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< Creating an inclusive and accessible travel environment for elderly people: A case study in Xinzhou, China〉

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Being a dissertation submitted to the faculty of The Built Environment as part of the requirements for the award of ***<MSc Transport and City Planning>*** at University College London:

I declare that this dissertation is entirely my own work and that ideas, data, and images, as well as direct quotations, drawn from elsewhere are identified and referenced.

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Abstract

The ageing population is a problem facing the whole world. Meanwhile, as age increases, the elderly will face more difficulties in travel, and their mobility and accessibility are also declining. Therefore this research explores how to create an inclusive and accessible travel environment for the elderly.

Xinzhou, China, is selected as the research area, and the older adults' travel behaviour and satisfaction are investigated. A nonparametric test shows that seniors are less satisfied with public transport, bikes/ e-bikes and walking. This research analyses the problems existing in these travel modes and puts forward two suggestions on the walk and bike/e-bike, which are strengthening supervision and completing equipment; for bus, it should be improved in four categories: accessibility, acceptability, affordability, and availability.

1. Introduction

Elderly populations worldwide are growing at an unprecedented rate, not just in developed countries but also in developing countries (Hu et al., 2013). China, one of the fastest growing countries in terms of the ageing population (Huang et al., 2020), is expected to account for 34% of the world's elderly population over 60 years of age by 2050 (James, 2002).

Transport is at the heart of how people live. It enables individuals to commute, visit friends and family, give back to society, and access essential services like healthcare and education (DfT, 2018). Thus, travelling is not only a basic need for older people to maintain their daily lives, but also it is essential for their quality of life and enjoyment of their twilight years (Xia and Guan, 2013). With the intensification of ageing, the mobility of older people has become one of the hot topics in transport (Yan et al., 2021).

Additionally, the prevalence of disability in older people is higher as they get older (Cheng et al., 2019). A mix of symptoms, including loss of vision and hearing, joint stiffness, and a decreased capacity to walk far, can dramatically affect a person's mobility. Therefore, the importance of mobility cannot be underestimated (DfT, 2018). Because mobility can boost social networks, provide access to jobs or education (Oishi, 2010), and promote self-esteem and wellness (Musselwhite and Haddad, 2010).

Nevertheless, theoretical and practical research on improving mobility for older people on Chinese mainland is lacking. There is a severe shortage of elderly-friendly travel facilities and service provisions and a long lag in

relevant special planning and protection policies (Liu et al., 2021). Thus, scholars and transport policymakers need to understand older people's characteristics and travel behaviour (Yan et al., 2021). It is also essential to examine how to satisfy the travel needs of older people (Luiu et al., 2017; Cui et al., 2017).

China currently ranks third in the world for emissions of greenhouse gases connected to transport (IEA, 2008). Hence, China needs to take action to control carbon emissions and promote low-carbon transport. Replacing personal car use through effective public transport and non-motorised transport infrastructure is essential for a low-carbon transport system (Bongardt et al., 2010). Because a higher share of alternative transport modes is directly related to less CO2 emissions, this article aims to propose some transport improvements that can promote the development of low-carbon transport and facilitate the travel of the elderly.

In 2021, the Chinese government proposed the Transport Power Strategy and took Shanxi Province as the first pilot unit. Xinzhou City, as part of Shanxi Province, will also vigorously develop its transport. In an era with increasing numbers of older adults, it is necessary to consider the availability of transport facilities and services for sustainable urban development (Cui et al., 2017). Therefore, this research will explore how Xinzhou can better develop inclusive and accessible transport for older people.

The research will proceed to review the literature, discuss the travel behaviour of the elderly and how to build an inclusive and accessible public transport travelling environment, and investigate the current transport situation for the elderly. The article will then detail the methods used to collect and analyse

primary data before examining the results of this data. Academic literature will be drawn upon to discuss these findings. The research will conclude with suggestions for applications in the research area (Burt, 2019).

2. Literature review

2.1. Travel behaviour

Earlier research showed that households and individuals' socio-economic indicators significantly impact travel mode preferences (Cervero, 2002; Van Acker and Witlox, 2010). For instance, males are more likely than women to drive (Giuliano, 1983). In China, a greater likelihood of car use relates to higher income, better work positions, and car ownership, whereas elderly and female people prefer walking or cycling (Pan et al., 2009; Shen et al., 2016).

It is acknowledged that older people are a heterogeneous population with a range of mobility and travel characteristics (Siren and Haustein, 2013; Su and Bell, 2012; Cui, J. et al., 2017). As people age, functional limits become more prevalent, and many older adults will have more than one impairment (Sundling et al., 2014), making travelling more difficult. Compared to other age groups, older people have relatively lower financial incomes and will have higher demands on urban transport as they age, and their physiological functions gradually decline. In addition, older people are now healthier and lead more fulfilling lives, generating more travel demand (Yan, Jin, and Li, 2021). Those over 75 are less satisfied with their mobility prospects than those between 65 and 74 (Mollenkopf et al., 2011). According to Siren and Hakamies-Blomqvist (2006), individuals without a driver's licence, those who reside in rural regions, and women all have unfulfilled transport demands. Women may rely more on accessible public transport since they are less likely than men to have a driver's licence or a car (Sundling et al., 2016). Even if the difference in life expectancy between men and women is reducing in most

places, most older adults are and will continue to be women (Hjorthol, 2013; Shergold et al., 2015).

