REIMAGINING MOVEMENT AND THE TRANSPORT APPRAISAL PROCESS THROUGH A GENDER LENS: A CASE STUDY IN THE UNITED KINGDOM UTILISING A LIFECYCLE APPROACH

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ABSTRACT

Through a combination of literature review, industry workshops and data analysis this paper imagines a transport system that, by demonstrating how multiple aspects of a person's identity can impact on travel patterns, considers new ways of working to ensure equitable transport outcomes for all. In this case, the characteristics of gender and age have been chosen to demonstrate this link and builds the case for collecting disaggregated data.

However, it is the use of this data and how it is incorporated into studies that is most critical. Recommendations are made around incorporating data into three areas of transport appraisal:

- 1. A detailed study of the population, their travel behaviour and perceptions should be undertaken *prior* to problem identification and option development. Generated options should then be sifted against their ability to be inclusive to the community they influence, based on local data and best practice examples.
- 2. At the Further Appraisal stage this paper considers that there are two routes to overcome the current barriers posed by the existing benefits appraisal methodology. The first is an overhaul of the methodology for calculating Values of Time to rebalance the value placed on caregiving trips. And the second is to develop an additional method to value trips with a 'low' economic value but high social value and incorporating these benefits into all BCR calculations.
- 3. At the Detailed Design phase, delivering inclusive design standards and operational procedures must be a minimum requirement for any scheme approval.

These recommendations are intended as an additional resource for future planning frameworks to centre inclusive travel in projects. The benefit to planners of incorporating this lifetime identity-based approach is the provision of a transport system that better meets the needs of users, whilst for decision makers it represents the opportunity to assess Value for Money in a way that more accurately represents economic, social and environmental value.

The methodology used demonstrates the intersectional effect of personal characteristics on travel. As such even though in this instance the work assesses the intersection of age and gender other underrepresented groups could also be assessed in a similar way, subject to consultation with the group in question.

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1. INTRODUCTION

Equitable transport access is a key factor in the physical, economic and social wellbeing of a community. However, the UK Transport System is not fully equal in its ability to meet the needs of every potential user (Karen Lucas, 2019). Women, Ethnic Minorities, LGBTQ+ and Disabled people are all less likely to have their needs met by the current transport system; potentially corresponding to worse health, economic and social outcomes for these groups. Of these groups, women (and non-binary people) are the largest, representing 51% of the UK population (Census 2011).

It is recognised that a user's needs are not static throughout their lifetime. Though the impact of age on travel has been considered in studies there is limited discussion of how this intersects with a person's identity as one or more of the underrepresented groups (URGs) outlined above.

This study focuses on the impact of gender throughout a person's lifetime to capture the widest intersection of the population contained in a URG (women). There are also several overlaps between the needs of this group with other URGs; for example, around security, physical accessibility and economic independence.

Using literature review and travel data, this study identifies areas where change or additional analysis is required to ensure that the UK transport appraisal process produces more equitable outcomes.

2. GENDER, AGE AND TRANSPORT

Transport investment in England is driven by the Transport Analysis Guidance (TAG). TAG tends to direct funding towards projects that have a predominant economic focus, where economic value is defined largely by a person's ability to access and undertake paid work. However, other trip purposes including care-giving and shopping contribute significantly to the economy, with the annual value of unpaid care provided by women in the UK estimated to be £77bn (CarersUK, 2016).

The majority of transport spending goes to major strategic projects such as Network Rail's Control Period 6 (2019-2024) investment package of £42bn (Network Rail, 2019), and the Road Investment Strategy 2 (2020-2025) at £27.4bn (Department for Transport, 2020). These projects support long-distance business and commuter services. In contrast the amount ringfenced for the Government's entire Walking and Cycling Strategy, which supports shorter distance trips with a variety of purposes, over a comparable period (2016-21) is £2.4bn (Hurst, 2020). Bus services, which also serve a local transport need, have seen ongoing reductions in services. (Campaign for Better Transport, 2019).

The first stage in the TAG process concerns problem identification and option development, where the nature of the intervention (e.g. mode and purpose) are conceived. A lack of diverse consultation at this stage could cause a disconnect between proposed options and their ability to meet the needs of the whole

community; skewing the resulting options such that they benefit only a certain demographic. The Campaign for Better Transport (George, 2010) confirms this disengagement between the community and the authorities implementing transport solutions such as the case of the Westbury Bypass. With long term aspirations of the Wiltshire County council to develop the bypass as a legacy scheme, this road-building option was then rejected at public enquiry due to the lack of evidence to be the best solution for the A350's traffic problems.

