RURAL DAILY TRAVEL ON THE DINGLE PENINSULA

THE RESULTS OF A SURVEY STUDY

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INTRODUCTION

The transport sector is a major consumer of energy and material resources and a source of environmental pollution, and the continued growth in energy consumption for transport has become a major concern [1]. The transport share of greenhouse gas emissions increased from 19.9% in 2022 to 21.4% in 2023, among which passenger cars accounted for almost half of the total emissions [2]. A report by the Organisation for Economic Co-operation and Development (OECD) has highlighted the urgent need for systemic change in the Irish transport system to reach decarbonisation goals by prioritising active and public modes of transport and reducing the reliance on electric cars [3]. A vast majority of existing research focuses on urban transport systems to contribute to the decarbonisation goals. However, there is also potential for rural transport systems to contribute to change, which is the focus of this report.

Car dependency is traditionally high in rural Ireland [4]. According to the latest data from the 2023 National Household Travel Survey, 82% of trips are made by car in rural areas. This is higher than the national average car use of 71% (*Table 1*). On the other hand, the percentage of trips taken by foot is much lower in rural areas (7% of all trips) compared to the national average (18%) [5]. The percentages of trips taken by other modes of transportation in rural areas are more or less the same compared to the national average.

Table 1. Percentage of transport mode (%) for all trips made, national average and rural areas in 2023.

Transport mode	National average (%)	Rural areas (%)
Car	71	82
Walking	18	7
Bus/coach	4	5
Truck/van	3	4
Train	2	1
Cycling	1	1
Other	1	1

Replacing rural car trips with trips by sustainable modes holds great potential for emission reduction [6]. Sustainable modes include active travel modes, like walking and cycling, and travel by public transport. In addition to providing environmental benefits, they can stimulate physical activity thus having positive health impacts [7-11]. For example, evidence suggests that cycling to school is associated with both physical health and mental health benefits such as higher cognitive

performance [12-14]. Promoting the use of active and public transport also improves safety for all road users. Research shows that public transport is not only a safer mode itself compared to car, but also improves safety for cyclists and pedestrians if more people use these active modes of transport [15]. Active and public transport is generally much more affordable compared to owning a car, providing equal opportunities to access essential needs for all, especially low-income groups. Moreover, using active and public transport provides more social interaction opportunities, which has been proven to have a positive impact on people's wellbeing [16].

Despite all the benefits, research has found that people tend to underestimate the benefits sustainable modes could bring [17]. Low-density rural transport also faces more challenges/barriers in modal shift, such as the lack of available (network coverage), reliable, and efficient public transport services, and the lack of safe cycling and walking infrastructure [18,19].

We examined the Dingle Peninsula as a case study to understand people's daily travel experiences in rural areas. In a survey study we asked them about their travel experiences and emotions. Also, we asked their perceptions on existing public and active transport infrastructure in their area. We used this data to identify people's needs and barriers in sustainable travel mode shift. In this report, we highlight the main results of the survey study.

SURVEY STUDY

This report presents the results of a survey study conducted between June and September 2024 on the Dingle peninsula (*Corca Dhuibhne*). The aim was to understand people's travel behaviour patterns, intentions to reduce their car use, perceptions of transportation infrastructure, and emotional experiences during trips. Participants were asked to recall their most recent trip and report characteristics of the trip (e.g., trip attributes) as well as their perceptions and experiences at the time of the trip (e.g., feelings throughout the trip). Using a snowballing method to reach as many people as possible through various communication channels such as targeted emails, newsletters, paid social media posts, and handouts, a sample of 386 participants (over the age of 18) with complete responses was collected.

Our respondents were geographically spread over the Dingle peninsula (*Figure 1*). The majority (33%) lived in Dingle, the main town on the Dingle peninsula. The remainder of the respondents lived in villages on the peninsula, such as Kilshannig West, Castlegregory, Ballyferriter, Dunquin, and Ventry.

There was a slight overrepresentation of women in the sample, with 57% female and 42% male respondents (2% preferred not to answer). The majority of respondents fell within the 45-54 age group (31.3%). While the age distribution closely reflected the general population, younger (18–34) and older (65+) age groups were somewhat underrepresented.

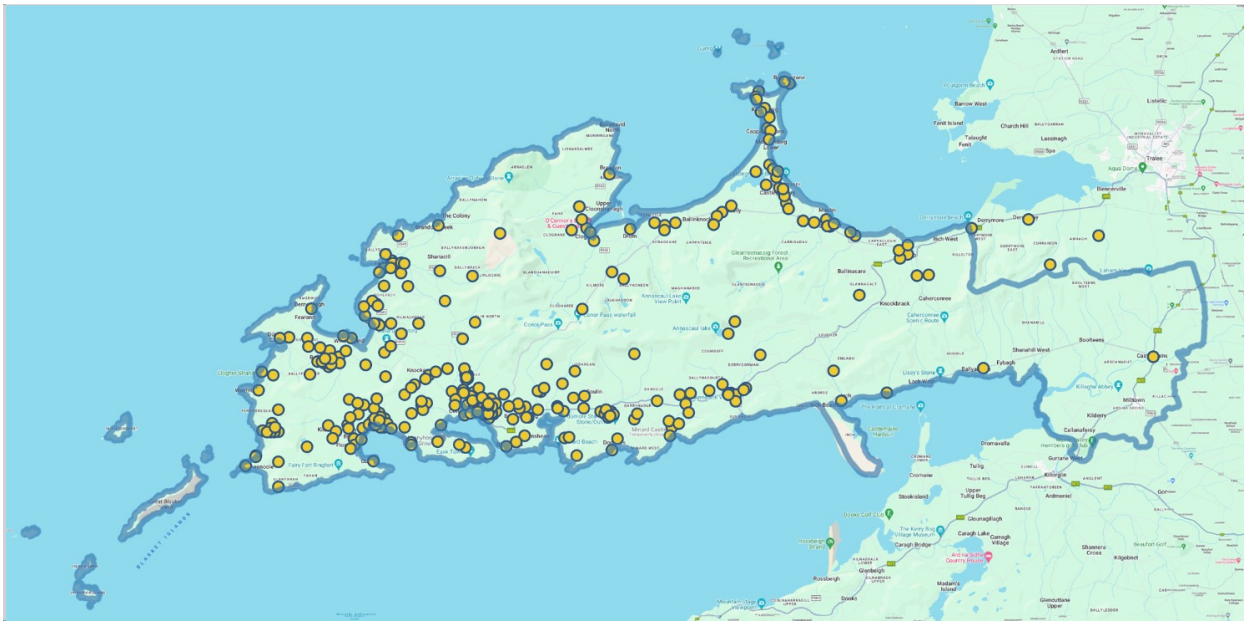

Figure 1. The geographical distribution of respondents[1].

Compared to the 2022 Census data for the Dingle Peninsula (Corca Dhuibhne) [20], the sample represented a population with relatively higher socio-economic status. In terms of educational level (*Figure 2*), 76% of respondents held at least a bachelor's degree, compared to 33% in the general population. The median household income fell in the range of €50,000 to €59,999 (*Figure 3*), slightly above the census median of €46,355. Nearly 80% of the respondents were employed at the time they filled out the sample, 12% were retired, and 3% were students.

