This took many forms including community events, mapping exercises, participatory video, dialogue/feedback workshops, knowledge sharing and various 'fun type' interventions.

Empirical research was timed such that it was conducted in parallel in both Brazil and the UK using the same approach and methods. The majority of the field work (i.e. social survey, the biographic interviews and the micro-ethnographies) was completed between January 2017 and March 2018.

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[2] We also accompanied some participants on public transport and taxi, and in one case in Oxford, mobility scooter.

Biographical interview in Jardim Atlântico, Florianópolis

Social survey, Menino Deus, Porto Alegre

Walking interview, Barton, Oxford

Velo-mobile methods in Super Quadra Sul 409/410, Brasília

This allowed the team to compare datasets between cities in Brazil and the UK and to evaluate the overall approach and methods, as well as the potential policies and delivery models to promote healthy urban mobility in different contexts. By using a combination of methods, the investigation was able to consider how the built environment and technological 'system' shapes personal mobility and impacts on wellbeing at different scales, ranging from the macro (i.e. general morphology including land use patterns and systems of mobility), to the micro (i.e. design detail of housing and local streets).

Participatory methods, Tronco, Porto Alegre

Travel behaviour in different urban settings

In the following section, we provide some answers to the first research question: *(1) How is urban mobility accessed by different socio-economic groups in different urban settings?*

In the social survey respondents were asked to report the number of trips made by different means of travel for different purposes in the course of the seven days prior to the interview. The average number of trips was calculated for each travel mode (see Table on the next page) and related to the spatial data. The analyses revealed:

The overall number of trips was higher among respondents in Oxford than in the three Brazilian cities.

The overall number of trips by respondents in Brazil was highest in the middle-income areas of SQS 409/410 in Brasília and Menino Deus in Porto Alegre.

The overall number and proportion of trips by car was highest in Brasília's SQS 409/410 middle-income neighbourhood.

Motorcycle ridership was very low among respondents in all Brazilian neighbourhoods - despite the number of motorcycles in Brazil almost doubling over the last decade.

Walking was the most frequent mobility option compared to other modes among respondents in low-income areas of Varjão (Brasília), Cruzeiro and Tronco (Porto Alegre) but also in the middle-income neighbourhood of Menino Deus (Porto Alegre).

Respondents living in the Oxford case neighbourhoods and SQS 409/410 and Varjão (Brasília) reported similar frequency of walking.

In Brazil, respondents in Menino Deus (Porto Alegre) reported the highest proportion of walking and those in Jardim Atlântico (Florianópolis) reported the lowest.

Cycling was more prevalent among respondents in the Oxford case neighbourhoods compared to respondents in the Brazilian case neighbourhoods.

Cycle trips were less frequent among respondents in all case neighbourhoods in Brazil but the highest proportion was in Vila Planalto (Brasília) followed by Menino Deus (Porto Alegre).

The highest proportion of trips by bus was in Tronco (Porto Alegre) and the neighbourhoods of Costeira do Pirajubaé and Jardim Atlântico in Florianópolis.

The highest percentage of immobile respondents in Brazilian case study neighbourhoods was in the low-income areas of Costeira and Jardim Atlântico in Florianópolis (18% and 13% respectively) and Tronco and Cruzeiro in Porto Alegre (12% and 10% respectively).

Average number (and proportion) of trips and mode reported for the seven-day period prior to survey

	AVE. JOURNEYS BY ALL MODES* (PERCENT OF ALL JOURNEYS)	WALKING	CYCLING	BUS	METRO / TRAIN	CAR (DRIVER OR PASSENGER)	MOTORCYCLE
Brasília SQS 409/410	11.6 (100)	3.4 (29)	0.2 (2)	0.9 (8)	0.2 (2)	6.7 (61)	0.2 (2)
Brasília Varjão	8.1 (100)	3.3 (41)	0.1 (1)	1.8 (22)	-	2.8 (35)	- (<1)
Brasília Vila Planalto	8.5 (100)	2.8 (33)	0.5 (6)	1.2 (14)	0.1 (1)	3.7 (44)	0.2 (2)
Florianópolis C. Pirajubaé	5.5 (100)	1.4 (25)	0.1 (2)	1.6 (29)	-	2.3 (41)	0.1 (2)
Florianópolis Jardim Atlântico	5.7 (100)	1.1 (19)	0.06 (1)	1.4 (25)	-	2.9 (51)	0.2 (4)
Florianópolis Saco Grande	5.3 (100)	1.5 (19)	0.06 (1)	1.4 (25)	-	2.6 (49)	0.1 (2)
Porto Alegre Cruzeiro	6.4 (100)	2.6 (41)	0.2 (3)	1.9 (30)	-	1.6 (25)	0.1 (2)
Porto Alegre Menino Deus	10.1 (100)	5.1 (50)	0.4 (4)	1.0 (10)	-	3.5 (35)	0.1 (1)
Porto Alegre Tronco	5.8 (100)	2.5 (43)	0.08 (1)	1.8 (31)	-	1.3 (22)	0.1 (2)
Oxford Barton	12.8 (100)	3.3 (26)	1.2 (9)	22 (17)	0.4 (3)	5.1 (40)	0.6 (5)
Oxford Rose Hill	13.4 (100)	3.2 (24)	2.1 (16)	2.1 (16)	0.6 (4)	4.9 (37)	0.5 (4)

* Totals may vary due to rounding.

Correlations between built environment attributes (i.e. composite walkability indexes and different individual measures of density, design and, especially, diversity) and walking frequency, adjusted for sex, age and education were significant but weak, particularly for Brasília and Porto Alegre. For cycling no associations were found, probably due to the low frequency of cycling in our sample. This does not necessarily mean that characteristics of the built environment are unimportant in shaping walking and cycling but does suggest that they are insufficient on their own. Walking and cycling may (or may not) occur despite the presence or absence of 'macro' built environment indicators purported to support them. It should also be noted that the spatial attributes of the 'walkable city' presented in Anglo-American studies usually describe the characteristics of centrally planned areas of developed cities, making the inference of relationships between the built environment, travel behaviour and people's health relatively straightforward. In the case of Brazil, or at least the samples of this study, the informal 'unplanned' nature of settlements makes investigating possible relationships more challenging and the

Cycling in Costeira do Pirajubaé, Florianópolis

Walking in Costeira do Pirajubaé, Florianópolis

Walking and cycling in Barton, Oxford

lines of causality may be blurred especially when people's mobility is heavily mediated by financial, social and symbolic constraints posed by a highly unequal society. Indeed, further analyses investigating the relationship between socio-demographic characteristics and travel behaviour revealed that:

Male respondents were more likely to make trips on foot and by bicycle compared to female respondents.

Older respondents were less likely to walk and cycle.

Respondents with higher educational levels were more likely to make trips on foot, but there appeared to be no relation with respect to cycling.

The higher the income level, the less likely respondents were to walk; again there was no relation with cycling.

→ In the next section we delve further into how respondents perceive the area where they live and their mobility experience as they move around their neighbourhood and between other areas of the city.

Neighbourhood perception and experience of healthy urban mobility

In the following section, we provide some answers to research questions two and three: *(2) What is the experience of mobility among different socio-economic groups using different mobilities and moving through different urban settings? (3) What meanings are attributed to different ways of moving by different socio-economic groups in different urban settings?*

Insights into experiences of healthy urban mobility across the case neighbourhoods were gained through the social survey gauging neighbourhood satisfaction as well as through qualitative interviews. Key data from the social survey on neighbourhood satisfaction are shown in the table on page 19.