Additionally, many schemes fail to consider the 'Gender commuting gap', which is synonymous to gender pay gap age trends (Keiller, 2018). The largest gender commuting gap is seen at an age where women are most likely to take on caregiving responsibilities (Office for National Statistics, 2018). Women are also more likely to be impacted by parenthood and change their travel habits; often by increased trip chaining (Henning Best, 2005). That is, women make more trips than men, travel less distance in total so their average trip length is shorter (Figure 1).



Figure 1: Trip Stages and Differences Travelled by Gender, demonstrating changes that occur around caregiving ages (Data (Department for Transport, 2018b), Analysis (Pearce, 2019))

Women are more likely to experience decreased income compared to men, who at a similar age are seen to increase their use of long-distance infrastructure (Henning Best, 2005). These patterns are present even in "dual-working" families where both parents work, which could suggest that the increase of women in the workplace has not resulted in a significant shift in their travel habits towards the 'male norm' of a two-way commute (Transport for London, 2010).

Modal choice varies with gender (González, 2016) and is especially important to women (Sustainable Mobility for All, 2017). Women are more likely to use public transport or walk and are the majority users of sustainable transport at all ages, bar 30 to 40-year olds with higher-level household responsibilities (González, 2016). Gender differences are found to be stronger in lower socio-economic areas and ethnic minorities. (Bocarejo, 2016).

Drivers for different gender choices are addressed by several empirical studies measuring transport option values by mode (Geurs, 2007). However, the relatively small number of studies in this field and their limited applicability in transport appraisal guidance requires further research (Lucas, 2011).

Access is one barrier to modal uptake. Whilst most women reside in car-owning households, this 'family car' is most likely to be used by the male in the household

(Mary Wyer, 2001). Car users do not just benefit from better access to the workplace, they also benefit socially from ease in undertaking other trips such as for shopping and healthcare. Women without access to cars are potentially hindered from accessing opportunities and disadvantaged by their dependence on less flexible public transport (Dobbs, 2005). Women are also more likely to travel with buggies, shopping, and with children which poses difficulties and challenges using buses (Transport for London, 2012).

The National Travel Survey (NTS, UK Figure 2) shows that the gender gap in car drivers is widest in older populations. Women travel more as a car *passenger* compared to men, particularly over the age of 60 (Department for Transport, 2018). AgeUK found older people struggle travelling to essential health services (Creighton, 2015) and especially older women who are less likely to drive and more reliant on public transport, which may not serve their access needs.



Figure 2: Car Trips by Age and Gender (Data (Department for Transport, 2018), Analysis (Pearce, 2019))

Other studies show that patchy access to public transport in rural areas and subsequent car dependency also causes accessibility issues for the elderly and young people (Lucas, 2011).

Ethnicity also impacts mode choice. Ethnic minority women are more likely to be living in poverty and have been disproportionately affected by cuts to benefits, making it harder to pay for transport costs (Women's Budget Group, 2017).

Whilst 41% of White British people engaged with cycling in 2017/18, (Edwards, Arthur, Adesida, & Ibrahim, 2019) cycling is sometimes unpopular with ethnic minority women for cultural reasons, for example women travelling alone is frowned upon in some communities (Goverment Office for Science, 2019). Office for National Statistics (ONS 2005) data reinforces this difference; only 11% of Bangladeshi and 14% of Pakistani women meet the recommended physical activity levels, compared to an average of 28% for all women.

Sometimes due to pressure from scheme promotors or politicians, Option Development may be driven more by local history than suitability, cost, or impact (George, 2010). This is linked to the discrepancy between investment in major road schemes in the UK compared to investment in local bus and active modes of transport. Further studies (Hamilton, Jenkins, Hodgson, & Turner, 2005) recommend that perennially considered options should ideally have no precedence in transport

appraisal as they may mislead the public and the Department for Transport (DfT) as the funding body.

Following Option Development, schemes are put through further assessment including journey time analysis to create a Benefit-Cost Ratio (BCR) and subsequent Value for Money (VfM) (Department for Transport, 2018a).