Boschmann and Brady (2013) discovered that as people age (over 60), they travel less and shorter distances. They also discovered that women make fewer and shorter trips than men and that individuals with disabilities travel the fewest trips of others. Schmocker et al. (2008) demonstrated that using public transport for shopping was negatively linked with functional limits in a sample of survey respondents aged 65 to 85.

There are several barriers to or facilitators in public transport for seniors or people with disabilities. Ticket costs (Su et al. 2009), boarding and alighting, the distance to the bus stop, and (in)security while travelling alone are a few examples (Wretstrand et al. 2009). Iwarsson and Stahl (1999) found that the possibility of participating in society was reduced by as much as 75% due to obstacles encountered to and from the bus stop while boarding or alighting the bus. Bus stop density will enhance older adults' travel frequency with the same transport mode (Schmocker et al. 2008). Additionally, it has been determined that short walking distances within stations and service reliability are facilitators.

Meanwhile, the Chinese government started implementing the "new urbanisation" policy for small and medium cities in 2012 (Wang and Wang, 2015). Thus, under the background of ageing and new urbanisation, urban planners and managers need to combine the travel behaviour of the elderly to formulate transport policies (Hu et al., 2018) while realising low-carbon transport and creating a more inclusive travel environment.

2.2. Travel satisfaction

Travel satisfaction is widely defined as the extent to which a transport system lives up to its users' expectations (Morfoulaki et al., 2010). Research on factors influencing travel satisfaction has focused primarily on the role of various travel modes (De Vos and Witlox, 2016; Friman et al., 2017; Lancee et al., 2017; St-Louis et al., 2014). Numerous research discovered that travel satisfaction is influenced by different travel modes (De Vos,2012). The least satisfied travellers appear to be those who use public transport, specifically buses, while those who engage in active travel report feeling the most delighted with their travels. Car users tend to have intermediate levels of satisfaction (De Vos et al., 2016; Mokhtarian et al., 2015; Olsson et al., 2013; Ye and Titheridge, 2017). While travelling, studies have found that factors like cleanliness, privacy, convenience, stress, social interaction, landscape, traffic congestion (Ettema et al., 2013), trip duration (Morris and Guerra, 2015), weather (St-Louis et al., 2014), perceived safety (Ettema et al. 2012), and on having company when travelling (Lancee et al., 2017) can all affect how satisfied you are with your travel (Stradling et al., 2007).

People use private vehicles for additional reasons, such as "pleasure-to-use and independence". (Steg, 2005; and Jakobsson Bergstad et al., 2011). Thus, driving impacts people's moods, which explains why many individuals find cars attractive (Susilo and Cats, 2014). Congestion levels, experienced traffic safety, dependability of travel time, parking accessibility, irritation with other road users, and a lack of choice to choose speed and lane are all factors that affect the travel satisfaction of car users (Ettema et al., 2013; Morris and Hirsch, 2016; Novaco and Gonzalez, 2009; Susilo and Cats, 2014).

Less research has been done on active travellers' travel satisfaction. Weather and seasonality, slopes, personal health levels, and the presence and quality of walking and cycling infrastructure can all impact how satisfied one is with walking and cycling (Manaugh and El-Geneidy, 2013; Pucher and Buehler, 2008; Willis et al., 2013). In comparison, Susilo and Cats (2014) thought that a barrier-free, smooth ride and the absence of roadblocks from other modes of transport are the two factors most strongly related to satisfaction with bicycle travel. Alfonzo (2005) and Stradling et al. (2007) stated that the aesthetic appeal of the surroundings also impacted the travel satisfaction of pedestrians.

In contrast to walkers and cyclists, who are generally more positive about active travel, a significant portion of those who use public transport may contribute to overall lower satisfaction levels (De Vos, 2018, 2019). Thus, urban transport officials and planners have been putting effort into enhancing public transport to help inhabitants be more satisfied with the transport service and to make the city better off (Zhao and Li, 2019).

Travel satisfaction with public transport has been defined as the overall level of fulfilment of travellers' expectations (Tyrinopoulos and Antoniou, 2008), the completion and fulfilment of needs and the outcome of cumulative and individual experiences (Abenoza et al., 2017). It has been demonstrated that the most unpleasant public transport encounters are particularly memorable (Friman and Fellesson, 2009).

Numerous studies have examined customer satisfaction among public transport riders (De Vos and Witlox, 2017). A variety of factors influence people's perceptions of using public transport. Public transport users'

satisfaction is most likely affected by service characteristics like cleanliness, comfort, the behaviour of the staff, safety, punctuality, and frequency (e.g., de Oa et al., 2013; dell'Olio et al., 2011; van Lierop et al., 2017). In contrast, pedestrians evaluated their walking trips using non-instrumental criteria like crowding, air quality, the presence of trees and flowers, the presence of beggars, and the type of pavement (Stradling et al.,2007). Also, the utilisation of public transport was significantly influenced by attitudes and personal safety concerns (Spears et al., 2013).

In conclusion, for the three travel modes, the external environment and safety are essential factors affecting travel satisfaction. For car users, emotional factors also impact their travel satisfaction, while the service characteristics can impact the travel satisfaction of public transport users.