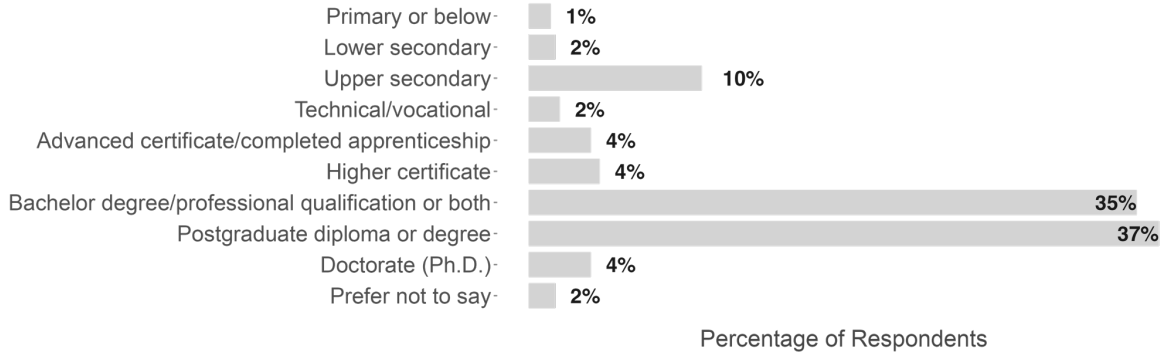

Figure 2. Sample distribution highest finished education level.

[1] Survey participants were asked to identify their primary location on the Dingle Peninsula. For accuracy, any points that were mistakenly placed in the sea have been excluded from the map.

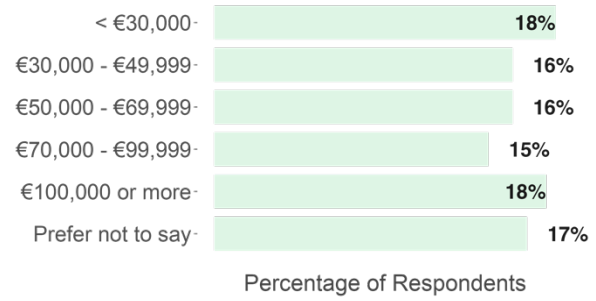

Figure 3. Sample distribution annual gross household income.

Households with no car (5%) or one car (33%) were slightly underrepresented in our sample (*Figure 4*); compared to 2022 census rates (8% zero-car households and 42% households with one car [20]). Yet, we have a good distribution of household car availability in the sample.

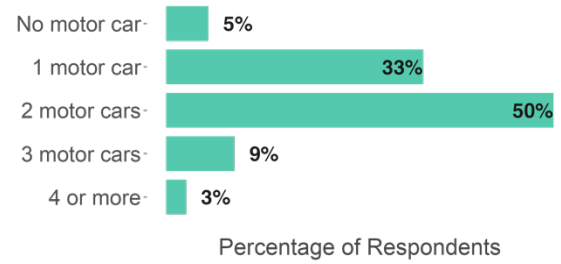

Figure 4. Number of cars available in respondents' households.

RESULTS

MODE USE PATTERNS

To get a general understanding of daily travel patterns on the Dingle Peninsula, we asked participants to report the frequencies with which they used each mode during the most recent month when they

stayed on the Dingle Peninsula. Each respondent provided a frequency rating (ranging from 1 "Never" to 5 "Everyday") for five travel modes: car, car-pooling, bus, bicycle, and foot. *Figure 5* shows the distribution of how often each travel mode was used.

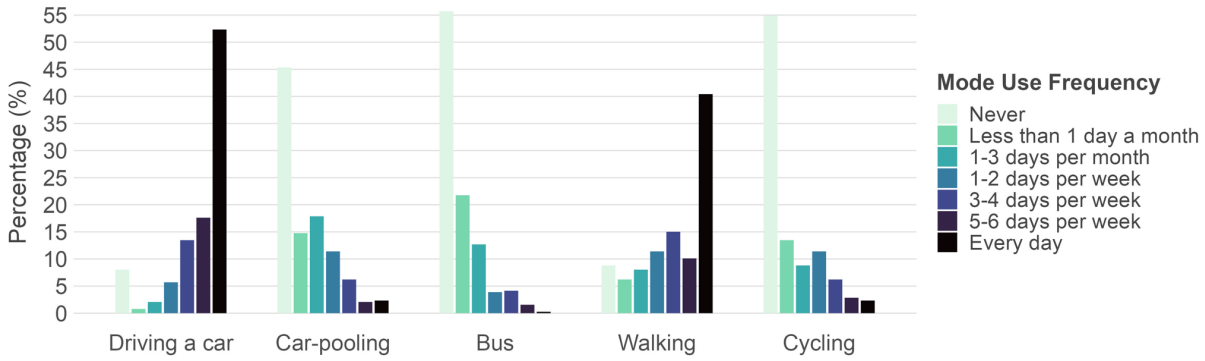

Figure 5. Distribution of respondents across different frequency levels for each mode, with bars representing the percentages of users in each category based on 386 survey responses.

The results showed that the car was the most frequently used mode of transport, with over half of respondents driving every day. Walking was the second most frequently used mode, with 40% of respondents walking every day.

Around half of respondents never used the bus (56%), bike (55%), or carpooling (45%). However, there was still a considerable number of people who used these modes occasionally, with 23% of respondents taking the bus at least a few times per month, 23% cycling at least once a week, and around 30% reporting they carpooled at least a few times during the last month.

Despite the high frequencies of driving, 8% of all participants did not drive at all in the month they were asked to report on. They mostly relied on active modes for daily travel, such as walking and cycling. For longer distances, nearly half of non-car users took buses weekly, followed by trips where they carpooled (*Figure 6*).

To further understand the use of different modes in our sample, we calculated the total number of trips by each mode per month based on the mode use frequency data[2]. For clarity, we focused on

[2] As we focus only on local travel and certain transport modes, longer trips taken by train or other modes were excluded. The calculation was based on the mode use frequency data collected from each participant over the last month. To calculate the proportions of trips by each mode, we made the following assumptions:

Every day → ~30 trips/month (1 trip/day × 30 days)
5–6 days per week → ~22 trips/month (5.5 × 4 weeks).
3–4 days per week → ~14 trips/month (3.5 × 4 weeks).
1–2 days per week → ~6 trips/month (1.5 × 4 weeks)..
1–3 days per month → ~2 trips/month ((1 + 3) / 2 = 2)
Less than 1 day/month → ~0.5 trips/month ((0+1)/2=0.5)
Never → 0 trips/month.

the four main modes: car, walking, cycling, and bus. This enabled us to make a direct comparison with the National Household Travel Survey (NHTS) [5][3]. Based on the NHTS definition and the geographical locations of our sample, we selected "Rural Areas" (all areas with a population of less than 1,500) and "Other Urban Areas" (Towns with a population of between 1,500 and 10,000) as comparable regions to the Dingle Peninsula (*Figure 7*).