BCRs are used to understand the VfM a scheme can provide. The primary component of the Initial BCR, often used to sift schemes during appraisal, is user time benefits calculated using Values of Time (VoT) for each journey impacted by the intervention. The DfT acknowledges this, stating "[user times] play an important role in policy making and investment decisions." (Department for Transport, 2015).

Business and Commuting Trips have the highest VoTs and make up a large proportion of scheme benefits and drive scheme direction. For example, Crossrail is a scheme massively driven by these business and commuting travel time benefits (Buchanan, C and Volterra, 2007). The group undertaking these trips contains an overrepresentation of working age men compared to the rest of the population (Keiller, 2018). It's possible that by prioritising these trips a disproportionate level of investment is being given to interventions that benefit working age men.

Unpaid Care-giving trips (which are largely carried out by women) are categorised by the VoT system as 'Other' non business trips. This category has a value of time that is significantly lower than both business trips and commuting trips. It is repeatedly described by the VoT methodology as a 'leisure' category (Department for Transport, 2015). The link between undertaking care-giving trips efficiently and freeing up time for people to undertake paid work is also not explored.



Figure 3: Trip Purpose by Gender (Data: (Department for Transport, 2018b), Analysis: (Pearce, 2019))

By failing to acknowledge the value of care-giving trips and combining them with optional leisure activities, the role of caregivers is overlooked. The time left available

to a carer for other trips including business and other economic participation is also impacted. This is further compounded by the addition of wider economic benefits (agglomeration benefits etc) which are typically tied to Business travel benefits.

The prioritisation of Business and Commuting trips is reflected in many transport networks (for example the London Underground and Copenhagen's Metro network) which are radial; connecting the city's periphery directly to the centre where jobs are located.

In contrast, trips between peripheral locations often requires users to travel into the centre and then back out. Social and educational amenities are often located peripherally meaning people who regularly make social and educational trips face poorer journey options. This means women, who are already more limited in terms of free time and access to income (The Statistics Portal, 2015) (Office for National Statistics, 2015) may spend longer and more money travelling over equivalent distances.

Whilst economic and environmental impacts are assessed in detail during transport appraisal, there is an absence of a similar level of assessment for social impacts (Karst T.Geurs, 2008). The only requirement is to undertake the distributional impact assessments (does not explicitly include gender) during the further assessment stage of scheme appraisal. Social impacts can be especially significant for vulnerable population groups and currently are poorly accounted for within the UK TAG (Jones, 2012).

Transport policy incorrectly assumes the same outcome for everyone impacted by any scheme (Acker, 2018). Whereas individuals face different constraints to accessing transport influenced by the individual's role in the household (Sarmiento.S, 1996).

Transport systems should be developed that are responsive to the practical needs of women and communities (Venter, Mashiri, & Buiten, 2006). One suggestion is to mainstream gender needs into transport research to improve sustainability and equity in future schemes (Mashiri, Buiten, Mahapa, & Zukulu, 2005). Although such systematic gender inclusion procedures exist in some countries, the institutional framework as well as the official and political will to operationalise them is weak (Venter, Mashiri, & Buiten, 2006).

One example of including women's practical needs in transport design is through personal security, which women were found to be less satisfied with (Pearce, 2019). The perception of one's personal security can impact both journey satisfaction and propensity to travel (House of Commons Women and Equalities Committee, 2018), particularly at night or via active modes (Greed, 2007) (Plan International, 2016).

Men are more likely to report being victims of crime (Office for National Statistics, 2017), on the network, however women are more likely to report feeling afraid (Transport for London, 2004). This may be partially due to the differences in types of crime that men and women experience. Women are more likely to be victims of sexual

crimes than men (Office of National Statistics, 2017) and it is known that not all sexual crimes against women are reported. TfL estimate that 90% of all sexual harassment crime on the tube is unreported. (Transport for London, 2019). Age is also a factor, with older people often reporting feeling vulnerable and younger women tending to be the most at risk of sexual assault (Ministry of Justice, Home Office & the Office for National Statistics, 2013).

The trips of women and other under-represented groups are significantly constrained on the public transport network in London, particularly at night time (Transport for London, 2015). The report largely attributes this to safety, though cost and lifestyle are also considered. In London, improving traveller security could increase network journeys by 10.5% (Mineta Transporation Institute, 2009). The propensity to change route after dark also varies by gender and age, with young women most likely to be impacted (Pearce, 2019). Limiting women's access to travel after dark could materially impact on economic opportunities.