For Oxford case neighbourhoods there was most satisfaction with access to public transport. Participants perceived that walking is easy although they do not consider it pleasant. Cycling was regarded less favourably than walking particularly in relation to pleasantness and ease, this was more pronounced in the Barton area. There was satisfaction with access to local facilities and to friends. In both neighbourhoods there was slight dissatisfaction with the amount and speed of traffic. Barton participants were particularly dissatisfied with traffic noise. There was slight agreement that both neighbourhoods were good places to live, with similar levels of satisfaction in Barton and in Rose Hill.

Across all the Brazilian case neighbourhoods there was satisfaction with access to shops and friends, and to a lesser extent, public transport. Participants perceived that it is easy and pleasant to walk in the neighbourhood. However, there was general dissatisfaction with ease and pleasantness

of cycling. Fear of crime was also notable across the Brazilian neighbourhoods. Cruzeiro and Tronco (Porto Alegre) and Costeira do Pirajubaé (Florianópolis), particularly stood out as neighbourhoods with higher degrees of dissatisfaction, while in contrast, there were higher levels of satisfaction in SQS 409/410 and Vila Planalto (Brasília), Jardim Atlântico and Saco Grande (Florianópolis) and Menino Deus (Porto Alegre). Overall, however, the participants of all the neighbourhoods considered that they live in a good place.

Key differences between the respondents in the UK and Brazil case study neighbourhoods were the general satisfaction in Oxford with public transport compared to the Brazilian cities. Respondents in the Brazilian neighbourhoods were generally more satisfied with levels of access to shops and friends. There appears to be more dissatisfaction with the amount of traffic and associated noise as well as traffic speed in the UK (at least outside of Costeira do Pirajubaé), but it is noticeable that there is greater dissatisfaction in Brazilian cities in relation to conditions for cycling (at least outside of Brasília). Despite this, respondents in the Brazilian neighbourhoods displayed higher levels of satisfaction with their neighbourhood when compared to respondents living in case neighbourhoods in the UK.

Level of satisfaction with neighbourhood setting and walking and cycling

NEIGHBOUR-HOOD	CITY / NEIGHBOURHOOD														
	BRASÍLIA				FLORIANÓPOLIS				PORTO ALEGRE				OXFORD		
	TOTAL	SQS 409/410	VARJÃO	VILA PLANALTO	TOTAL	C. DO PIRA-JUBAÉ	JARDIM ATLÂN-TICO	SACO GRANDE	TOTAL	CRUZEIRO	MENINO DEUS	TRONCO	TOTAL	BARTON	ROSE HILL
n=	1107	325	431	349	1084	345	335	404	1105	358	388	359	272	137	135
Access to public transport	2.3	2.6	2.9	2.1	2.8	2.3	3.3	2.7	2.7	2.4	3.4	2.2	3.3	3.3	3.3
Access to shops	3.3	3.7	3.1	3.1	3.2	3.1	3.1	3.4	3.4	3.2	3.8	3.3	2.5	2.5	2.6
Access to friends	3.3	2.9	3.5	3.2	3.5	3.6	3.3	3.5	3.5	3.5	3.3	3.6	2.3	2.3	2.5
Ease of walking	3.6	3.7	3.5	3.6	3.2	2.9	3.1	3.4	3.0	2.8	3.4	2.9	3.1	2.9	3.1
Pleasant to walk	3.3	3.6	3.1	3.3	3.1	3.0	3.0	3.3	2.7	2.3	3.3	2.4	2.5	2.5	2.6
Ease of cycling	2.8	3.3	2.5	2.9	1.3	1.2	0.9	1.8	1.9	1.5	2.7	1.5	2.5	2.4	2.7
Pleasant to cycle	2.8	3.2	2.5	2.9	1.5	1.6	0.9	2.2	2.0	1.5	2.8	1.6	2.2	2.1	2.4
Safe from threat of crime	2.2	1.6	2.5	2.5	1.5	1.3	1.6	1.5	0.9	0.6	0.9	1.1	2.1	2.0	2.1
Amount of traffic	2.6	2.2	2.6	2.9	2.3	1.7	2.5	2.5	2.2	2.1	2.1	2.3	1.9	1.8	2.1
Speed of traffic	2.6	2.5	2.4	2.8	2.0	1.4	2.3	2.3	1.9	1.7	2.2	1.9	1.8	1.7	1.9
Noise of traffic	2.7	2.7	2.6	2.9	2.5	1.9	2.7	2.8	2.3	2.0	2.6	2.3	2.0	1.6	2.4
Neighbour-hood a good place to live	3.4	3.6	3.3	3.6	3.6	3.5	3.6	3.6	2.9	2.5	3.6	2.7	2.4	2.4	2.5

0 = strongly dissatisfied; 2 = neither dissatisfied or satisfied; 4 = strongly satisfied.

Further investigation into the relationship between neighbourhood perception and travel behaviour revealed:

Positive perception of the neighbourhood and overall neighbourhood satisfaction increase the likelihood of walking and cycling.

Neighbourhood perception is more likely to impact walking behaviour than cycling behaviour.

If respondents feel that they have control over their ability to walk or cycle and positive attitudes to walking and cycling (and, in the case of cycling, also a high degree of intent) they are more likely to do so.

The extensive amount of qualitative data that was generated was analysed using Jensen's Staging Mobility framework (Jensen, 2013). Given the limited space, only a brief overview of the positive and negative aspects of the different physical settings and walking and cycling is provided. Selected quotes from participants are used to illustrate these points.

BRAZIL – BRASÍLIA

In **SQS 409/401**, participants were generally positive about their experience of the area and their neighbourhood relations. They talked about their favourable access to local amenities and the fact that poor connectivity for cars encourages walking for short trips. Green spaces were appreciated and particularly the profusion of fruit trees alongside footways. The main criticisms were poor maintenance of footways and encroaching vegetation that could potentially provide cover for criminal activity. There was also a sense that the wider area is car dominated and there are no real dedicated facilities for cycling. It was suggested that the spatial configuration reduced the potential for chance encounters as people generally move around by car between their homes and activities spread out across the city.

Participants from **Vila Planalto** generally appreciated the improvements to infrastructure that had occurred over the years. They were particularly fond of access to green space and the nearby lake. The semi-informal area had also experienced an influx of mobile services (e.g. food caterers) and this was seen as valuable as it reduces the need to travel further afield. However, they were critical of the lack of footways and regarded those that exist as poorly maintained and lacking adequate drainage. There was also an increasing problem with vehicles parking on them. The few people that we interviewed who cycled spoke about how they avoided roads and rode on footways or grassed central reservations because of fear of fast-moving motor vehicles. Nevertheless, within the neighbourhood there was a sense of community and a general feeling of personal safety.

People spoke of the **Varjão** neighbourhood as having a strong community spirit. They were appreciative of green areas surrounding the site. However, walking is made difficult by non-existent or poorly maintained footways that are often strewn with litter and waste. Localised flooding was also problematic. There was a feeling that road traffic posed a danger to walking and cycling and that footways and areas outside of properties were becoming dominated by cars. People talked about the irregular bus service linking Varjão to the wider city making public transport a chore.