2.3. Mobility and accessibility of the elderly

2.3.1. Mobility

Webber et al. (2010) defined mobility as the ability to move within environments that extend beyond one's home to the neighbourhood and other regions. Mobility might lower social exclusion risk, improving well-being (Stanley et al., 2011). Mobility and the ability to get out of a home are essential aspects of their quality of life (Farquhar, 1995). Thus, future transport policies should prioritise the mobility of elderly populations to support their independence and improve their quality of life (Wong et al., 2018).

It is known that older persons tend to lessen or stop driving as they age because their skills and abilities deteriorate and their lifestyles change

(Edwards et al., 2010). Furthermore, in some poor areas, older people are also unable to afford to buy a car or use it for daily travel. It raises the question of what public transport can do to satisfy the mobility needs of seniors if cars are not accessible. The underappreciated importance of older people's transport demands has a broader social impact beyond only the adverse effects of reduced mobility on the quality of life (Cui et al., 2017). For instance, reduced mobility may result in transport disadvantage and even severe social exclusion (O'Hern and Oxley, 2015).

Alsnih and Hensher (2003) highlighted that public transport could be an alternative to the private car for the elderly's mobility and accessibility; Mercado et al. (2007) advised increasing public transport service for the elderly's travelling mobility. In China, fewer older adults have car licences and own private cars. Gilhooly et al. (2005) and SEU (2003) argued that older passengers on public transport frequently faced various obstacles, including physical, emotional, financial, logistical, and availability related.

2.3.2. Accessibility

The accessibility of older people should also be considered. Accessibility refers to the capacity to reach goods, services, and destinations. It is tied to mobility, which allows individuals to go from one point to another (Litman, 2016).

Accessibility issues might make it difficult for older people to stay active and participate in social activities (Hallgrimsdottir et al., 2015; Hess, 2009). Accessible pathways, appropriate traffic signals, and street crossings are necessities for pedestrians (Suen and Mitchell, 2000). Older persons are

more careful and avoid crossing roadways without pedestrian amenities (Bernhoft and Carstensen, 2008). It is presented that walking barriers cause older people to stop walking (Stahl and Berntman, 2007), whereas limited access to public transport – mainly walking access to stations – is a significant constraining factor on transit ridership of older adults (Hess, 2009; Lin et al., 2014). Chiesura (2004) found that a lack of access to urban parks causes the elderly to engage in less physical exercise and have less contact with nature.

According to Cao et al. (2010), accessibility had a more significant impact on the travel behaviour of older persons. As a result, a concentrated focus on accessibility interventions will primarily benefit elders, allowing them to feel more independent, secure, and dignified (Alsnih and Hensher, 2003).

An increase in the accessibility of public transport services can help promote the mobility of the elderly while also gaining support from the public and lowering air pollution emissions from urban transport (Hu et al., 2013). In the meantime, it is determined that adequate mobility and accessibility are prerequisites for extending life expectancy, leading a healthy lifestyle, and lowering elderly boredom and melancholy (Olawole,2015; Saunders et al.,2013; Webber et al., 2010). In order to increase their level of wellness and lessen boredom and depression, older people, including the disabled, should be encouraged to take trips to and from shopping malls, medical facilities, visits to friends and family, entertainment parks, etc. (Hu et al., 2013).

2.3.3. Elder mobility and accessibility issues

In western countries, the travel problems of the elderly are caused mainly by the low utilisation rate and operation efficiency of public transport (Johnson et

al., 2017). The elderly are highly dependent on private cars, but the safety hazards of driving are high due to physiological reasons, such as fatigue and poor concentration of the elderly (Liu et al., 2021). Meanwhile, older Americans utilise public transport less frequently for the following reasons: inconsistent services, accessibility issues for bus stops, stations, and transfers, the unavailability of some locations, and fear of criminality (Burkhardt at el., 2002). Moreover, for seniors who used to ride， the riding abilities may be compromised by age-related functional and sensory problems (Spirduso et al., 2005), so older cyclists may be more susceptible to, for example, uneven cycling tracks, complex traffic situations, and hilly terrain (Ma and Dill, 2017; Wahl and Lang, 2004).

In China, the main problems are the lack of specific elderly-friendly transport policies, the public transport system, and the unsuitable non-motorised travelling environment for the elderly (Li et al., 2019). First, the construction of transport policies suitable for the elderly has been absent for a long time. Secondly, in terms of public transport, connecting and transferring between urban buses is complex, and the lack of barrier-free facilities for buses causes inconvenience for the elderly. As for walking and cycling, there is still a lack of public facilities and measures to ensure the safety of the elderly (Liu et al., 2021).

Compared with other travellers, disabled travellers experience a lesser level of freedom in their travel options. When travelling, it is common to make advance plans, making spontaneity challenging. According to the Customer Touchpoints typology, people with disabilities frequently fit into the group of "travel shy" (TfL, 2009). They consequently lack confidence when travelling

and prefer to stick with tested routes and transport options. This could undermine attempts to promote social inclusion by making it more difficult for persons with disabilities to access social networks, employment, and other services.