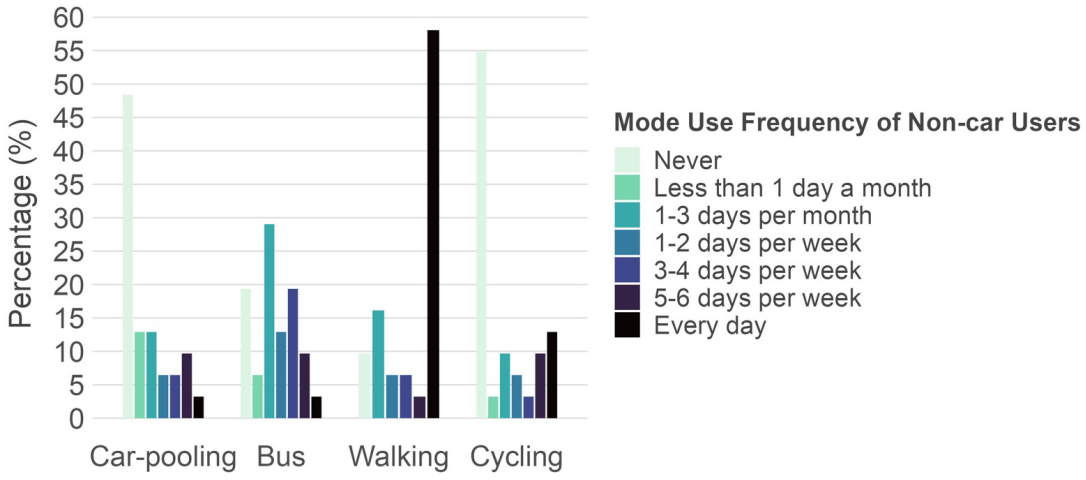

Figure 6. Mode use frequencies of non-car users (31 respondents).

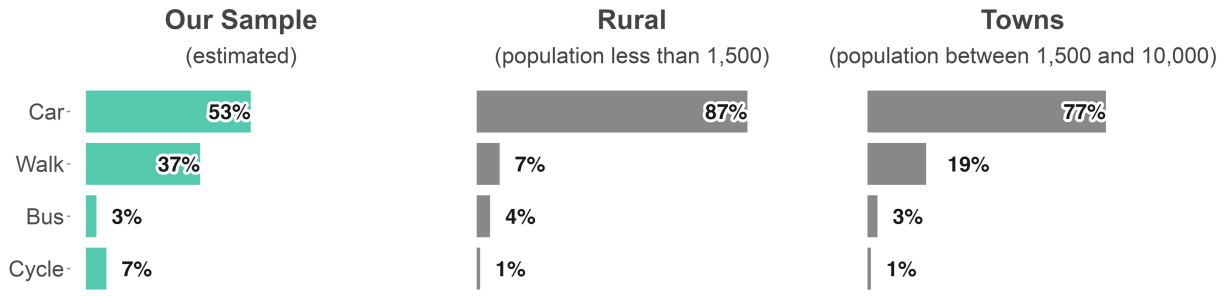

Figure 7. Percentages of all trips taken by modes of transport in our sample compared to other rural areas.

There are some distinctive differences between our data and the national averages of rural areas and towns. We see a much lower number of car trips in our sample (53%). In contrast, the number of trips taken by foot (37%) or bicycle (7%) are much higher compared to other rural areas or towns in Ireland.

[3] The results and comparisons with 2023 national travel survey data should be interpreted with caution, considering the differences in data collection, the seasonal changes in travel patterns and the representativeness of our sample.

Finally, the estimated percentage of bus trips (3.4%) is slightly lower than the number of bus trips in other rural areas (4%).

These differences may reflect the efforts of the Dingle Peninsula on sustainability in recent years [21]. However, they could also be influenced by sampling bias, given the snowball method used for data collection. Further research would be useful to confirm whether these patterns reflect broader regional trends or specific features of our survey population.

TRIP CHARACTERISTICS

To complement the broad overview of how people typically travel, we captured the finer details of individual journeys. We asked participants to report the characteristics of their most recent trip on the Dingle Peninsula. Those "most recent trips" provide a snapshot of their actual travel behaviour. They can provide a better understanding of travel experiences of daily travel on the Dingle peninsula. Respondents were asked to record all segments of their trip that were longer than five minutes. For each segment of the trip, respondents were asked to answer questions about trip characteristics, including trip purpose, trip distance, duration, and travel mode[4].

TRIP DISTANCE AND TRIP DURATION

In Ireland, the minimum acceptable journey distances for walking and cycling are around 4km and 10km [22]. We refer to trips within 4km as "short trips" and trips between 4-10km as "medium-length trips" in this report.

Following this definition, 31% of the reported trips were short trips. That many trips were relatively short in time was confirmed by respondents' trip duration data. The median trip duration was 15 minutes, and 75% of trips lasted less than 30 minutes. Looking at mode-specific patterns (*Figure 8*), 17% of car trips were short trips (under 4 km). A similar pattern for walking and cycling trips is seen; these trips were typically under 4km. *Figure 9* complements this data with a focus on the time the trips took across the four travel modes. This suggests that active modes may replace many short car trips without significant time penalties, making walking and cycling viable alternatives for everyday travel. As these are generally acceptable distances for walking or cycling, there is potential to focus interventions on encouraging the use of active travel modes for these short trips.

Nearly 30% of all trips were medium-length trips. Again, looking at mode-specific patterns, 35% of car trips were medium-length trips and were within 30 minutes. Similarly, 30% of cycling trips and 16% bus trips were between 4-10km and took less than 30 minutes. For those trips that might not be accessible by foot, cycling or public transport could be suitable options to replace car trips. For trips

[4] As we mainly focus on the local daily travel, we excluded 17 trip segments that were taken by train and other modes (boat, airline, etc.), resulting in 645 trip segments reported by 384 survey respondents. Most trips were made by car (66.8%), followed by walking (17.1%), bus (9.9%) and cycling (6.2%).

longer than 10km, car and bus were the primary modes. Bus trips tended to cover much greater distances (74% of bus trips were >10km) and took longer (45% took over 30 minutes) than car trips. This shows that buses are used for longer-distance travel and are likely to be seen as a good alternative for car trips over these distances.

Overall, we see potential for mode shift for bus services for longer trips, whereas active modes are offering a sustainable substitute for short car travel. However, for this potential to be realised, it is important to understand car drivers' intentions to change their car use. We explore this in the next section.

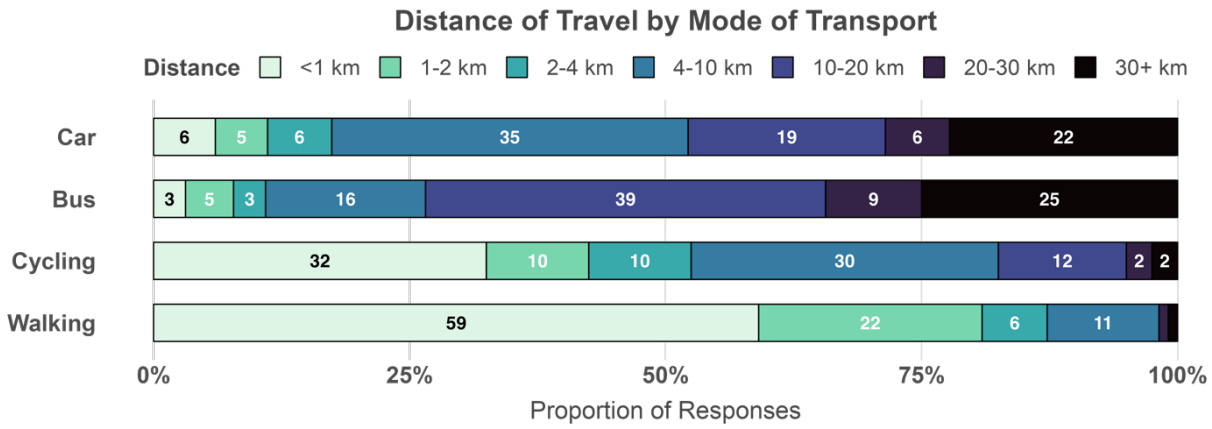

Figure 8. Distance of travel by mode of transportation based on 645 trip segments.