FELICIO, SQS 409/401

'The floor here is very unsuitable for sidewalks, with these buildings, when someone is using a wheelchair, or a stroller, it is awful. Besides these buildings are crumbling, it's dangerous right?'.

HERCULES, VILA PLANALTO

'The infrastructure here has improved a lot compared to what it used to be, because it had no asphalt before, it was just dirt...now it's paved and has sidewalks'.

LEON, VILA PLANALTO

'I wanted to be able to negotiate with the local government and ask them to make a bike path from here to the courthouse, not only for me, but also to give people the chance to have options'.

MARINA, VARJÃO

'The sidewalks are very bad, and the automobile owners park on the sidewalk. And it's too bad for us to walk'.

BRAZIL– FLORIANÓPOLIS

Participants in **Costeira do Pirajubaé** emphasized the poor condition of footways. This is made worse by people parking their cars on them. Although the area is served by a cycle path, it requires crossing the main highway to get there and participants spoke about feeling unsafe accessing it even via a footbridge linking the neighbourhood. Participants were less concerned about their personal safety although many mentioned assaults in the neighbourhood. The frequency of buses serving the area was well regarded.

In **Jardim Atlântico** participants were concerned about the terrible conditions of footways. Many reported preferring to walk on the road as surfaces are generally smoother. Although the area is not served by cycle paths, people felt comfortable going to cycle in other places nearby where they felt infrastructure is better and the opportunity exists to be closer to nature. Walking and cycling was often spoken about as a means of being physically active and not something that is usually performed for travel. However, participants, especially younger people, expressed positive feelings about driving cars because they felt comfortable and safe from strangers. For them, driving a car is 'health mobility'.

In **Saco Grande** participants spoke about the precarious condition of footways highlighting the presence of holes and rubbish that, together with a steep incline, made it very difficult to move around the area on foot or by bicycle. The feeling of insecurity, especially at night, was often mentioned and this was exacerbated by a lack of street lighting. On flatter sections dominated by the SC-401 state highway and main roads, participants felt afraid to cycle because they were aware of a previous tragedy where a cyclist was killed after colliding with a car. Participants also spoke about general travel stress among road users because the SC-401 is the only way to travel between Saco Grande and the north of Florianópolis island. Despite these negative aspects, residents felt that the neighbourhood is a good place to live because of access to facilities including a large shopping mall.

Cycling in Costeira do Pirajubaé, Florianópolis on the Governador Aderbal Ramos da Silva highway

OLIVO, COSTEIRA DO PIRAJUBAÉ

'Nasty here, that's it, this sidewalk because we do not have security, they put the car on the sidewalk'.

TALES, JARDIM ATLÂNTICO

'Because everything is irregular (sidewalk), I normally go out by car'.

FLORBELA, JARDIM ATLÂNTICO

'In my reality, safe mobility is what I am doing now, be in my car'.

NARCISO, SACO GRANDE

'A teacher died there … You know that he died by bicycle?... this SC-401 gives a lot of trouble. I am willing to cycle, but I will not'.

BRAZIL– PORTO ALEGRE

Participants in **Cruzeiro** felt particularly strongly about the poor maintenance of footways and general infrastructure for walking. They were also concerned about traffic conditions which made them feel unsafe. People talked about the lack of respect between different road users and the threat posed by motorists. This meant that cycling was hardly used - although they expressed demand for bike paths - and is mostly reduced to leisure activity away from the roads. Another issue related to public safety. Some participants spoke of choosing to walk over taking public transport because of fear of assault while waiting at bus stops. Fear of crime was particularly prevalent among female participants. Green space was highly valued and some participants actively chose routes through parks to seek shade from intense sunlight.

Participants in **Menino Deus** spoke of how they were attracted to the area and regarded it as a good place to live, because it offered convenient services close by, was well connected to the rest of the city, and the infrastructure was generally of good quality. This included some cycle paths, but there was criticism that these were not well connected and were not maintained and had since decayed. People appreciated the ease of walking around the area and the quality of footways and tree lined streets. There was a sense that the neighbourhood was 'cosmopolitan' and a desirable place to live but there was concern about crime and 'poor traffic education'. Combined with good public transport, there was recognition that Menino Deus offered the potential to adopt sustainable mobility practices, both within, and beyond the neighbourhood.

Tronco, being located on the side of a hill, poses challenging topography for walking and cycling. This was often mentioned by participants as particularly hindering cycling which was regarded as mainly the preserve of 'daring' young males. Furthermore, infrastructure for walking was regarded as poor with footways either lacking or blocked by rubbish and debris. Participants also spoke of their fear of crime, with certain spaces being actively avoided because of the operation of drugs gangs. They also spoke of how they generally felt safer when they were in their own street/area because of the strong sense of community. Interaction between road users was often discussed in terms of poor traffic behaviour and 'disrespect' for pedestrians and cyclists with drivers frequently ignoring signals and crossings. Moreover, the presence of packs of stray street dogs deterred some people from walking along certain routes. Coupled with the lack of services in the area, poor public transport means that many people would walk or rely on lifts to access services further afield, this was particularly true for women. Overall, participants' accounts often included a sense of neglect of the area and mistrust of authorities' ability to do anything about it.

MIRIAM, CRUZEIRO

'Through the neighbourhood it is a little hard to cycle, there might be traffic lights, but people here in the neighbourhood don't respect them that much'.

ELISA, MENINO DEUS

'I feel way safer than walking... the bicycle gave me that, the sensation of being safer when I come back at night'.

RAQUEL, TRONCO

'In the morning my husband gives me a ride, this segment [outside neighbourhood] is really dangerous, there are lots of robberies'.

UK – OXFORD

Negotiating the underpass under the Headington roundabout, Barton

Challenge of crossing the Bayswater Road, Barton

In **Barton** there was general recognition that the estate's location on a hill made walking and cycling challenging although it was recognised that being on the edge of the city provided excellent access to the countryside. There was a general sense that the urban fabric of Barton had been left to decay and maintenance of the area was poor. This was compounded by the severance effect of the Oxford ring-road and the noise and pollution from heavy traffic.

Access to the city via an underpass under the (Headington) roundabout served as a critical point for walking and cycling. Interactions between pedestrians and cyclists were negotiated but there were reports of negative interactions as walkers took issue with cyclists using space that they were not authorised to use. Crossing the road was difficult on roads bordering the neighbourhood (especially Bayswater Road) due to the speed and volume of traffic.

There was also concern about the increase in vehicles parked on pavements in the area and traffic congestion around Bayards Hill School at the start and end of the school day. Residents, and women in particular, were deterred from using underpasses during hours of darkness. There was some frustration with the quality of cycle infrastructure connecting the city centre along arterial roads, particularly among parents of young children, but the cycle track alongside the ring-road was appreciated. Despite concerns about the quality of the physical environment, there was general recognition that the neighbourhood was well served by public transport and that walking, and to some extent cycling, for local trips was easier than using a car, mainly because of traffic congestion and difficulty and cost of parking in the city centre. Despite uncertainty about the future of the neighbourhood - particularly the development of an adjacent urban extension - there was a feeling that there was a good sense of community spirit.

MOHAN

'It's hardly surprising that people don't want to go for a walk is it? You get depressed walking around here'.