The elderly and the disabled are vulnerable groups in transport and improving their travel environment is the most fundamental requirement for their integration into society and enjoyment of life together (Zhao et al., 2006). Various policies and programmes relating to elderly mobility and accessibility have been implemented in various nations. Equity in public transport is mandated in the United States by the Safe, Accountable, Flexible, Efficient Transportation Equity Act (Delbosc and Currie, 2011). The European Conference of Transport Ministers has secured an accessible mobility environment and legislative amendments that address older transport challenges, such as enhancing public transport accessibility (European Conference of Ministers of Transport Council of Ministers, 2003). Furthermore, the European Commission (2011) recognises older people's walking problems and emphasises the need to improve transport infrastructure accessibility for the elderly. The U.K. government is taking steps to expand work opportunities for persons with disabilities, lessen social isolation, and promote independent living (DfT, 2018).

Compared with these countries, Chinese research on urban elderly transport mainly starts from the aspects of policies and regulations, public transport, and non-motorised systems. However, comparative research is mainly limited to the study of the importance of laws and regulations to ensure the travel of the elderly, and the operability and system of policies are insufficient.

Nevertheless, the research and practice of public transport involving services and the entire travel process for the elderly are often lacking (Liu et al., 2021). Therefore, later chapters propose a more comprehensive urban transport method for improving the mobility and accessibility of the elderly, which responds to their travel characteristics.

2.4. Research gap

Travel behaviours have been extensively studied in metropolitan areas (Wang and Chai, 2009; Zhao et al., 2014). However, China's small cities have unique contexts regarding economic growth, infrastructural development, and household socio-economic features. As a result, Xinzhou, as a medium-sized city, cannot directly use the residents' characteristics from large cities. Hence, a survey of the travel behaviour characteristics of older people in Xinzhou is necessary.

However, no research has been carried out in a city where public transport is not very developed and private car ownership is not high, like Xinzhou. Nevertheless, Xinzhou is currently facing the problem of the elderly travelling. Therefore, it is meaningful to study how to ensure the mobility and accessibility of the elderly to create an inclusive and accessible travel environment in Xinzhou.

3. Methodology

3.1. Introduction

This part describes the relevant research methods used in this research.

Data are obtained mainly through questionnaires, which are primary data. A combination of qualitative, quantitative and open-ended questions is set up for the questionnaire to get the data. The collected data are examined using descriptive and inferential statistics in SPSS 28.0 (Fasina et al., 2020).

The research focuses on obtaining characteristics by studying the travel behaviour of the elderly. Then, combined with the current transport situation in the research area, scientific and reasonable transport suggestions that benefit the elderly and the elderly with disabilities are put forward.

3.2. Research objective and questions

The main question of this research is what can be done to improve their travel environment.

The primary question is broken down into two secondary questions to make the research's advancement easier (Mella Lira, 2020). The first question is: what impact does travel mode have on travel satisfaction? Through this question, the research could find travel modes with low travel satisfaction. The second question is how to create an inclusive and accessible travel environment in the research area. Based on the first question, targeted research is conducted on low travel satisfaction modes, and finally, reasonable suggestions are given.

3.3. Questionnaire design

A total of twenty-six questions are set for this questionnaire. The questionnaire contains both open and closed-ended questions that seek data on the respondents' socio-demographics, travel behaviour characteristics and travel satisfaction (Burt, 2019). Convenience, comfort, and safety of travel are the three main aspects the questionnaire focuses on while conducting a satisfaction survey. As a result, a five-point Likert scale is used. Especially for the disabled respondents, the questionnaire is designed to learn their attitudes toward the transport situation. The questionnaire is presented in Appendix 1.

3.3.1. Quantitative questions

The socio-demographic and travel behaviour characteristics survey are conducted using a quantitative approach, combining single- and multiple-choice questions to obtain information about the respondents. This section consists of 17 questions, 10 of which are about the socio-demographic profile, 5 of which are about travel behaviour, and 2 of which are explicitly designed for respondents with disabilities to obtain their attitudes regarding accessibility.

The third question in the questionnaire is a screening question to determine whether the respondent is a resident of the central Xinfu District.

3.3.2. Qualitative questions

This research uses the Likert scale to measure the respondents' attitudes when surveying travel satisfaction. The statements on a Likert scale are to define a unidimensional construct (Babbie, 1999; McIver and Carmines, 1981).

A linear scale reflecting how much respondents agree or disagree with each statement makes up the answer continuum (Warmbrod, 2014). The scale of eight questions used in this study focuses on three aspects of travel satisfaction: convenience, comfort and safety of travel.

The last question is open-ended in the questionnaire to obtain the respondents' suggestions for transport development. These suggestions are essential for this research in the section where the suggestions are given. The individual suggestions of the respondents are representative of the majority population in old age. So, using these suggestions, this research can suggest more practical and valuable development objectives.

3.4. Survey design

Due to the COVID-19 epidemic on China's mainland, the author could not return to the research area to distribute the questionnaires in person. Therefore, the questionnaires were collected offline and online using the "Questionnaire Star" and "WeChat" Apps. The author's family living in that area were trained as researchers and played a significant role in the collection process. These researchers were responsible for identifying the target group and providing timely and scientific explanations to help them complete the questionnaires successfully. With this collected information, the research is able to accurately analyse the travel behaviour of the elderly population in Xinzhou.