Figure 4: Proportion of people who change switch mode after dark (Pearce, 2019)

A YouGov poll found that women are significantly more likely than men to report feeling afraid when walking alone at night, getting a taxi, or riding a bus alone (YouGov, 2018). 32% of the female survey respondents across all ages also reported 'taking steps on a regular basis to protect themselves from sexual assault' (compared to 9% of male respondents) including avoiding walking alone, certain spaces and travel at certain times of day. These travel Trip modifications such as avoiding walking and certain spaces may have a direct impact on the financial and time cost of travel.

The survey also highlights differences in perceptions across a person's lifetime. Both women and men over 60 were less likely to report taking steps to reduce the risk of sexual assault compared to the all age average Figure 5. The survey did not consider

how income and other responsibilities affect a person's ability to modify their journey to protect themselves.

Age and gender are not the only personal factors that influence perception of personal security. Transgender and non-binary people experience higher rates of verbal and sexual abuse than those who identify within the binary (European Institute for Gender Equality, 2019), so it is reasonable to consider that their personal security may also be a barrier to travel. Ethnic minorities also report a higher than average concern for their personal security when using public transport (Transport for London, 2015).



Figure 5: Proportion of people who change route when street lighting is provided (Pearce, 2019)

Women tend to notice measures around personal safety more than men consequently feel safer (Wallace, Rodridguez, White, & Levine, 1999). Due to the types of crime experienced and perceptions of the transport network across different groups there are variations seen in preferred interventions to improve personal security. Men tend to prefer technological measures whilst women prefer the presence of other people (Gardner, Cui, & Coiacetto, 2017).

Summary

Although the industry recognises that needs vary with age and gender there has been little quantitative research done to identify the specific areas and subsequent magnitudes where needs diverge.

There is a gap in the collection of identity-based trip data in relation to women's travel habits and perceptions across their lifetimes. Four key areas where literature suggests that gender differences should be considered in greater detail across a lifecycle are:

• Accessibility: Both for an individual's physical needs and due to external factors, such as travelling with small children or shopping.

- **Security:** Particularly at night, for vulnerable modes such as walking and travelling alone.
- **Spend:** Both in monetary and time values. Impacted by mode choice, distance and opportunities for reduced or subsidised travel costs.
- **Caregiving:** Understanding the impact of undertaking care-giving responsibilities across a gendered lifecycle.

The review also highlights that where data has been collected there are limited opportunities and examples within current transport planning to incorporate this data and create a meaningful change in outcomes. This is particularly true of the Option Development stage, the Further Development stage, and during the detailed design process where features such as lighting, ramps and CCTV are considered.

3. DATA ANALYSIS AND METHODOLOGY

Travel data analysis has been undertaken to demonstrate the trends that can be seen when a Gendered Lifecyle approach is taken. The bulk of this study utilises data from the Greater London Authority *London Travel Demand Survey* (LTDS) which was provided by Transport for London for the year 2017 – 2018. Detail of this dataset is in Appendix A.

Use of this dataset does have several limitations including:

- It does not consider genders beyond male and female, and is unable to capture the diverse range of experiences of the full population;
- Data is only analysed for a single year, 2017 2018;
- It surveys London residents, limiting the applicability of results to other geographies; and,
- It does not collect user perception and satisfaction data.

A Chi-Square test has been used to test for a null hypothesis (no relation between two variables). When (p<0.05), there is a 95% probability that this null hypothesis (no relation) is false and should be rejected, suggesting some correlation is present.

4. RESULTS

General Trends



Figure 6: Male mode share minus female mode share across all ages

Mode choice varies between genders (Figure 6). Men undertake more trips by distance by car and bicycle compared to women who use buses and other public transport in addition to more frequently being car passengers.



Figure 7: Percentage Male minus Female Bus and Rail users by distance by age

These differences vary with age and may be partially linked to trip purposes. The biggest change in trip patterns is seen for the ages of 30 to 50 years (Figure 8). NTS0611 and NTS0612 (Department for Transport, 2018b) both show men in this age range make more commuting and business trips, whilst women undertake more trips involving shopping and escorting children and elderly.

Women are likely to have a greater dependency on buses as a lifeline for a larger age range (Figure 7), particularly in older age. This group is therefore most likely to be impacted by cuts to bus services.