STEVE

'I think that pavements are turning into car parks and it's not fair on the pedestrian'.

MARIA

'Onto the blessed ring-road cycle track. It's so nice! Very lucky!'

UK – OXFORD

Public transport, Rose Hill

Local green space, Rose Hill

In **Rose Hill** there was appreciation of access available to green space, notably along the River Thames path, and also to the rest of the city on foot and by bike along quieter back routes and the ring-road cycle track. Access to the nearby supermarket across a footbridge linking the estate was appreciated as was the frequent bus service connecting the city centre although there were some concerns over the reduction in service provision.

The more direct route by cycle to the city centre along the main arterial route was criticised because of lack of supportive infrastructure. The single access road to the estate also means that there is a concentration of traffic through the centre of the estate making the road difficult to cross on occasions. There was a feeling that the area had become dominated by motor traffic and that speeding is a problem. However, participants were generally positive about the trajectory of the estate particularly since the opening of a new purpose-built community centre and a housing renewal programme. Overall, despite the issues raised above, our participants felt that the neighbourhood was a safe and friendly place to live.

MARY

'Though it is an estate you have got the greenery of the hedges… the allotments…'.

ANNA

'I don't know what the crime rate is like but it feels fine, I have never worried about it'.

CATRIONA

'People who walk round here are dead friendly and I think people are really positive about the Community Centre'.

AGNES

'Ashurst Way [the main road through the estate] is very, very dangerous, lots of buses and cars'.

Crossing in Menino Deus, Porto Alegre

Alleyway in Tronco, Porto Alegre

→ In summary, participants across the eleven neighbourhoods provided a deep insight into the experiences of accomplishing everyday mobility on foot and by cycle (and indeed other means of moving around). This paints a picture of varying quality of experience. The situation in Brazil is perhaps stark in terms of poor quality infrastructure for walking and cycling and fear of crime. However, common to both geographical contexts was how motor traffic is perceived to dominate urban space and to have a detrimental impact on walking and cycling and the wider environment.

Some participants regarded healthy mobility as staying safe in a car

Health and wellbeing in the neighbourhood

In the following section, we provide some answers to research question four. *(4) How do different settlement types and associated ways of moving impact individual and community health and wellbeing?* **We also provide some additional answers to research question three drawing on our qualitative work in relation to health and wellbeing:** *(3) What meanings are attributed to different ways of moving by different socio-economic groups in different urban settings?*

Noncommunicable diseases (NCDs), also known as chronic diseases, tend to be of long duration and are the result of a combination of genetic, physiological, environmental and behaviours factors. The main types of NCDs are cardiovascular diseases (like hypertension, heart attacks and stroke), cancer, mental health problems (like depression), diabetes, chronic respiratory disease and musculoskeletal conditions. NCDs disproportionately affect people in low and middle-income countries where more than three quarters of global NCD deaths – approx. 32 million – occur. These diseases are driven by forces that include rapid unplanned urbanization, globalization of unhealthy lifestyles and population ageing. Modifiable behaviours, such as smoking, physical inactivity, unhealthy diet and the harmful use of alcohol, all increase the risk of NCDs. Unhealthy diets and a lack of physical activity may show up in people as raised blood pressure, increased blood glucose, elevated blood lipids and obesity. These are called metabolic risk factors that can lead to cardiovascular disease, the leading NCD in terms of premature deaths. Insights into life habits (drinking and smoking), NCDs (depression, diabetes, heart disease and stroke), nutritional status (body mass index and abdominal obesity), physical activity and quality of life across

the case study neighbourhoods were gained through the social survey using standard measures (e.g. World Health Organization Quality of Life Group, 1998) as well as investigating perspectives on personal mobility and wellbeing through qualitative interviews. Key data from the social survey are shown in the table on page 28.

Smoking, drinking and depression

Abusive alcohol consumption (AAC)[3]
The highest rates of AAC were found among respondents from the two UK neighbourhoods, Barton (41.1%) and Rose Hill (37.2%). Among Brazilian neighbourhoods, the highest proportions were observed in the two more well-to-do neighbourhoods in Brasília, SQS 409/410 with 33.3% and Vila Planalto with 30.4%. Overall, the proportion of ACC was higher in Porto Alegre, with an average percentage of 21.5% and lowest in Florianópolis with 13.8%.

Smoking The highest rates of smoking were found in Porto Alegre with 21.1%, more specifically, 26.3% and 24.6% in Cruzeiro and Tronco, respectively. Barton in the UK presented the next highest rate of smoking with 20.5%; all other neighbourhoods showed less than one fifth of the participants reporting that they currently smoked.

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[3] Three or more drinks on a typical day and/or six or more drinks on anyone occasion (Babor et al. 2001).

Depression While the prevalence of self-reported depression was lower than the occurrence of AAC, the sequence of highest to lowest proportion appeared to follow that of alcohol consumption: Barton and Rose Hill (21.8% and 29.8%, respectively) were highest, followed by SQS 409/410 in Brasília (23.2%). Overall levels were higher in Porto Alegre than Florianópolis.

Diabetes, Hypertension, Heart disease and Stroke

Diabetes Overall, more respondents in the three Brazilian cities reported diabetes than those in Oxford, with participants in Florianópolis reporting more diabetes (14.5%), followed by Porto Alegre (12.1%) and Brasília (9.5%). Respondents in both Barton and Rose Hill, with 9.0% and 7.2% were below the rates reported in practically all Brazilian neighbourhoods studied.

Hypertension Once again, the overall proportion of participants in the Brazilian cities reporting hypertension was higher than in Oxford: 38.9% in Florianópolis, 32.1% in Porto Alegre and 23.0% in Brasília versus 20.7% in Oxford. The highest incidence was Jardim Atlântico with 43.0%, the lowest in Varjão (21.1%) and Rose Hill (21.3%).

Heart disease Again, while the overall, reported prevalence of heart disease was lower than that of hypertension, the sequence from highest to lowest follows that of hypertension: Respondents in Florianópolis reported the highest proportion with 14.8%, followed by those in Porto Alegre (9.4%) and Brasília (8.4%), and, finally, from Oxford with 6.2%.

Stroke The sequence of reported stroke incidents does not follow exactly the one of hypertension and heart disease. However, 4.1% of Oxford respondents contrast with 4.2% from Porto Alegre and 4.4% from Florianópolis. The number of participants from Brasília reporting strokes or cerebral ischemia was nearly half (2.2%) of that of the other three study sites.

Body Mass Index, Abdominal obesity and Physical activity

Body mass index (BMI) More than half of all respondents from the four cities studied were either overweight or obese - national average at 2017 is 54% for Brazil[4] and 64% for UK[5]. Among respondents from Porto Alegre, 66.7% reported BMIs suggesting overweight or obesity, followed by respondents from Florianópolis (65.7%) and Oxford (65.6%) and lastly, 55.9% from Brasília.

Abdominal obesity Consistent with the previous observation, a high proportion of respondents from Florianópolis (41.5%), Porto Alegre (51.2%) and Brasília (61.1%) presented abdominal obesity. Due to methodological considerations the abdominal circumference of participants was not measured in Oxford.

Physical activity[6] The proportion of respondents reporting a minimum of at least 150 minutes per week of physical activity averaged around 25% across the four cities studied; however, the middle-income neighbourhoods in SQS 409/410 (Brasília) and Menino Deus (Porto Alegre) demonstrated higher levels (30.5% and 42.1% respectively).