3.4.1. Research area

This research selects the central urban area of Xinfu District, Xinzhou, as the

target area. Xinzhou is a city in the north-central part of Shanxi Province, China, while Xinfu District belongs to it, with about 25 square kilometres. The built-up area of the central urban area of Xinfu District is small, and the public transport only has buses.

Figure 3.1. *The research sites*

Considering the travel characteristics of the elderly, the research sites are selected near supermarkets, parks, and residential quarters. Figure 3.1 uses blue icons for supermarkets, green icons for parks, and red icons for residential areas. The selected survey sites are all located in Xinfu District and are often gathering places for the elderly.

3.4.2. Data collection

The research uses convenient and purposeful non-probability sampling

techniques in administering the questionnaire and selecting respondents (Fasina et al.,2020).

According to the results of the seventh census, the total resident population in the central urban area of Xinfu District is 239,594, of which 24,766 are older people over 60 (Xinzhou Bureau of Statistics, 2021). It can be seen from the calculation that 378 valid questionnaires need to be collected to meet the 5% error under the 95% confidence level.

This research distributed questionnaires in the area from May 3 to May 13, 2022, to collect data. A total of 474 questionnaires were collected. According to the third question, 41 respondents did not live in Xinfu District, so the valid questionnaire was 433.

3.5. Methods used in data analysis

3.5.1. Descriptive analysis

When conducting data analysis, this research first uses descriptive analysis to sort out and summarise the respondents' socio-demographics, travel behaviour characteristics and travel satisfaction. To make it easier to analyse the data, descriptive data are presented in frequency tables (Fasina et al.,2020).

A Likert scale containing eight questions for the travel satisfaction survey is used. A Likert scale comprises several statements that define and explain the meaning and content of the construct (Warmbrod, 2014). A procedure for calculating a composite score for each individual is to calculate a mean-item summated score (Warmbrod, 2014). It is essential that when determining a

mean-item score, it is assumed that each item on a scale has the same weight.

3.5.2 Nonparametric test

This research uses a nonparametric test to examine the effect of different travel modes on travel satisfaction.

In practical data analysis, the overall data cannot meet normality and variance homogeneity requirements. Therefore, parametric testing methods are limited by the conditions of the applied assumptions and cannot achieve the desired application (Zhang and Wang, 2014). However, nonparametric testing methods can be used if people want to obtain more information from the sample data.

The Kruskal-Wallis test is a nonparametric test proposed by William H. Kruskal and W. Allen Wallis for testing whether multiple overall distributions are identical (Ostertagová et al.,2014). It is a goodness-of-fit test for exploring the distribution of continuous variables. In this research, the main travel mode is a categorical variable, but mean travel satisfaction is a continuous variable. Therefore, it is reasonable to use the Kruskal-Wallis test when exploring the relationship between the two.

3.6. Research ethical

As this research was conducted in China, it complied with all relevant Chinese laws and regulations, and all the information from the respondents was kept strictly confidential. The respondents were utterly anonymous and agreed that the information they provided in the questionnaire would be used for this

research.

This questionnaire only collectes information on gender, age and income but did not collect identifiable information such as the names and addresses of the respondents. The information collected through this questionnaire cannot be identified or associated with individuals. It is anonymised and processed information which does not fall under the category of personal information and does not violate the *Personal Information Protection Law of the People's Republic of China* and other relevant laws.

Meanwhile, the author confirms that all personal data will be stored and processed in compliance with *the General Data Protection Regulation* (GDPR 2018).

4. Data analysis and findings

4.1 Descriptive analysis

A survey was undertaken in the centre of Xinzhou of people over 50. There were 433 valid questionnaire responses, 29 of which were answered by people with disabilities.

This section analyses responses to the three parts of the questionnaire: socio-demographics, travel behaviour characteristics, and travel satisfaction.

4.1.1. Socio-demographics

This part gives an overview of the demographic characteristics of the respondents, such as age and sex, as well as other variables, including household composition, income, and car ownership (Gjonça and Calderwood,2002).

Table 4.1. *Respondents' socio-demographic characteristics*

Socio-demographics	N=433(Total)		N=29(With disability)	
	Frequency	Percentage	Frequency	Percentage
Gender				
Female	208	48.0%	5	17.2%
Male	225	52.0%	24	82.8%
Age distribution				
50-59	205	47.3%	19	65.5%
60-69	155	35.8%	3	10.3%
70-79	50	11.5%	3	10.3%
80+	23	5.3%	4	13.8%
Still work?				
No	240	55.4%	21	72.4%
Yes	193	44.6%	8	27.6%
Have a driver's licence or not?				
No	231	53.3%	22	75.9%
Yes	202	46.7%	7	24.1%
Have a car or not?				

No	242	55.9%	24	82.8%
Yes	191	44.1%	5	17.2%
Personal income				
0-2000 yuan	114	26.3%	16	55.2%
2000- 4000 yuan	149	34.4%	9	31.0%
4000-6000 yuan	113	26.1%	3	10.3%
6000 yuan+	57	13.2%	1	3.4%
The number of people in a household				
1-2	106	24.5%	17	58.6%
3	97	22.4%	6	20.7%
4	128	29.6%	4	13.8%
5+	102	23.6%	2	6.9%
Need to pick up or drop off kids?				
No	226	52.2%	10	34.5%
Yes	207	47.8%	19	65.5%

As shown in Table 4.1, the gender of the respondents was balanced, with 48% female and 52% male. 126 men and 76 women held a driving licence, making 46.7% of the total number of respondents. Meanwhile, 44.1% said they owned a car.