Figure 8: Percentage Male minus Female Bicycle and Walking users by distance by age

Ethnicity is another factor: both the LTDS and the NTS show that white people travel furthest and made the greatest number of trips compared to all other ethnicities. Among minority groups, Black people travelled the shortest distances and made fewest trips. Ethnic minorities are also more likely to walk a higher percentage of trips per person (29%) compared to 24% of trips by White people. 63% of cyclists by main mode by distance in London are white male compared to 8% non-white cyclists. Of the LTDS breakdown of 29% of female cyclists, white female bicycle users outnumber non-white bicycle users at nearly all age ranges and the gap grows as they get older.



Figure 9: Percentage of respondents who did not leave house all day

A correlation was seen (p<0.05) between gender and propensity for a person to have not left the house on the day of interview. This correlation is strongest for the over

70 age categories demonstrating older women's increased vulnerability to loneliness and inactivity.



Caregiving

Figure 10: Working status of respondents by gender

Formal caregivers constitute 12% of the survey population (Figure 10), though this figure does not include informal caregivers who may fall under any other working status. 94% of all respondents who identified their status as being a caregiver were women, and 64% were women aged between 30-50 years old. Women are also more likely to change their travel habits because of a child starting school than men (p<0.05), and as a result of changed family circumstances (p<0.05). Therefore, it is considered reasonable to conflate caregiving trips with gender in the context of improving equality for women in the 30-50 age bracket.



Figure 11: Respondents who are Carers and percentage who changed travel by age and gender



The biggest gender gap for changes to travel due to stopping work is for the age ranges of 26 to 35 years

Figure 12: Percentage respondents who changed travel from stopping work by age and gender

Figure 12). Mothers aged 16 to 49 are less likely to be in employment than women without dependent children of the same age which may contribute to this gap (Office for National Statistics, 2017a). Male travel patterns are affected by stopping work at a much later age.



Figure 12: Percentage respondents who changed travel from stopping work by age and gender

There is a correlation between caregiving and the amount of stages undertaken in a trip (p<0.05), with caregivers showing a higher propensity to undertake 5+ stages

within a trip. This could result in interchange penalties in terms of time and of cost if the pricing framework for all stages is not the same.



Figure 13: Percentage of trip stages by employment status by gender

A correlation is seen between caregiving and the distance travelled in a single trip (p<0.05). Caregivers are more likely to undertake short distance trips and less likely to undertake mid-long-distance trips than people with other employment statuses (Figure 14). This means that caregivers are likely to be highly reliant on short distance (circular) infrastructure and last mile solutions.



Figure 14: Percentage of trips based on employment status by distance and gender

Accessibility

The LTDS collects very limited data on physical accessibility, with just a single question on the difficulty experienced when accessing buses. This demonstrates a correlation between gender and the degree of difficulty experienced when accessing buses (p<0.05). Women are more likely to find it difficult or nearly impossible (without help) to access buses. It is likely that the women who find it most difficult to access buses are those travelling encumbered through care-giving responsibilities and older women, who tend to live longer than men and face increased disability due to age.



Figure 15: Percentage Respondents having difficulty accessing buses by gender

Security

The LTDS does not explicitly consider security in its questions. However, as outlined in the literature review, many perception-based security impacts are exacerbated at night. It is possible to draw conclusions around security by comparing the differences in travel patterns during hours of darkness compared to the day for different ages and genders. 'Night-time' is assumed to be hours between 9pm and 5am and represent hours that are dark throughout for most of the year. 'Daylight' represents all other hours.

Women tend to travel more than men in the daytime (p<0.05) and men tend to travel more than women at night (p<0.05), and the magnitude of this gender difference varies with age.



Figure 16: Night time and Day time total trips by gender and age

The mode share of trips changes with time of day and gender, and this correlation is stronger for women than men. The results demonstrate a shift from more vulnerable active modes towards (more expensive) private modes such as taxi and private car. There is an increase in the proportion of trips undertaken by London Underground. This could be due to higher perceived security compared to active modes and buses, a reflection of the reduced services offered by other public transport modes at night, or a change to trip purposes.



Figure 17: Percentage change in trip proportion for day and night by gender

There is a clear age and gender variation with the impact of time of day and the propensity for a person to travel on foot. Women reduce their proportion of walking trips at night at a higher rate than men at all age groups except the 11 to 15 and 51 to 55 age bands.