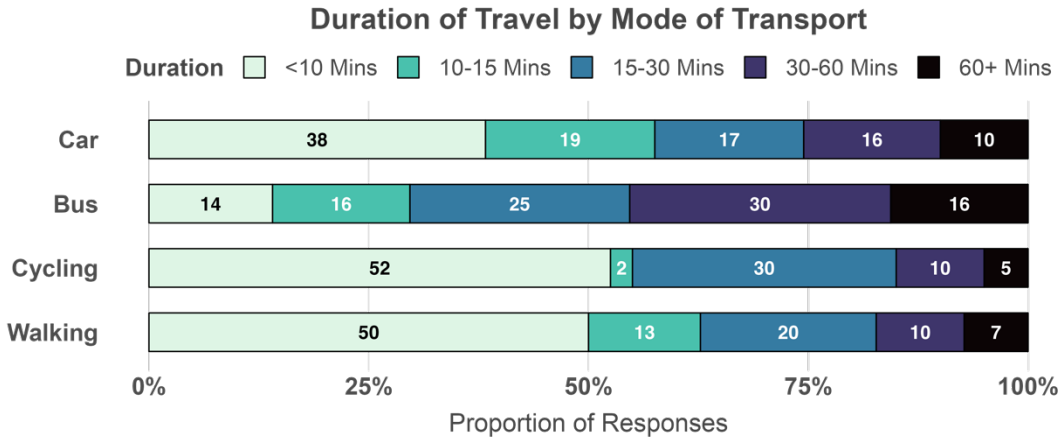

Figure 9. Duration of travel by mode of transportation based on 645 trip segments.

INTENTION TO REDUCE CAR USE: STAGES OF CHANGE

We examined car users' intentions and actions in reducing car use based on the transactional model of behaviour change (TTM) [23,24]. This is a theoretical framework that was first widely applied in the health field and has been used in the transportation field in recent years. TTM explains the formation of a new behaviour by viewing the change as a process that occurs over time. This process involves a series of stages, each with their own characteristics. There is a precontemplation stage (not ready), contemplation stage (getting ready), preparation stage (ready), action stage (actively changing), and maintenance stage (sustaining change). Sometimes a relapse can occur, meaning that car users can return to old behaviours that belong to a previous stage. Each specific stage of change requires different policy strategies as they have different attitudinal and behavioural implications. Empirical evidence has shown that interventions based on the TTM are more effective than general interventions at changing travel behaviours, such as increasing use of active transportation modes [25-28].

To determine where people were in terms of the stages of change model, participants were first asked about their car use for routine trips (do not travel by car, try to use non-car modes as much as possible, or most frequently use a car). Depending on their car use habits, the frequent car users were then asked about their intentions to reduce their car use. Car users who had already reduced their car use were asked if they intended to maintain or further reduce their car use. Based on the answers, participants were assigned to the different stages of behaviour change (*Figure 10*).

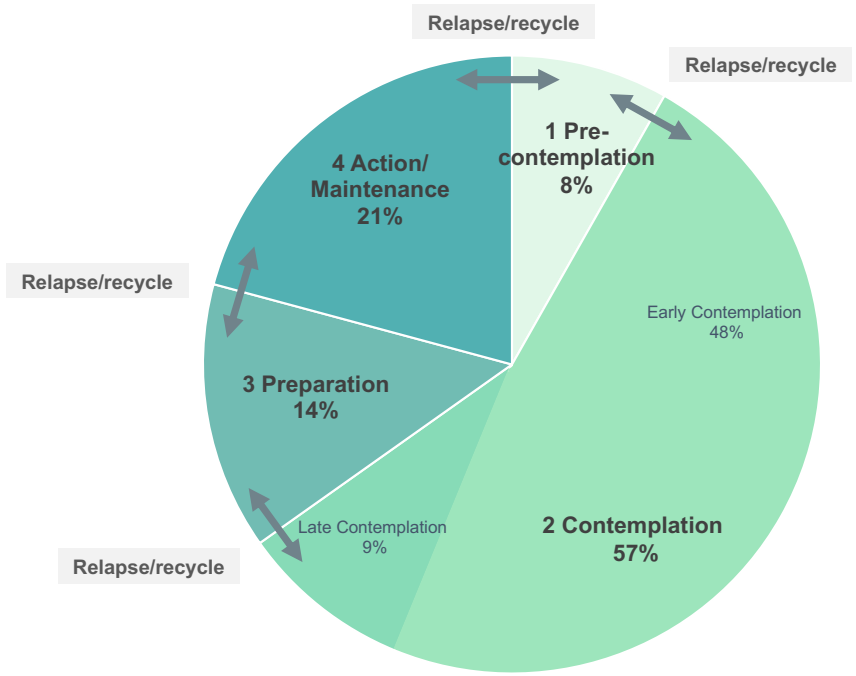

Figure 10. Distribution of participants across different stages of the behaviour change model for car use reduction based on 365 frequent car users in our sample.

Precontemplation stage

A small group of car users (n=30) reported no intention to reduce their car use, indicating that they were not ready for change. For this precontemplation group, increasing general problem awareness should be the main strategy to encourage behaviour change [23,24]. Awareness and educational campaigns might focus on the benefits and positive experiences with walking and cycling. In addition, stressing the social norm (i.e., walking and cycling are common and socially approved of) could stimulate a shift in mindset [25]. For example, short-term actions could include representing diverse groups using active modes in media and promotional materials to challenge stereotypes (e.g., that cycling is only for young, fit men). In the longer term, integrating cycling activities and events into schools and youth programs can foster early positive associations, normalising cycling as a common activity from a young age [25].

Contemplation stage

Most car users were in the early contemplation stage (n=209), indicating they were aware of a need to reduce their car use and contemplating about change. However, no concrete planning or action on how to achieve this had been taken. Among them, 175 participants reported that they would like to reduce car use but perceived it as difficult or impossible. For this early contemplation group, it is important to remove general practical barriers and create low-risk opportunities for them to try and experience the alternative modes. For example, besides safer walking and cycling infrastructure, trial programs for cycling and bus, walking and cycling events, as well as support with renting and buying a bicycle can be helpful [26,29,30]. Further investigation of these barriers is also needed so that tailored policies can be designed to reduce them.

Another 34 participants were in the late contemplation stage, meaning they were closer to the preparation stage. They were planning to reduce their car use, but not in the immediate future. For this group, the priority is to motivate and encourage them to plan changes concretely. For example, interventions could help participants identify days when they don't need to use their cars or short trips where alternative modes of transport could be tried [23,24].

Preparation stage

50 participants were in the preparation stage meaning they were concretely planning to reduce their car use in the coming months. Assistance and support on developing specific plans can move this group into action [23,24]. For example, starter incentives or trial schemes may make it easier for them to integrate their new travel behaviour into daily routines and increase the likelihood of establishing lasting habits [25].

Action/ Maintenance stage

A total of 76 participants had already taken action to reduce their car use by using alternative modes whenever possible. Fifty-three participants showed an ongoing commitment to further reducing their car use. Positive feedback, social support, and reinforcement can encourage them to stay in the Action/Maintenance stage and prevent relapse [23,24]. For example, feedback information on financial savings and fitness improvements, recognition campaigns such as peer stories and social rewards can help sustain the use of sustainable modes [25].