For the age distribution, over 80% of respondents were between 50 and 69 years old, while only 5.3% were over 80. Of the 433 older people surveyed, 44.6% still had to work. Regarding monthly personal income, only 13.2% had a personal income of more than 6,000 yuan. Furthermore, the respondents with a monthly income of 2000-4000 yuan accounted for the highest proportion, at 34.4%.

There were 24.5% of respondents with 1-2 members in the household, 22.4% with three members, 29.6% with four members, and 23.6% with five or more members. The household composition of the respondents was relatively diverse. Moreover, 226 (52.2%) indicated that they did not need to take their children to and from school.

Then, it comes to the analysis of the socio-demographics of disabled people. As shown in Table 4.1, a significantly higher proportion of this group, 82.8%, were women. Those without a driving licence accounted for 75.9%, and those without a car for 82.8%. Regarding age distribution, 65.5% were between 50 and 59 years old, and only 13.8% were over 80. 55.2% had a personal monthly income of 0-2000 yuan, and only 3.4% had a personal income of over 6000 yuan. More than half of them in this segment had only 1-2 people at home, but only 34.5% of the respondents did not need to pick up or drop off their children.

Table 4.2. *Difficulties encountered by disabled people in travel*

Q12 options	Responses		Percent of Cases
	N	Percent	
Inconvenience in getting on and off public transport	22	41.5%	75.9%
Inconvenience in using public toilets	9	17.0%	31.0%
Inability to use street bridges or underpasses	6	11.3%	20.7%
Facilities for disabled people are damaged, occupied or not available at all	6	11.3%	20.7%
There are very few wheelchairs access ramps in buildings or public facilities	3	5.7%	10.3%
No voice guidance at crossings	7	13.2%	24.1%
Total	53	100.0%	182.8%

The research showed that many people with disabilities found it inconvenient to use public transport or toilets (Table 4.2). Also, the damage to existing accessibility facilities caused problems for them to get around. The lack of audio cues creates inconvenience and unsafety when crossing intersections for people with impaired vision.

4.1.2. Travel behaviour characteristics

This part analyses the travel behaviour characteristics from the respondents' last trip, such as starting and ending points, time of travel, main travel purpose and mode.

Table 4.3. *Statistics on the travel mode*

	Walking	Bike/ e-bike	Bus	Private car/ taxi
Frequency	219	74	57	83
Percent	50.6	17.1	13.2	19.2

As seen in Table 4.3, 50.6% of respondents last journeys were on foot, while only 13.2% were by bus. Seventy-four respondents used a bike/ e-bike, and eighty-three used a private car/taxi, with roughly equal numbers of respondents using both methods.

Table 4.4. *The start and end points statistics*

	The start points		**The endpoint**	
	Frequency	Percent	Frequency	Percent
Residential areas	426	98.4%	62	14.3%
Supermarkets or shopping areas			113	26.1%
Hospitals			22	5.1%
Parks, scenic spots			167	38.6%
Restaurants or leisure places			5	1.2%
Train stations, coach stations, etc.	1	0.2%	7	1.6%
Offices	1	0.2%	19	4.4%
Banks			3	0.7%
Schools	5	1.2%	32	7.4%
Outside surveyed area			3	0.7%
Total	433	100．0%	433	100.0%

It can be seen from Table 4.4. that 98.4% of the respondents made their last trip from a residential area, but there were different destinations. Among them, 38.6% of the endpoints were parks or scenic spots, and 26.1% were supermarkets or shopping areas. The result showed that many older people travelled for leisure, such as shopping in the supermarket or walking in the

park for exercise.

Table 4.5. *Description of travel behaviour*

		Main travel mode				
		Walking	Bike/ e-bike	Bus	Private car / taxi	Total
Companion status	No(alone)	107	54	32	34	227
	Yes (with companion/s)	112	20	25	49	206
Main travel purpose	Work/Education	26	20	12	32	90
	Shopping or personal business	56	35	12	12	115
	Leisure, sports, and recreation	90	7	9	17	123
	Visiting relatives or friends	7	3	4	3	17
	Accompanying others	10	2	4	10	26
	Other	30	7	16	9	62
Weather	Sunny	168	50	44	66	328
	Rainy	43	18	12	14	87
	Windy	8	6	1	3	18

Table 4.5 presents that the difference between the number of accompanied and unaccompanied respondents on the last trip is not significant. Nevertheless, the unaccompanied respondents were almost twice as likely to travel by bicycle.

The main travel purpose of 115 respondents was shopping or personal business, 123 were leisure, sports and recreation, and only 17 were visiting relatives or friends. At the same time, the respondents whose main travel mode was private car/taxi had the largest number of people whose travel purpose was work/education.

4.1.3. Travel satisfaction analysis

This part analyses the satisfaction of the respondents. Descriptive analyses were carried out for the quantitative questions to calculate the mean and standard deviation. Reliability and validity were also determined through

reliability analysis (Table 1 in Appendix 2). The scale is reliable and can be used for further analysis.

Questions 18-25 are a travel satisfaction survey using a Likert scale, which obtained the respondents' satisfaction with their travel experience.