Figure 18: Percentage change in walking trip proportion for day and night by gender

Differences are also seen in the distances travelled by men and women at different times of day, with a correlation seen between gender and the length of a trip at night (p<0.05). It demonstrates a reduction in very short distance trips (<1km) and an increase in short-mid distance trips (3-10km). This difference is strongest for women.



Figure 19: Percentage change in night and day trip proportions by distance and gender



Figure 20: Proportion of short distance night time trips by gender and age

Gender differences in the proportion of short and mid distances trips vary significantly across age ranges. At most ages' men take a higher proportion of short distance trips at night, in particular the 21-30 age band. Older people undertake a very low proportion of short distance trips at night regardless of gender. For mid-distance trips age differences appear to be more sporadic, despite women seeing the largest change in trips made in this category overall.



Figure 21: Proportion of mid-distance night time trips by gender and age

Cost of Travel (Money and Time)

As outlined above, women make a higher number of trips which is likely to result in increased interchange penalties in terms of both cost and time.

Women more likely use local bus services, with 82% of eligible older women having a concessionary bus pass compared to 74% of men (NTS 2012). Cuts to bus services are therefore likely to be most strongly felt by women.

The lower proportion of women in work also affects their access to subsidised travel. The LTDS shows that 61% of women surveyed do not have employer subsidised bus passes compared to 38% of men. There is also a correlation (p<0.05) between gender and employer paid rail season tickets, with 63% of women not receiving this incentive compared to 47% of men.

On comparing parking costs, the LTDS dataset shows a correlation (p<0.05) between gender and employer's paying for season ticket costs at National Car Parks (NCPs).



Figure 22: Percentage of respondents whose employer paid NCP season ticket by gender

A correlation is seen (p<0.05) between gender and the location of cars parked during work hours (Figure 23), with men tending to utilise free parking more than women. Female commuters are less likely to be provided with parking arrangements at work and are more likely to use paid public car parks. One reason more women don't access free public car parks could be due to caregiving commitments with less opportunity to arrive early and secure spaces. Trip spend on commute also shows female drivers are more likely to pay for on street parking due to proximity to work and other flexible time options.



Figure 23: Percentage of respondents parking locations by gender

Summary

Analysis of the LTDS dataset and literature indicates that there are differing needs between genders across a person's lifetime:

- **Children** exhibit the smallest gender difference in terms of their travel habits, though there is some evidence that the uptake of active modes begins to diverge between genders at an early age.
- Young adults (in particular women) are prone to feelings of poor perceived personal security which can result in poor journey experiences and changed travel patterns, particularly at night. Preferred interventions and their overall impact can vary between genders.
- **Mid-life** women are more likely to become caregivers and see a dramatic shift in the trips they undertake as a result. In particular a significant rise in the number of short-distance, multi-stage trips which may result in an increase in time and monetary costs. Accessibility may also be affected.
- Older women are less likely to drive, leaving them particularly dependant on public transport to access local amenities including health services. Older women are also more likely to report a difficulty in using public transport such as busses.

The study has also demonstrated that there are intersections with other personal characteristics such as ethnicity which impact travel patterns. A larger sample size is required to understand these intersections in more detail.

5. OUTCOMES AND PROPOSALS

Current transport data collection and appraisal methods assume similar transport impacts and outcomes for all user types at all points across their lifetime. This paper demonstrates that this assumption is incorrect and through both literature review and data analysis showcases key differences in how men and women travel across their lifetimes. An additional finding is that there is no explicit framework to collect this data nor incorporate these differences throughout the traditional TAG process.

Whilst the industry is aware of the need for a diverse workforce to create solutions that better meet the varied needs of its users, in the UK only 20.95% of transport workers are women (European Comission, 2017). As an industry with limited diversity and experiences, detailed data on URGs becomes even more critical to deliver projects that represent the needs of a range of users. This paper recommends the collection of disaggregated travel data by gender (and any other relevant URG) across all age ranges as standard for major schemes.

Using travel data to ascertain gaps in usage is the perhaps the simplest way to identify barriers to travel. Data should be used to compare the demographics of existing or new users of the transport network to those in the study area – identifying differences in the two demographic profiles. Attention should be paid to understanding the needs of URGs.