Quality of Life Index

The Word Health Organization quality of life index consists of four dimensions, plus an overall score. On a scale of 0 (lowest) to 100 (highest), the respondents in Porto Alegre present the highest overall QoL score with a mean of 72.0, followed by Florianópolis, 71.7, Brasília, 69.9 and, finally, Oxford, 65.8. The sub-scales representing social relations, psychological wellbeing and environmental aspects follow a similar pattern. However, for physical health, respondents in Brasília show higher scores than those in Porto Alegre or Florianópolis. Across all dimensions, respondents from the three Brazilian cities show higher quality of life scores than those from Oxford.

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4 Brasília DF, Ministério da Saúde (2018)

5 NATCEN Social Research (2018)

6 World Health Organization (2010). Global recommendations on physical activity for health. WHO.

Self-reported health, wellbeing and physical activity

NEIGHBOUR-HOOD	CITY														
	BRASÍLIA				FLORIANÓPOLIS				PORTO ALEGRE				OXFORD		
	TOTAL	SQS 409/410	VARJÃO	VILA PLAN-ALTO	TOTAL	C. DO PI-RAJUBAÉ	JARDIM ATLÂN-TICO	SACO GRANDE	TOTAL	CRUZEIRO	MENINO DEUS	TRONCO	TOTAL	BARTON	ROSE HILL
Alcohol consumption (%)															
Never	64.4	57.4	72.8	60.3	71.0	69.5	71.9	71.5	54.3	56.0	46.5	61.2	39.8	36.7	43.0
Moderate	7.4	9.3	4.5	9.3	15.4	18.6	11.4	16.1	24.2	25.3	29.2	17.6	20.9	21.9	19.8
Abusive	28.2	33.3	22.7	30.4	13.6	11.9	16.8	12.4	21.5	18.7	24.3	21.2	39.4	41.4	37.2
Smoking (%)	13.0	15.1	10.5	14.1	15.8	15.4	14.0	17.6	21.1	26.3	13.2	24.6	19.1	20.5	17.8
Diabetes (%)	9.5	11.4	7.2	10.7	14.8	15.1	14.6	14.6	12.1	14.0	7.8	14.8	8.1	9.0	7.2
Heart disease (%)	8.4	11.2	6.5	8.1	14.3	18.9	13.7	10.9	9.4	9.2	9.1	9.9	6.2	9.8	2.5
Stroke / cerebral ischemia (%)	2.2	1.6	1.9	3.2	4.4	4.4	4.8	4.2	4.2	3.4	2.6	6.7	4.1	5.8	2.4
Hypertension (%)	23.0	23.8	21.1	24.8	38.9	39.1	43.0	35.4	32.1	30.0	32.2	34.2	20.7	20.2	21.3
Depression (%)	14.9	23.2	9.6	13.9	16.3	18.0	16.7	14.5	18.6	13.4	20.1	22.1	25.7	21.8	29.8
Hearing loss (%)	17.7	18.6	13.8	21.9	20.8	27.0	18.6	17.3	24.9	19.1	32.2	22.7	17.8	14.5	21.2
BMI (%)															
Low weight	2.1	1.8	2.4	2.1	1.9	1.3	2.5	1.9	1.2	1.5	0.8	1.2	Δ	Δ	Δ
Normal weight	41.9	42.9	42.2	40.5	32.4	33.0	32.3	32.0	32.6	31.7	34.4	31.5	34.4	25.0	62.5
Overweight	35.2	39.2	33.9	32.8	37.6	38.4	32.9	40.8	40.7	44.0	41.9	36.3	40.6	45.8	25.0
Obesity	20.7	16.1	21.5	24.6	28.1	27.4	32.3	25.3	25.5	22.8	22.9	31.0	25.0	29.2	12.5
Abdominal obesity (%)	61.1	56.6	63.0	62.8	41.5	42.3	45.1	37.9	51.2	48.9	52.6	52.1	*	*	*
Physical activity (>=150 min/week) %	23.1	30.5	16.7	24.3	24.3	27.2	24.2	21.8	22.1	11.2	42.1	11.2	25.0	22.6	27.4
Quality of life (Wellbeing)															
Mean (0-100)	73.9	72.7	74.8	73.8	71.1	69.9	72.0	71.5	72.5	72.6	74.8	70.0	69.3	67.0	71.5
Physical	70.7	71.8	69.5	71.4	71.7	72.5	70.6	71.9	72.2	73.3	73.6	69.6	63.7	61.0	66.2
Psychological	74.6	73.4	75.6	74.5	75.4	76.2	75.1	74.9	76.5	77.5	76.9	75.2	68.9	65.1	72.6
Social Relations	59.9	67.2	52.8	62.1	62.7	58.1	62.0	67.2	61.4	56.0	71.8	55.5	64.3	64.1	64.6
Environment	69.9	71.7	66.5	69.4	71.7	71.8	68.3	74.6	72.0	65.8	75.8	70.4	65.8	64.1	67.0

* Waist circumference was not measured for Oxford participants.
Δ None of the participants from Oxford was classified as low weight, probably due to the low sample size.

Investigation of the relationship between mobility, health and wellbeing indicated that the more people walk and cycle, the less likely they are to report chronic diseases such as hypertension, depression and abdominal obesity and the more likely they are to score highly on quality of life measures. Furthermore, the higher the score for neighbourhood perception, the higher the score on physical, psychological, social and environmental quality of life in the four cities. This result suggests that positive perception of the neighbourhood can be an indicator of wellbeing.

Some built environment variables may have an impact on residents' health conditions by facilitating walking or cycling and in so doing may influence residents' quality of life. In Florianópolis, for example, places with higher walkability indexes showed higher scores on all four quality of life dimensions - physical, psychological, social and environmental. Macro built environment attributes such as density, diversity and design were also found to impact health conditions but the picture is complex. In Brasília, for example, obesity and cardiovascular disease was less prevalent in dense, walkable places. There was also a positive relationship between level of walkability and better physical and environmental wellbeing. However, places in Brasília with higher residential density also showed higher predominance of depression. Overall, our results indicate that people generally feel better in walk-friendly places.

Exploratory analysis (using structural equation modelling) was conducted to investigate the relationship between neighbourhood perception, built environment attributes, attitudes to walking, walking behaviour, quality of life and health indicators. This showed that walking is more influenced by attitudes to walking and neighbourhood perception. Therefore, the more positive people feel about walking and the more satisfied they are with their neighbourhood, the more likely they are to walk. In turn, walking was a good indicator of how people rate their quality of life which in turn is a good indicator of health. In summary, the more people walk the more likely they are to report a higher quality of life and better health. The built environment showed a contradictory result suggesting 'walkable places' do not necessarily promote walking behaviour. This could be related to socio-economic characteristics of the neighbourhoods we investigated. For example, the middle-income neighbourhood of SQS 409/410 in Brasília demonstrates high car use although the area is considered 'walkable'. Conversely, in the low-income neighbourhood of Varjão, which has poor conditions for walking, most journeys are performed on foot. Again, as we highlighted in Key Insights 1, this does not mean that the characteristics of the built environment are unimportant in supporting and promoting walking (and cycling), but it does suggest that they are insufficient on their own.