Table 4.6. *Descriptive of travel satisfaction*

Title No.	Mean	Std. Deviation
18	3.74	1.171
19	3.85	1.124
20	3.64	1.147
21	3.70	1.115
22	3.90	1.095
23	3.75	1.078
24	3.79	1.067
25	3.73	1.070

The five metrics of the Likert scale were assigned: "Strongly agree" was 5 points, "Agree" was 4 points, "Neutral" was 3 points, "Disagree" was 2 points, and "Strongly disagree" was 1 point. SPSS calculated the mean and variance of 8 items of the Likert scale. After calculating, the results on these eight questions were between "Neutral" and "Agree" (Table 4.6). However, this result also shows that the respondent's satisfaction with the transport convenience, comfort and safety was not excessively high. Therefore, the research area should improve the senior residents' travel satisfaction.

Next is an analysis of the satisfaction of the current accessibility facilities for disabled people in the city.

Table 4.7. *Satisfaction of disabled people with accessibility facilities*

	Frequency	Percent
Strongly dissatisfied	4	13.8%
Dissatisfied	6	20.7%
Neutral	9	31.0%
Satisfied	5	17.2%
Strongly satisfied	5	17.2%

Table 4.7 explains that disabled respondents do not have high overall satisfaction with the city's accessibility facilities, with only around a third being satisfied or strongly satisfied with these facilities. So, this means that the city needs to improve accessibility to ensure the convenience and safety of disabled people. Currently, the government of Xinzhou does not prioritise the mobility and accessibility of disabled people when carrying out road planning and infrastructure construction. The travel satisfaction level of the disabled respondents suggests that they should be considered more, and adequate infrastructure should be set up to assist their travel.

4.2. The impact of travel mode on travel satisfaction

Since satisfaction levels of a specific activity episode can be regarded as the outcome of a decision (Kahneman et al., 1997; Kahneman and Krueger, 2006), recent research (De Vos and Witlox, 2017) suggested that levels of travel satisfaction vary according to the mode used.

On the premise that the data neither satisfy the normality of the data nor the homogeneity of variance (Table 2 in Appendix 2), this research selects the one-way Kruskal–Wallis analysis for the nonparametric test. The hypothesis is： "The distribution of Mean travel satisfaction is the same across categories of Main travel mode."

Table 4.8. *Independent-Samples Kruskal-Wallis Test Summary*

Total Number	Test Statistic	Degree Of Freedom	Asymptotic Sig (2-sided test)
433	27.320[a]	3	0.000

a.The test statistic is adjusted for ties.

However, according to the result (Table 4.8), the p-values were less than 0.05, and the null hypothesis did not hold. Therefore, there was a significant difference in travel satisfaction depending on the mode. This research used a multiple comparison approach to examine, more specifically, the impact of different travel modes on respondents' satisfaction.

From Pairwise Comparisons of four travel modes (Table 4.9), it can be seen that the p-values for the three groups bus-walking, bus-bike/e-bike, and bus-private car/taxi were all less than 0.05, indicating that the travel satisfaction of respondents who used bus is significantly different from those who used a bike/e-bike, walking or a private car/taxi.

Table 4.9. *Pairwise Comparisons of four travel modes*

Main travel mode		Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Bus	Walking	-.51199*	0.13142	0.001	-0.8545	-0.1695
	Bike/ e-bike	-.51060*	0.15026	0.005	-0.9018	-0.1194
	Private car/ taxi	-.63578*	0.14039	0.000	-1.0015	-0.2701
Walking	Bike/ e-bike	0.00139	0.12913	1.000	-0.3426	0.3454
	Private car/ taxi	-0.12379	0.11751	0.873	-0.4359	0.1883
Bike/ e-bike	Private car/ taxi	-0.12518	0.13826	0.934	-0.4936	0.2433

*. The mean difference is significant at the 0.05 level.

To analyse the quantitative relationship between the satisfaction of different travel modes in more detail, this research uses the Games-Howell method to conduct a two-by-two comparison (Table 4.9). The results shows that the mean satisfaction of respondents who use the bus is 0.51 lower than those

who use walking, 0.51 lower than those who use a bike/e-bike and 0.64 lower than those who use a private car/taxi, all with statistically significant differences.

This further presents that the respondents who used a bus are the least satisfied (Abou-Zeid, 2009; Duarte et al., 2010; De Vos et al., 2016). The satisfaction of using a private car/taxi is the highest, and the satisfaction of respondents who use walking and a bike/e-bike is in the middle.

Table 4.10. *Cross tabulation of travel modes and travel satisfaction of disabled people (N=29)*

		Satisfaction with the accessibility situation					
		Strongly dissatisfied	Dissatisfied	Neutral	Satisfied	Strongly satisfied	Total
Main travel mode	Walking	2(6.9%)	4(13.8%)	4(13.8%)	4(13.8%)	5(17.2%)	19
	Bike/ e-bike	0	0	2(6.9%)	1(3.4%)	0	3
	Bus	1(3.4%)	2(6.9%)	2(6.9%)	0	0	5
	Private car/ taxi	1(3.4%)	0	1(3.4%)	0	0	2
Total		4	6	9	5	5	29