Using this approach, it is likely that high speed and long-distance schemes designed to enhance business and commuting trips will demonstrate a lack of diversity amongst users, and indeed reveal that the investment only directly benefits a small segment of the demography. Local and regional schemes focusing on accessible streets and first/last mile solutions are more likely to demonstrate equity.

Furthermore, the collection of gender and age disaggregated perception data is critical to understand and minimise identified travel gaps. Data collected should focus on the user's perceptions of accessibility, comfort and safety, and the degree to which these influence their travel choices and satisfaction. Long form surveys are encouraged to understand complex user experiences.

Literature review and data analysis demonstrates that gender and age differences in travel patterns should be incorporated at all stages of scheme design. Data-backed inclusive actions must be taken at the beginning and at every subsequent stage of scheme development, rather than towards the end of the appraisal process.

The **Option Development Stage** is perhaps the most critical stage at which disaggregated travel and perception data must be considered. It's at this stage that problems are identified, and the direction of the scheme is formed, ultimately driving the type of intervention and therefore those who benefit from the scheme.

There is a need for change in the current TAG process and recommendations on data collection. A detailed study of the population and their travel behaviour and perceptions should be undertaken. Generated options should be sifted against their ability to be inclusive to the community they influence, based on local data and best practice examples. This change would have an impact on not just the nature of options coming forward, but also the way that transport practitioners view the role of transport and its relationship to society.

At the **Further Appraisal** stage this paper considers that there are two routes to overcome the current barriers posed by the existing benefits appraisal methodology. Both pose a significant opportunity to capture additional wider scheme benefits.

The first is a DfT-led overhaul of the methodology for calculating VoT to rebalance the value placed on caregiving trips. This would have far reaching impacts on the economic premise on which schemes are evaluated and would likely be highly controversial as it would classify many major schemes as 'poor' value for money.

An alternative is for local and regional transport authorities to develop an additional method to value trips with a 'low' economic value but high social value and incorporating these benefits into all BCR calculations. This is likely the more achievable option in the short term as it requires no change to existing legislation and could be applied on a proportionate, case by case basis.

At the **Detailed Design phase**, trip and perception data should be utilised to understand the needs of communities, particularly URGs including:

- Their perceptions of safety and accessibility on the network; and,
- Acknowledging that preferred interventions may vary between groups.

The uplift in usage derived from improving accessibility and personal security should be incorporated into wider benefits to capture value added. Delivering inclusive design standards and operational procedures must be a minimum requirement for any scheme approval.

It is recommended that disaggregated data is also collected **Post Scheme Opening** to understand the impact of interventions. As there are currently limited examples of interventions where gender disaggregated before and after trip data has been collected, there is an opportunity to leverage this data in building an industry wide best practice portfolio. Wherever possible, the authorities which hold this data should seek to make lessons learnt publicly available.

Utilising this TAG-wide approach would likely have a significant impact, for example:

- Shorter distance radial trips will be enhanced, leading to an improvement in wellbeing and freeing up more of women's time to undertake paid work; impacting gender pay gap and women's financial autonomy;
- Major strategic schemes will be more rigorously assessed and need to demonstrate social value which may lead to many landmark schemes being scrapped or altered in favour of more equitable and beneficial options previously unconsidered;
- Barriers to cycling will be better understood to enable more people to participate, realising health benefits and influencing mode shift;
- The UK's aging population will benefit from infrastructure that is accessible, reducing the prevalence of loneliness and inactivity whilst also providing the elderly with dignity and autonomy;

- Pricing frameworks will be reviewed to ensure trip chainers, flexible workers and caregivers can benefit from frequent use discounts and are not penalised for their travel patterns; and,
- Through prioritised personal security URGs will have a greater access to the night time economy and will not be financially penalised for the hate crimes they would risk whilst travelling.

6. CONCLUSION

There is a need for transport authorities to collect and incorporate disaggregated user transport usage and perception data into transport appraisal with an intent to include minority groups that may have been excluded in the past. If transport investment is to benefit everyone in the community and ensure no one gets left behind in access to opportunities the industry needs start actively working towards a data-led inclusive approach at every stage of transport planning today.

The Covid19 pandemic is causing changes in commuting patterns, evening trips and care giving responsibilities. Further research is recommended to understand future travel patterns and impacts of the acceleration of working from home for both genders and other URGs as part of any Covid19 transport response.

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