Structural model of the relationship between neighbourhood perception, built environment attributes, attitudes to walking, walking behaviour, quality of life and health indicators.[7]

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[7] Model developed by using Structural Equation Modelling technique which presented satisfactory model fit indices. R^2 shows how the model explains variability in response around the mean. So $R^2=0.59$ means that 59% of the variance is explained while 41% remains unexplained.

Walking and cycling can promote health and wellbeing by providing opportunities to be physically active while on the move and to engage with society and the outdoor environment. However, it should be recognised that walking and cycling, besides contributing to personal wellbeing, can also result in negative experiences of physical space or with interactions with other road users. In this section the common themes that were mentioned as either augmenting or diminishing personal wellbeing while walking and cycling are highlighted. It should be noted that participants who took part in the go-alongs were largely self-selected and were therefore more likely to hold more positive attitudes towards walking and/or cycling.

What augments wellbeing while walking and cycling?

First, many participants spoke about how they valued the opportunity to include walking and cycling in everyday routines and how this helped them to keep active and promote wellbeing. For older and disabled participants, we also found that any form of mobility seemed to promote wellbeing because it meant getting out of the house. The proximity of facilities was seen as a key factor in facilitating convenient movement around the local area on foot and by cycle, thus reducing the need to travel to other parts of the city. However, the ability to connect with other parts of the city was further appreciated, for example, given the availability of frequent and reliable public transport within walking distance of the home. The feeling of community was also important and it was felt that walking allowed the opportunity for more face-to-face interaction with neighbours and to build positive social relations. Some people also spoke about how walking and cycling allowed them quality time alone. Commuter cyclists in the UK talked about arriving at worked feeling positively energised and ready to start the day. The quality of the physical environment was significant in shaping the experience of walking and cycling. The presence of green space and street trees along routes and within the vicinity of neighbourhoods

enhanced the walking experience (while also providing shade from intense sunshine in the Brazilian context). Urban aesthetics also influenced positive mood and this could be as subtle as street art or as grand as certain architecture. There was a sense that wellbeing was enhanced when people talked about walking and cycling through areas they believed authorities and other people actually cared for and maintained.

What diminishes wellbeing while walking and cycling?

Although there was a general 'taken-for-grantedness' about walking, and to a lesser extent, cycling, in Brazil and the UK, when prompted, participants reflected critically on aspects that diminished their experience. Chief among those was non-existent or poor quality footways in Brazil and parked cars obstructing footways in all cities. The hillier topography across some neighbourhoods challenged the capability of some participants who found walking difficult or tiring (and cycling purgatory). Cycle users also spoke about poor quality or non-existent bike paths that could put them in contentious or dangerous situations with other road users, thus provoking anxiety. This was significantly more pronounced among Brazilian respondents, but there were plenty of examples from the UK. The factor that most prejudiced the walking and cycling experience was danger posed by road traffic. Points of stress were crossing busy roads or being forced to cohabit space with cars because of lack of facilities (e.g. footways or cycleways suddenly ending). Lack of respect on the part of motorists towards pedestrians and, particularly, cyclists was pronounced in Brazil, although there were also several stories of negative interactions with motorists among UK cyclists. Fear of crime was a common theme particularly among female respondents. Participants in Brazil were particularly attuned to threats to their personal safety while out walking and accounts of personal assaults were common.

KEY INSIGHTS 4

Citizen engagement potential and healthy urban mobility

In this section we provide some answers to research question five: *(5) What are the benefits and challenges of involving residents and stakeholders in the co-production of research and policy outcomes?*

First, we should acknowledge that there are major differences in the context to participation between the the UK (in the Global North) and Brazil (in the Global South) and to a lesser extent between the different cities. These differences must be taken into account both in terms of the engagement undertaken in different places and how ideas such as participatory research and 'co-production' are conceived.

The UK and Brazilian research teams were sensitive to this issue and were able to build and share a range of techniques and skills in the course of developing participatory approaches that could be adjusted to suit each specific context. We were also mindful of debates about the possibilities and limitations of participatory research in terms of levels of control (Arnstein, 1969; Cooke & Kothari, 2001) and co-production (Horner, 2016) and we return to these debates later. The range of participatory activities in the different cities included:

Mapping and making links with residents and stakeholders: In all cities contact was made with relevant NGOs and community organisations at the start of the project. For example, in Porto Alegre, a special session was run involving NGOs to build links between them and the project.

Running hands-on sessions to generate research data and to let people know about the project: In Oxford, researchers attended 'Fun Days' organised by the local community and ran mapping stalls asking people to chart their trips and to mark on maps things that enabled and disabled mobility. In Planalto, in Brasília, a similar event asked people to hang their demands on a 'wishing line'. These provided information and ideas additional to the social survey results. (e.g. the benefit of mobility for wellbeing and the impact of air pollution in Oxford or the increase in car-based journeys following the closure of a school in Planalto). Hands on methods such as mapping worked well to engage a range of people. They also challenged us to present ideas in a way that would engage residents and meet their concerns about how the communities in which they live (often termed deprived, or marginal) are portrayed.

Participatory video: In Rose Hill a free course was put on for residents which enabled them to gain skills in video making. Two videos about mobility issues in the area were produced by participants which were then used by the groups in their campaigns for safer cycling and the restoration of a bus service (see **www.hum-mus.org**).

Community film on cycling, Rose Hill

Community film on reduced bus service, Rose Hill

Priority setting and Feedback meetings:
The Florianópolis team of mainly health professionals engaged the community through Primary Health Care (PHC) services. A meeting was held with residents in one of the case study communities. Initial results were presented in a specially produced booklet and a 'manifesto' of demands to improve mobility in the area was drawn up with stakeholders. This approach was duplicated in all the case study cities and was able to draw attention to the role of healthy urban mobility in promoting health and wellbeing.

Knowledge Sharing and Interventions: In Tronco, Porto Alegre, information from the project has been used by the community in their representations on the city plan which is currently being updated. Meanwhile, in neighbouring Cruzeiro, where lack of open space was identified as a key barrier to healthy mobility, the feedback meeting was

followed by a temporary intervention with the community to occupy one of the largest areas of currently inaccessible open space, the central space of a major road - claiming back car-oriented space for community use.

Among researchers there was a feeling of satisfaction having 'given back' something to the community e.g. information/data, skills, money spent on activities. The relationships formed through participatory activities have the potential to catalyse further activities which are likely to extend beyond the life of the project. Involving residents and stakeholders brought further benefits to the research including:

Bringing new ideas and additional forms of knowledge into the findings

Challenging researchers to communicate ideas and concepts in a clear and accessible way and find innovative ways to gather information

Questioning the use of terms such as 'low-income' or 'deprived' communities

Building trust with communities and stakeholders

Feeding back results which can be used by groups and neighbourhoods in their own work with stakeholders

Making sure that recommendations and proposed actions are strongly based on what those communities want.