Table 2 presents a summary of the stages of change and the different focus of policy interventions

for each stage.

Table 2. Different stages of behaviour change, their profiles, and tailored policy focuses.

Stage	Profile	Policy Focus
Precontemplation **(Not Ready to change)**	Drivers not considering reducing car use.	- Raise awareness about environmental, health, and cost benefits of sustainable modes. - Change the social norms (i.e., showing on media that walking, cycling, and taking buses are common and socially approved of). - Integrate cycling and walking education in schools and youth programmes.
Contemplation (Thinking about change)	Drivers who are aware of the need to reduce car use but without any plans.	- Remove common barriers by providing safer walking and cycling infrastructure, trial programs for cycling and bus, walking and cycling events, as well as support with renting and buying a bicycle. - Further investigate the barriers that make people think car use reduction is impossible.
Preparation (Planning to change)	Drivers who are actively planning to reduce car use.	- Create low-risk opportunities such as starter incentives and trial schemes for car users to try and experience the alternative modes (e.g., walking and cycling events, support with renting and buying a bicycle). - Provide assistance and support on plan changes concretely (e.g., help them identify days they do not need to use their cars).
Action/Maintenance (Actively changing or sustaining change)	Individuals already using alternative modes.	- Provide positive feedback such as reinforcing financial savings and fitness improvements from using sustainable modes. - Offer social support and recognitions such as community awards and sharing peer stories.

PERCEPTIONS OF LOCAL WALKING AND CYCLING INFRASTRUCTURE

We explored people's perceptions of local infrastructure for active modes of transport, walking and

cycling. We asked participants to rate both the walking and cycling infrastructure in the area where they live on the Dingle Peninsula on three dimensions: quality, pleasantness, and safety. Participants were given six statements (*Figure 11*) and asked to what extent they agreed or disagreed with them.

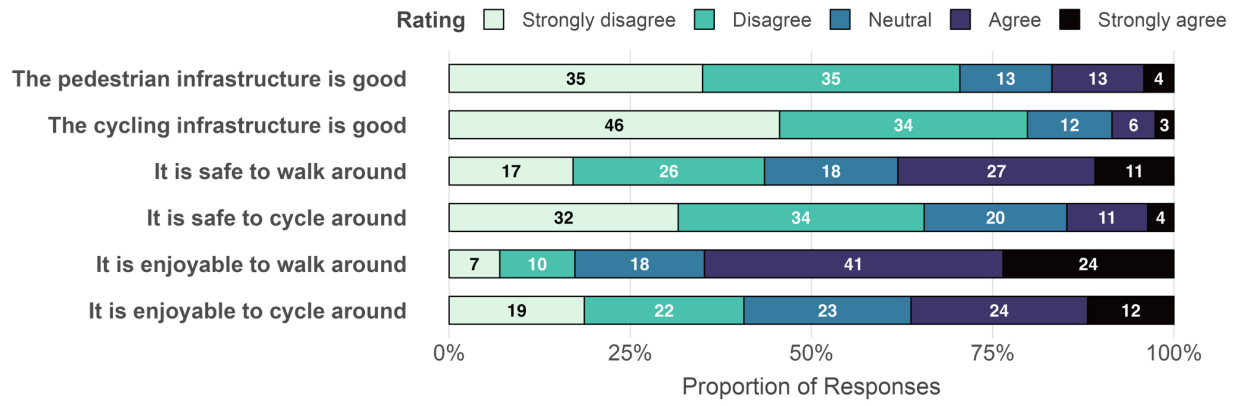

Figure 11. Ratings of local walking and cycling infrastructure in the neighbourhood based on 386 survey responses.

The results show that most participants were dissatisfied with the quality of walking and cycling infrastructure, with around 71% of respondents who indicated that they disagreed or strongly disagreed with the statement that pedestrian infrastructure in their neighbourhood was good. Nearly 80% of respondents strongly disagreed or disagreed that cycling infrastructure was good, with only 8.5% expressing that they agreed with the statement.

Travel safety was also a significant concern, particularly for cycling. Nearly two-thirds (66%) of the respondents (strongly) disagreed that cycling is safe, while only 15% considered cycling to be safe. In contrast, walking was perceived as relatively safe compared to cycling. Forty-four percent of participants indicated that they (strongly) disagreed that walking was safe in their neighbourhoods. When it comes to enjoyment, most people (strongly) agreed that walking was pleasant (65%), while 36% (strongly) agreed that cycling was enjoyable.

To examine the relationship between perceptions and mode use frequency, we simplified the mode use frequency categories[5] and further compared perceptions by each mode use frequency group (*Figures 12*[6]).

[5] Every day/ 5–6 days per week/ 3–4 days per week → Frequent users
1–2 days per week/ 1–3 days per month/ Less than 1 day/month → Occasional users
Never → Non-user

[6] Figure on the next page shown in landscape orientation.

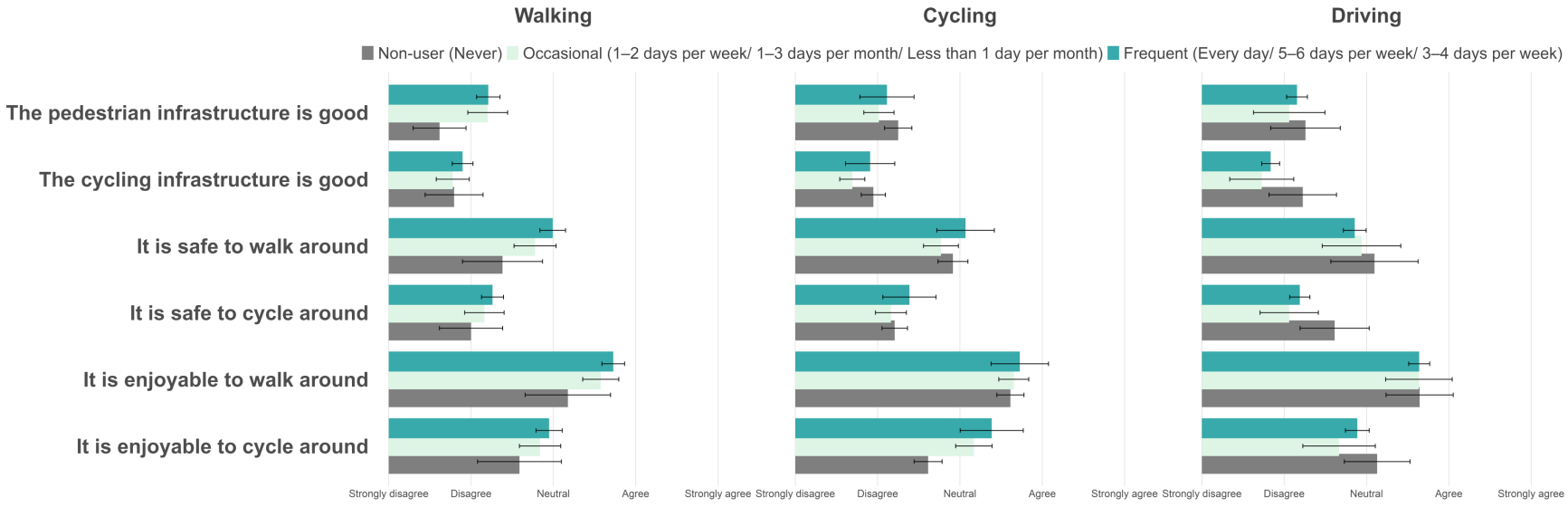

Figure 12. Ratings of local walking and cycling infrastructure by walking, cycling, and driving frequency based on 386 survey responses.