However, during the course of the project we also encountered many challenges. First and foremost was the lack of trust in democracy and politicians in both countries which impacted people's willingness to engage in policy-related research. This made it even harder to reach beyond those who are already engaged in the communities where we worked and to make space for the project within cities that had parallel interventions and/or research projects. This was compounded by the project being set up to influence rather than to directly deliver healthy urban mobility solutions making it harder for

'Wishing line' of problems and ideas for improvements in the neighborhood. Menino Deus, Porto Alegre

participants to get a clear sense of the direct benefits that would result from involvement. We were also very conscious of not setting up 'false promises'. Attempts to include residents in administering the survey and help them acquire research skills in the process were not successful due to difficulties in fitting involvement around other commitments (Oxford) and one incident of falsification of survey forms (Florianópolis). Conducting research and engaging with citizens was even more complicated in Brazil where communities face violence and competition over control of territory (and mobility) by drugs gangs. Finally, there are the complexities of large research projects with multiple objectives and demands, some of which have impacted on participatory processes.

Therefore on reflection, while our research was community-informed - to varying degrees in the different cities - and the trajectory of involvement increased towards the end of the project, we would not consider it to be 'co-produced' in the meaning set out by Horner (2016) i.e. leading to the transformation of practices by all parties resulting from working together throughout the lifetime of a project. We are reminded of debates about the extent to which participation is 'tokenistic' or in fact enables citizen control (see for example Arnstein,

1969). This means there is a need for clarity about where a project/or activity may be placed on a ladder/spectrum of participation and the nature of influence that participants are likely to have and, eventually, to achieve.

Additionally, a key objective of the project was to explore the potential for participatory mobilities planning with local communities to support and develop solutions for healthy urban mobility in the social, cultural and political context of Brazil and the UK. Our work suggests that, while there is great potential to build participatory research into research projects of this nature, achieving that potential would mean applying some of the lessons we have learnt in this project and also rethinking the way funding programmes operate. If global research agendas are to promote participation and engagement there needs to be more critical reflection about how this might itself impact on the way programmes and calls are structured. For example, programmes should call for an initial pilot scheme to establish or reinforce links with communities before full proposals are submitted. Individual projects could also have a 'year zero' during which dialogue with stakeholders is prioritised with resulting changes made to research questions and methods prior to the main research being commenced.

Researching healthy urban mobility in different global contexts

In the following section, we provide some answers to research question six: *(6) To what extent is the methodological framework developed applicable to a range of contexts in the Global North and Global South? and (7) What are the implications of 'seeing from the south' for conceptualizing urban mobilities on a global scale?*

The multidisciplinary and multi-method approach used in this complex cross-cultural project presented challenges that need to be considered in future research. Here we summarise some of those challenges that we hope will provide inspiration for future researchers to develop methodological strategies applicable in different geographical, cultural and social contexts.

Spatial data

Availability of spatial digital data from public and private agencies, at least in Brazil, is limited. This makes the task of gathering information and organizing it into a uniform and reliable set of GIS layers time-consuming. The informal nature of some of our case neighbourhoods in Brazil required significant time spent on the ground to identify and correct the list of addresses in order to draw an accurate sample.

Social survey

For the social survey, the multidisciplinary approach to collecting data on multiple themes required development of an extensive questionnaire. Each interview took, on average, about an hour to administer and inevitably affected willingness to participate. Some people who took part in the survey found some standardised questions too intrusive (e.g. WHOQOL item on 'Sex Life'). Some were uneasy about us taking physical measurements, particularly abdominal circumference, and this was omitted at the UK sites.

The approach to administering surveys also impacted the sample size. Our initial goal was to achieve a random sample of 400 responses in each neighbourhood (i.e. 1200 cases per city). This was challenging both in Brazil and in the UK. The sampling approach had to be adjusted in one neighbourhood in Brasília due to threat of violence towards the team of researchers. Furthermore, quality checks in Florianópolis revealed fraud was committed by local residents acting as interviewers and meant that additional time had to be spent in the field administering a substitute sample. Meanwhile in the UK, the team of field researchers, largely made up of research degree students, were faced with difficulty recruiting participants. Many residents refused on the basis that they already felt over-surveyed by the local Council and other organisations, or in the process of being surveyed, they found the questions intrusive and irrelevant. Differences in employment practice also impacted resourcing the survey in the UK - researchers were paid by the hour in Oxford while researchers in Brazil received payment per completed interview.

As resources became tight, the Oxford team used a drop-and-collect method but this had the effect of compromising response rate. The combination of challenges in Oxford meant that the original intention to collect data in a third (middle-income) neighbourhood had to be abandoned.

Biographical interviews

A flexible approach had to be adopted when administering biographical interviews. Some participants struggled with completing a life history grid detailing key events across their life course because of low level of literacy (particularly case study areas in Brazil); or because they were sensitive about divulging information; or simply because they were not able to recall past events. While workshops and training sessions were undertaken to prepare the field researchers in each area, not all had first-hand expertise in biographical interviewing. This meant that there was an element of 'learning by doing' and development of experience when interacting with participants of different ages, sexes, ethnicity and from different backgrounds.

Mobile methods

The application of mobile methods was even more challenging for the research teams as it meant effectively using the body and senses as a research tool to observe and interview while on the move. Training workshops were held for researchers but most were new to the method and became more accomplished after administering the approach in the field. Cycling go-alongs presented a certain degree of risk and tested the capabilities of researchers trying to observe participants and pre-empt their every move whilst also navigating difficult traffic conditions. Walking go-alongs could also present risk to researchers (and participants), for example, when forced to walk on the road because of lack of footways. There were also threats to personal safety and sensitivity had to be applied towards videoing go-alongs in areas controlled by drugs gangs.

Unfortunately, one of our researchers and their participant was threatened by a gang in Varjão in Brasília forcing a delay in re-entry to the neighbourhood while the Police were notified. This highlights the challenges, and very real risk to both researchers and participants of conducting this type of method in more challenging contexts.

Participatory approach

The major differences in the cultural/political context to participation between the UK and Brazil mean that terms such as 'participatory research' or 'co-production' cannot be seen as universal givens. Not only is the policy context different, but also, in particular, the situation of violence faced by many communities in Brazil has a major impact on participation by residents and presents challenges and ethical risks to researchers. It was therefore in this area of work that we were most mindful of calls for 'seeing from the south' Watson (2009) and how such a perspective might impact on the conceptual aspects of our work.

To this end we attempted to move beyond dichotomies to look for hybridity and reflexivity in thinking about north/south theory and practice - see Mabin (2014) and Weiner (2014). First, the cross-cultural project led to an interchange of ideas and learning across teams (e.g. in our work on participation, the drawing up of manifestos) and the awareness of the context in each city. This chimes with Robinson's (2013) call for new types of context specific comparative research. Second it challenged us to engage in debates about concepts such as participation. These included whether participation can move beyond tokenism to both empower participants and transform research practices - the question of whether participatory research is 'tyranny' (co-opting participants into a pre-set agenda) or 'emancipation', giving voice to demands, legitimising different forms of knowledge and building skills and confidence (Cooke & Kothari, 2001). But we were also challenged to consider how 'participation' is constituted differently in

Community engagement, Cruzeiro, Porto Alegre

different places and that a 'one-size-fits-all' framework will be unable to capture such complexities. Our conclusions in Key Insights 4 about 'co-production' are relevant here as this project has shown the limitations to participation as well as its possibilities. Third, is the nature of current research agendas, particularly in the UK where great emphasis is put on meeting global challenges and ensuring impact. This has meant that engagement in cross-cultural research projects (and engagement itself) is high on research agendas and is, if not a condition of funding, then an expectation. As this project has shown there are inherent tensions built into such expectations which need to be more critically addressed in the design of future research programmes of this nature.

→ In summary, we stress that the methodological design of cross-cultural multidisciplinary research should consider these among other aspects that may interfere in the process. It is important to adopt a flexible approach adapting original intentions to accommodate unexpected demands that may arise during the process of research. Most of all, the health and safety of researchers and participants should be paramount.

Realising healthy urban mobility in different global contexts

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'If fairness and justice are to be basic principles that pervade transport investment decisions, then consideration of the quality of the travel environment, slow transport and local destinations should become much higher priorities, rather than the continued historical focus on faster travel over longer distances, and the unsubstantiated arguments about wider economic benefits'.

The traditional focus of transport investment has been on supporting increased mobility through provision of infrastructure for motorised transport rather than improving accessibility to activities that negates the need to use a car. The effect of this has been that those on higher incomes can afford to access cars and can therefore overcome accessibility constraints and are able to use more discretion as to where they access activities. Meanwhile, those on low incomes who cannot afford a car, or who are unable to drive, have fewer options, lower quality services and travel under worse conditions that are often the byproduct of a motorised system (e.g. noise, traffic pollution, community severance and risk of road danger). This, along with seductive marketing promising social status, increases the desire to own motorised means among the urban poor - 'if you can't beat them, join them!' Upon obtaining motorised means of transport a disproportionate amount of time time and money is then spent simply being mobile to access activities.

The inequality of provision of infrastructure to support and promote healthy urban mobility, therefore, reflects a wider symptom of inequality in society. It is the interaction between poverty and other factors that leads to barriers to healthy mobility in low income areas. Our cross cultural perspective has underlined the importance of (in)equality in terms of understanding and achieving healthy urban mobility on the global scale. The detailed cross-national empirical work has underlined how these inequalities, and responses to them, are constituted differently in different places and how there are major differences between the two countries. This means that there can be no universal, one-size-fits-all theory or practice. However we have also shown how recognising and tackling such inequalities is a major factor in realising truly healthy urban environments.

When we set out on this project our original premise was that walking and cycling constituted 'healthy urban mobility'. However through the course of the research, and upon critical re-evaluation, we recognise that health and wellbeing benefits may also be conferred through any kind of mobility including motorised mobility (whether private car or public transport), by helping people to connect with activities, to feel safe and secure while traveling and to feel like active participants in a motorised society. That the experience of walking and cycling can have negative impact on wellbeing in different contexts should also be acknowledged. Many low-income groups do not have the choice but to perform 'healthy urban mobility' within challenging

and potentially unhealthy and unsafe urban domains. Being actively mobile may also be less attractive to those performing jobs that already require a considerable amount of labour or carers moving around with older family members or children.

Our **key message** is that there needs to be greater recognition of the fact that low-income suburban/peripheral areas have particular mobility patterns and are disproportionately affected by autocentric design and poor provision of, and cuts to, public transport. Furthermore, poor everyday mobility experience negatively affects quality of life and therefore adversely affects wellbeing. Promotional measures must therefore be tied in with strategies to support the improvement of the physical fabric of neighbourhoods and that protect social welfare and justice in order to support and enable full inclusion in healthy urban mobility. This will require channelling investment towards developing good quality, safer infrastructure and safer

environments that support and promote walking and cycling (and we would add to this, public transport). In turn this will increase affordances so that walking and cycling are available to a diverse range of people who cannot, or would not ordinarily choose, to walk and cycle. Equally, efforts must be put in place to help motivate people to overcome personal, social and cultural barriers, and to improve their competences, for example, by providing opportunities for people to develop knowledge and experience of healthy urban mobility (e.g. social walks and rides; cycle training for women and older people who are marginalised from this activity). Community participation in transport decision making is also paramount to draw on the knowledge and experience of citizens in terms of what would enhance healthy urban mobility in their neighbourhoods. Finally, the indirect effects of infrastructure projects need to be taken into consideration in any evaluation (e.g. risk to health and wellbeing) and their distributional impact.

OUR KEY MESSAGES

Recognition of the issues

✓ Recognise that low income suburban/ peripheral areas have particular mobility patterns and are disproportionately affected by autocentric design and poor provision of, and cuts to, public transport.

✓ Recognise that poor everyday mobility experience negatively affects quality of life and therefore adversely affects wellbeing.

Integrated policy approach to maximise opportunities for healthy urban mobility

✓ Channel investment towards good quality, safer infrastructure and safer environments for walking and cycling (and public transport) to protect social welfare and justice and enable full inclusion in healthy urban mobility.

✓ Motivate people to overcome personal, social and cultural barriers, and improve competences, for example, by providing opportunities for people to develop knowledge and experience of healthy urban mobility particularly among under-represented groups.

✓ Community participation in transport decision making is paramount to create the conditions for healthy urban mobility to flourish - the impacts on community health and wellbeing should always be taken into account in the evaluation of any transport project.

SUGGESTED POLICY INTERVENTIONS

An integrated policy approach embracing planning & transport, health, education, policing, employment and social welfare is required to ensure opportunities for walking and cycling are maximised. Such policies and programmes should focus on:

Reducing the need to travel (mobility) and increasing access (accessibility) to a full range of local activities in order to provide necessary conditions for walking and cycling to flourish.

Reinforcing the mobility hierarchy in residential areas where walking and cycling are prioritised over the movement of motor traffic. This will require implementing and enforcing slower speed zones in residential areas to tackle traffic danger by reducing the speed differential between motor traffic and walking and cycling.

Investing in walking by improving the quality and navigability of footways and crossings and addressing the problem of pavement parking by considering new laws to tackle the problem. For example, in Brazil, this could include transferring responsibility for building and maintenance of footways from fronting property owners to public authorities, or, better enforcement to ensure smooth, even and unobstructed passage.

Investing in cycling by providing dedicated cycle infrastructure separated from motor traffic along major highways and ensuring that emerging modes such as electric cycles ('e-bikes') and e-scooters are considered in the mix.

Paying regard to the quality of the built environment in supporting and encouraging healthy urban mobility. This relates not just to mobility infrastructure but interventions to make people feel positive about their neighbourhood (e.g. public art, trees and open space) and a sense of security and personal safety.

Accentuating the positive health and wellbeing benefits of healthy urban mobility and raising awareness that the benefits of walking and cycling are substantially larger than the risks relative to car driving (see de Hartog et al., 2010).

Developing programmes to support walking and cycling, particularly among under represented groups such as women and older people, who are less likely to perceive that cycling, in particular, is something available to them.

Developing participatory approaches to transport planning. Tactical urbanism provides the opportunity for communities to experiment with, and demonstrate, the possibility of large-scale, long-term solutions supportive of walking and cycling (see Fernandes Barata & Sansão Fontes, 2017).

Finally; considering more holistic approaches to transport planning to eliminate road fatalities and serious injuries altogether (e.g. Vision Zero adopted in Sweden in 1997 has been successful in achieving the world's safest roads) and considering changes to the law to improve mobility rights and justice (e.g. adopting 'strict liability' such that in civil proceedings motorists are automatically assumed to be responsible for a collision that takes place between them and a cyclist or pedestrian).

Only with such integrated, consistent and coherent policy actions can the challenge of providing better and more equitable health and wellbeing outcomes for communities in the global south and north be achieved.

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