Frequent walkers and cyclists agreed that safety and enjoyment were higher for these modes of transportation than occasional users and non-users. These findings are consistent with previous research [31], which shows that frequent cyclists generally hold more positive views of cycling safety and infrastructure. Similarly, we see that frequent car drivers tended to have more negative views of all three dimensions (infrastructure quality, safety, and enjoyment) than non-frequent drivers.

The results emphasise the importance of addressing infrastructure and safety issues across all neighbourhoods on the Dingle Peninsula, so that walking and cycling become not only feasible but also enjoyable options for a broader share of the community. The more positive perceptions of walking and cycling infrastructure among more frequent active mode users suggest that events that provide residents the opportunity to experience active travel first-hand— such as cycling trials, car-free days, or community walking events— may help shift public perceptions on sustainable modes.

Figure 13 and *Figure 14* show the geographical distribution of average ratings for local walking and cycling infrastructure. Walking was mostly rated neutral to positive, with more negative perceptions concentrated in specific villages including Ventry, Fionn Tra, Ballyferriter Village, Knockavrogeen, Feohanagh, and Castlegregory. These locations could be prioritised for targeted improvements to create a more continuous, accessible, and safe walking network. Negative perceptions of cycling infrastructure were more widespread and evenly distributed across most villages except for Annascaul, while Dingle Town showed more mixed ratings. Initial improvement efforts could start from town villages centres where negative ratings were most concentrated before broader network improvements.

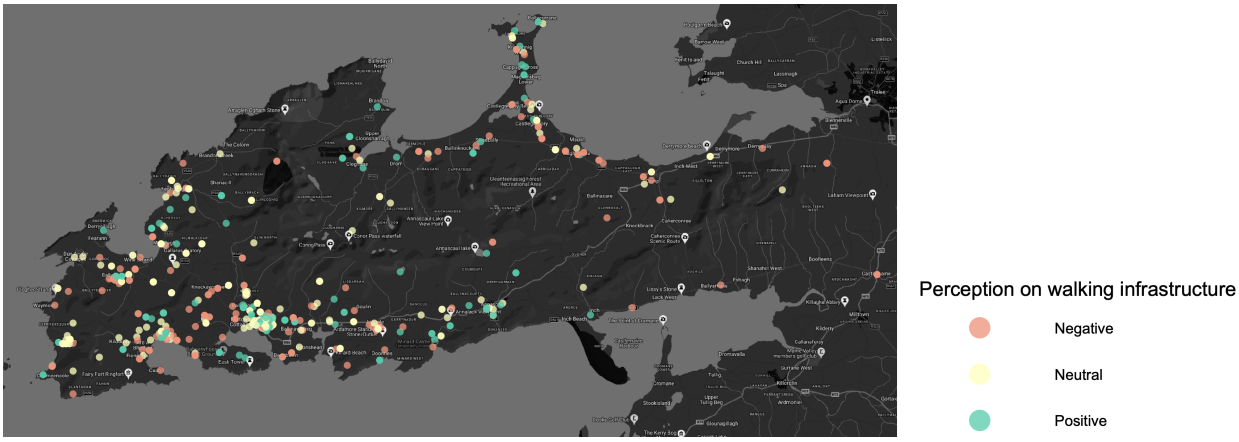

Figure 13. Map of average ratings of local neighbourhood walking infrastructure.

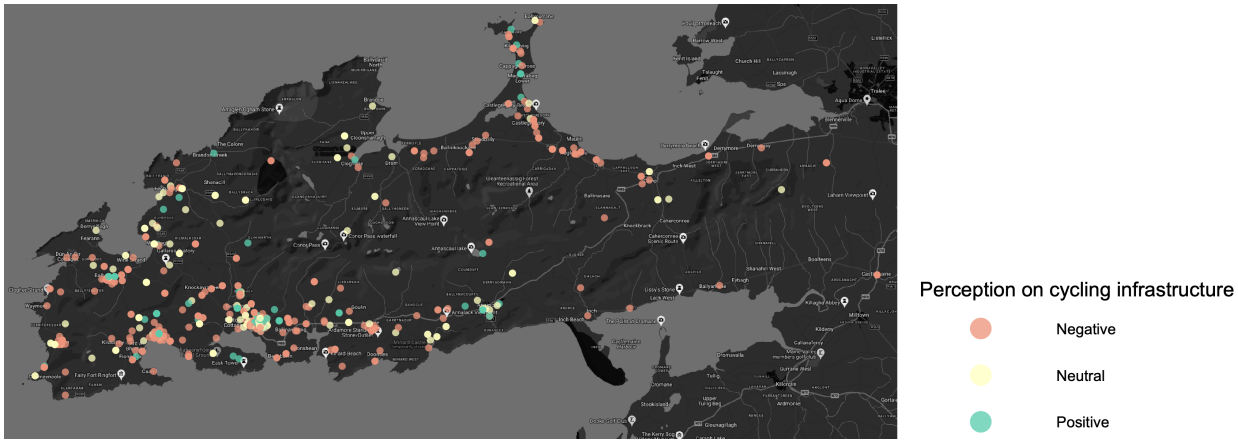

Figure 14. Map of average ratings of local neighbourhood cycling infrastructure.

PERCEPTIONS OF BUS SERVICES

At the time of data collection, some new bus services were introduced. We asked respondents to report if they are aware of the recently introduced bus services, and if they have used them. Focusing on the recently available bus services, we used three examples: (1) the increased frequency of bus 275 (Tralee - Dingle, every two hours from Monday to Sunday), (2) the extension of bus route 277 from Dingle to Dún Chaoin / Dunquin, and (3) door-to-door scheduled bus services available by booking in advance.

Figures 15 shows that public awareness of the recently introduced bus services was relatively high, but actual usage remained low. Most respondents were aware of the extended bus routes 275 (76%) and 277 (81%), yet fewer than a third had actually used them (30% for route 275 and 28% for route 277). This implies that awareness levels of these bus routes are already high. Instead, efforts should focus on encouraging behavioural change and addressing the specific barriers that prevent people from using these services. One potential barrier may be negative perceptions of bus services, particularly among car users. Previous research shows that car users tend to have less favourable views of public transport compared to regular public transport users [32,33]. To address this perception gap, strategies could include improving the image of public transport by highlighting both personal and environmental advantages, as well as addressing practical concerns about service accessibility and reliability. Cheap or free travel days can also provide low-risk opportunities for people to try the service again, especially those who have not used the bus in a long time [33].

Awareness of the new door-to-door service was much lower: more than half of respondents had not heard of it, and only 12% had used it. This indicates a need for stronger outreach and easier access to information about the service. Importantly, awareness alone does not guarantee usage. Further research is needed to understand the barriers for residents to use these bus services.

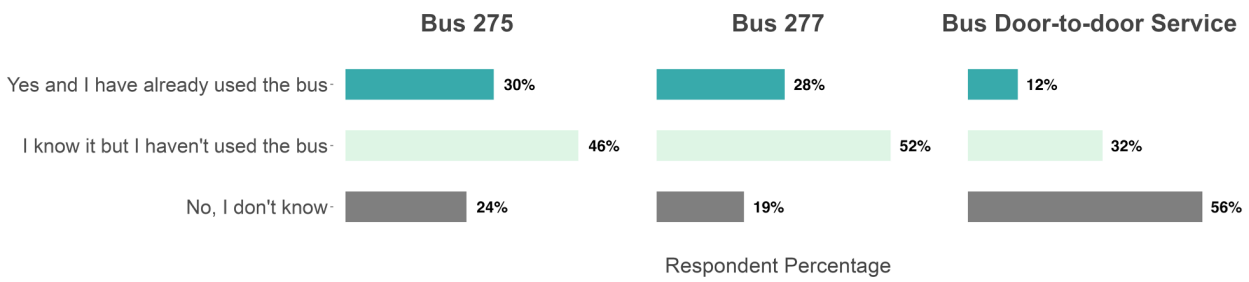

Figure 15. Awareness and usage of bus 275, 277, and door-to-door services based on 386 survey responses.

We asked participants how much they would consider a fair price for bus services. Participants were provided information and the current prices for adults in two scenarios. First, a one-way local bus trip from Dingle to Dunquin at €2.50. The other scenario was a longer one-way trip from Dingle to Tralee by Bus Éireann at €11. The median value of the fair price people perceived for the Dingle to Dunquin bus service was the same as the current price, suggesting that most people found the current local bus fare acceptable. In contrast, the acceptable price for the longer bus trip was around €8, which is 27% lower than the original price. This likely reflects the way car owners evaluate costs: many do not account for the full costs of car ownership (including insurance, maintenance, and depreciation) when comparing driving with bus travel [33]. Public campaigns could therefore play an important role in raising awareness of the real costs of car use compared to the relatively low cost of public transport. At a national level, lowering bus fares where feasible would further strengthen the bus's competitiveness, as many users are unlikely to view it as the "cheaper option" unless fares are clearly lower than the combined cost of petrol and parking for comparable journeys [33].

COGNITIVE EVALUATIONS OF TRIPS

To gain a more nuanced understanding of people's travel experiences, we asked participants what they thought of their trips in terms of safety, convenience, flexibility, reliability, and the level of strenuous effort involved in each trip segment. Such evaluations are a critical part of travel experience appraisal and a key component of travel satisfaction [34,35]. We compared their evaluations across different travel modes (*Figure 16*).

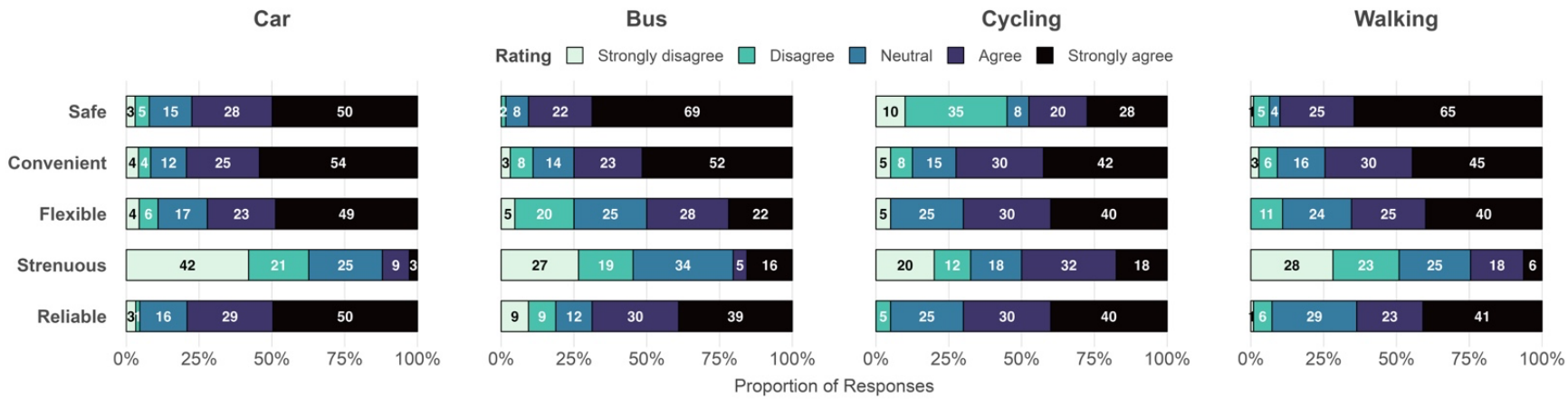

Figure 16. Ratings of cognitive aspects (safe, convenient, flexible, strenuous, reliable) of trip segments by travel mode based on 645 trip segments.

Safety. Bus trips were perceived as the safest trips overall, followed by walking and then car trips. Cycling was perceived as the least safe, with 45% of respondents reporting that they felt unsafe. This indicates the potential to attract car user to replace their car trips with cycling and bus trips by emphasising the safety benefits. At the same time, improving cycling safety should be a priority, for example, by redesigning junctions and slowing car traffic [36].

Convenience. Almost 8 out of 10 car trips were rated as convenient (54% strongly agree, 25% agree). Bus trips followed closely, with 75% of respondents finding them convenient, while walking and cycling scored slightly lower. This suggests that although cars are perceived as most convenient, the gap between car and other modes is not as wide as often assumed.

Flexibility. Car trips were also mostly rated as flexible (49% strongly agree, 23% agree), followed by cycling (40% strongly agree, 30% agree) and walking (40% and 25%). Only half of respondents agreed that bus trips were flexible. The flexibility of bus trips could be improved by increasing the frequency and reliability of bus service, as well as further improving the on-demand bus services. Compared to car trips, non-car modes generally received more neutral ratings (about 25% of responses), indicating that the flexibility of walking and cycling might have been underestimated in the rural context. Future communication campaigns could focus on stressing the flexibility advantage of active modes over cars for particular trips.

Reliability. Car trips were perceived as most reliable (79%), followed by cycling (70%), bus (69%), and walking (64%). Walking and cycling received more neutral ratings than expected, which contrasts with findings from other contexts where these modes are often considered highly reliable [37]. This again points to potential gaps between perceptions and actual performance, which could be addressed through targeted communication strategies, for example, by reframing the reliability of walking and cycling for short trips compared to unpredictable car journeys in congested conditions [38].

Level of Strenuous Effort. Car trips were rated as the least strenuous (12%), followed by bus (21%) and walking (24%). Cycling was considered the most strenuous mode, with about half of all segments rated as such. Surprisingly, 34% of bus trips received neutral ratings on strenuosity, suggesting further research is needed into what aspects of bus travel may feel physically demanding. Technological solutions such as e-bikes could reduce perceptions of cycling as strenuous, making it a more attractive option for longer or hillier trips.

EMOTIONAL EXPERIENCES DURING TRIPS

Finally, we were interested in the emotions that people experience while travelling. The emotional aspect of travel experiences is essential for people's overall well-being. A better understanding of emotional travel experience can inform effective strategies to improve both travel experiences and public health.

To assess how different travel modes influence the change in emotional experiences, we asked participants to rate how they felt before and during each segment of their most recent trips, on a five-point scale ranging from “not at all” to “over much”. Participants rated the extent to which they experienced each of the eight emotional items, including four positive emotions (happy, relaxed, excited, and energetic) and four negative emotions (sad, stressed, bored, and tired). A regression analysis was conducted to assess how emotions of three travel modes changed (travel by bicycle, foot, bus), compared to travelling by car as the baseline level.

Results show that for pre-trip emotions (controlled for individual differences), there were significant changes in three emotions (excited, energetic, and bored). Compared to car users, cyclists reported significantly higher levels of excitement ($\beta = 0.38$, $p = 0.010$) and energetic feelings ($\beta = 0.39$, $p = 0.011$) over the duration of the trip. This emphasises the emotional rewards of cycling, not just its functional benefits. This could play a critical role in encouraging more cycling trips. Future campaigns could, for example, emphasise the emotional benefits of cycling. For car users who rarely or never cycle, creating opportunities to experience cycling firsthand could help them discover these positive emotions themselves, for instance, through community cycling events or trial programmes.

Bus users, on the other hand, reported significantly higher levels of boredom than car users ($\beta = 0.21$, $p = 0.040$), which is consistent with previous studies [29]. Enhancing rural bus experiences through opportunities for social interaction or onboard entertainment may help reduce such negative feelings [39].

CONCLUSION AND RECOMMENDATIONS

The findings reveal that sustainable travel modes - bus, walking, and cycling- have been viable and attractive options on the Dingle Peninsula. Compared to national data of travel in rural areas, we had a somewhat higher household car ownership in our sample, a lower proportion of car trips, and a higher proportion of walking and cycling trips.

There is strong potential to further improve travel experiences and support more sustainable mobility. A vast majority of frequent car users expressed some intentions to reduce car use, with varying levels of readiness. This indicates an openness to change car use among the driving community. Yet, over half of all respondents had never used the bus or a bike. Cars were widely used, with many short car trips. These have the potential to be replaced by active modes. Residents reported strong dissatisfaction with the quality and safety of local walking and cycling infrastructure. Bus services showed the potential to play a role in longer journeys. Awareness of new bus services

was generally high except for the door-to-door service, with a gap between knowing about them and actually using them. While most residents were satisfied with local bus fares on relatively short trips, many called for more affordable fares on national bus services.

Based on these findings, we suggest focusing on three areas to encourage more sustainable travel on the Dingle Peninsula (*Table 3*).

Reduce car dependency: start with short car trips and tailored strategies for different stages.

To encourage sustainable travel across different trip lengths, policies should be tailored to the specific opportunities and challenges associated with short (<4km), medium (4-10km), and long journeys (>10 km). For short and medium-long trips, there is strong potential to replace car travel with active modes such as walking and cycling. For longer trips, using bus services can be a potential replacement for car use. To encourage these changes, policy actions could follow a tailored approach based on the Transtheoretical Model of Behaviour Change (TTM), recognising that car users differ in their readiness to adopt more sustainable travel behaviours (see also *Table 3*).

Pre-contemplation stage: Public campaigns should focus on both the immediate benefits (more flexibility, lower cost, and especially emotional well-being benefits) of replacing short car trips with sustainable modes as well as the norms and culture. For example, showing diverse groups using active modes in media and promotional materials can challenge stereotypes and strengthen community identity [25]. Early interventions through school-based cycling activities and educational programmes can shape positive attitudes from a young age [25].

Contemplation and preparation stages: Pilot and trial programmes such as Walk to School, Cycle to Work, community walking and cycling events, discounted bus fares, and bike rental schemes can provide opportunities for residents to experience sustainable modes first-hand, fostering more positive perceptions [26,29,30]. When these initiatives are integrated into daily routines—for example, school commutes or work trips—they are more likely to lead to lasting behaviour change [25].

Action and maintenance stages: Continuous positive reinforcement can help sustain travel behaviour change. For example, strategies can include providing regular reminders and feedback on financial savings and health improvements, along with social recognition and rewards (e.g., community competitions and workplace challenges with badges, certificates, and other awards; personal story sharing on social media; online leaderboards; etc.) [40].

Improve the experience of walking and cycling, with a priority on safety and comfort.

High-quality, safe walking and cycling infrastructure is essential to promote active travel for those who frequently walk and cycle. In addition, it will support car drivers in all stages of behavioural change [28]. Future investments should prioritise locations with the most negative perceptions of local infrastructure. For example, wider continuous pavement and protected/painted bike lanes should be provided where feasible. To increase both perceived and actual safety, traffic calming measures could also be implemented, such as reduced speed limits, speed bumps, and junction

redesign (e.g., clear crossings and priority signals) [17,41,42]. Importantly, motorist education is needed to teach drivers how to safely share the road with cyclists and pedestrians [42], which is currently underemphasised compared to cyclist education.

Increase bus service accessibility and usage.

Improving public transport use requires both better information provision and service affordability. Clear and accessible information on the door-to-door bus services should be provided, for example, through signage, mobile apps, and community outreach. More efforts should focus on bridging the awareness-behaviour gap and removing the specific barriers to using bus services. As car users tend to have more negative views of public transport [32,33], the image of public transport needs to be improved by emphasising both personal and environmental advantages.

For long-distance bus trips, most participants perceived the current prices as too high. One effective strategy could be to reframe how the costs of car use and bus travel are presented, as people often underestimate the actual costs of car use [33]. Public communication campaigns could highlight the full costs of driving, including fuel, insurance, maintenance, and parking, relative to bus fares to shift these perceptions. Additional strategies might include offering discounts to frequent bus users or introducing cost-saving schemes such as 10-trip bus passes.

Table 3. Summary of policy recommendations, focus, and actions.

Recommendations	**Focus**	**Policy Actions**
Reduce car dependency: start with short car trips and tailored strategies for different stages.	Tailor policies to the specific opportunities and challenges associated with short (<4km), medium (4-10km), and long journeys (>10 km).	- Follow a tailored approach based on the Transtheoretical Model of Behaviour Change (TTM), recognising that car users differ in their readiness to adopt more sustainable travel behaviours. o *Pre-contemplation stage*: Focus on both the immediate benefits (more flexibility, lower cost, and especially emotional well-being benefits) and the norms and culture of sustainable modes (i.e., media representation, early interventions through school-based cycling activities and educational programmes) o *Contemplation and preparation stages:* Provide opportunities for residents to experience sustainable modes first-hand (i.e., pilot and trial programmes such as community walking and cycling events, discounted bus fares, and bike rental schemes)

		○ *Action and maintenance stages*: Provide regular reminders and feedback (i.e., on financial savings and health improvements), as well as social recognition and rewards (e.g., community competitions and workplace challenges with badges, certificates, and other awards; personal story sharing on social media; online leaderboards; etc.)
Improve the experience of walking and cycling, with a priority on safety and comfort.	Provide high-quality, safe walking and cycling infrastructure and increase both perceived and actual safety.	- Prioritise locations with the most negative perceptions for infrastructure improvement (i.e., wider continuous pavement and protected/painted bike lanes where feasible). - Implement traffic calming measures such as reduced speed limits, speed bumps, and junction redesign (e.g., clear crossings and priority signals). - Provide motorist training on how to safely share the road space with cyclists and pedestrians.
Increase bus service accessibility and usage.	Improve accessibility of door-to-door bus service and affordability, bridge the awareness-behaviour gap.	- Provide clear and accessible information on the door-to-door bus services, (e.g., signage, mobile apps, and community outreach). - Improve the image of public transport by emphasizing both personal and environmental advantages. - Reframe the full costs of driving, including fuel, insurance, maintenance, and parking, relative to bus fares to shift perceptions. - Offer discounts or cost-saving schemes such as 10-trip bus passes.

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