Table 4.10 shows the satisfaction with the accessibility situation of disabled people. Most of the disabled respondents used walking, and travel satisfaction for most of them with the accessibility situation was generally low. The travel satisfaction of five respondents who used a bus was below neutral. This indicates that public transport is not yet accessible to disabled people. For those who used a bike/e-bike, their satisfaction was all above neutral, reflecting that they had a good experience travelling by bike/e-bike. Based on the current situation, there were specially designed bikes (i.e., tricycles) for people with physical disabilities. The invention of this disabled-specific bike had largely alleviated the difficulties encountered by disabled people. The private car/taxi was the least used travel mode of respondents, with only two

using it. One was very dissatisfied with the accessibility situation, while the other was neutral. So, the respondents who used a private car/taxi were still unsatisfied with the accessibility situation. Combined with section 4.1, there are two reasons why very few disabled people use a private car/taxi. One is that their income is generally low, and they cannot afford the cost of using private cars or taxis; the other is that their disabilities and lack of accessibility prevent them from driving.

4.3. Problems with low satisfaction mode

From the findings of 4.2, the respondents who used public transport had the lowest satisfaction level, and those who used private cars/taxis had the highest satisfaction level. Thus, based on the actual situation and the respondents' suggestions, the problems of using foot, bikes/e-bikes and buses are described in this section.

Table 4.9 presents that the average travel satisfaction of using walking and bike/e-bike is not much different. In the following text, walking and bike/e-bike are collectively referred to as non-motorised transport (Lyv, 2011).

4.3.1 Problems with non-motorised transport

A total of 23 suggestions for improving non-motorised transport were collected in the questionnaire. After summarising, there are two main problems for non-motorised transport in the research area: the lack of government supervision and defective supporting equipment.

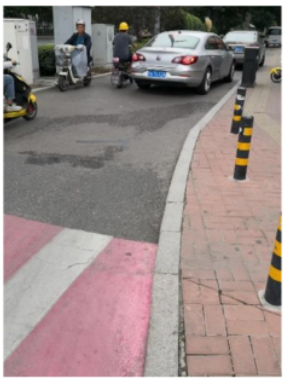

Figure 4.1. *An e-bike was ridden in the counter-flow direction*

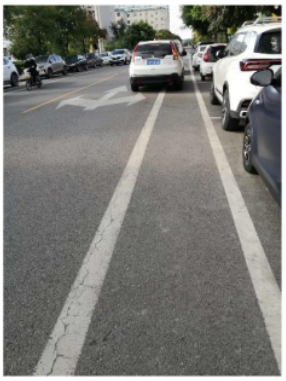

Figure 4.2. *Motor vehicles occupied bike lanes*

Combined with the observations and responses, the government departments and the traffic police are significantly lacking in managing non-motorised transport. Not only is there a lack of management of the non-motorised modes themselves, but also the management of other transport modes. As shown in Figure 4.1, in the bike lane, a person was riding an e-bike in the counter-flow direction. However, due to the lack of non-motorised transport management, there are no effective measures to stop such violations of road travel safety in time. At the same time, due to the lack of motor vehicle management, the

phenomenon of motor vehicles occupying non-motorised lanes often occurs (i.e., Figure 4.2). This lane occupation inconveniences walkers and cyclists and threatens their safety (Zhang et al., 2019).

Figure 4.3. *Bike parking area*

Non-motorised transport still has the problem of inadequate facilities. Under the influence of car-based thoughts (Xu et al., 2003), transport infrastructure in Xinzhou is usually not designed to provide cyclists and walkers with safe conditions comparable to other road users (e.g., car drivers). Therefore, their level of protection is considerably lower (Wegman et al., 2012). On most roads in urban areas, there are no rest seats, sunshades/rain shelters, and fewer trash cans for pedestrians. According to the respondents' suggestions, the green light time is not enough when crossings the road. Especially for the elderly with limited mobility, the green light time is too short, and it takes two green lights to pass through an intersection. There are some bike parking spots marked by the government (i.e., Figure 4.3), but due to the lack of supervision and reliable bike parking facilities, bikes parked in this area are at risk of losing.

Meanwhile, for disadvantaged people, there are few accessible facilities. There is no elevator for the disabled on the overpass, and there are no accessible toilets for the disabled in the public toilets. Besides, there is no ramp or elevator for wheelchairs entering some buildings with steps.

4.3.2 Problems with public transport

This part analyses the problems encountered by elderly and disabled people using public transport. Based on the collected questionnaires, this research has gathered 27 suggestions about public transport from the respondents, including four suggestions from people with disabilities. Table 4.10 shows that the disadvantaged experience difficulties when using public transport.

The buses currently used in Xinzhou are all-electric and environmentally friendly (Kumar and Revankar, 2017). However, some vehicles and stops do not perform well.

Figure 4.4. *Mops left leaning against the door*

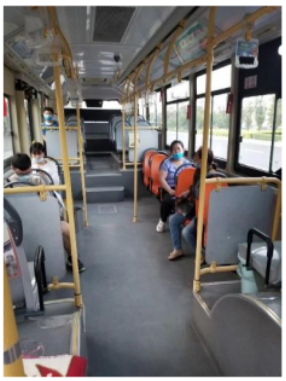

Figure 4.5. *Narrow interior space*

The hygiene on the bus is a big problem. As shown in Figure 4.5, the mop was placed directly at the entrance, which has a great hidden danger to health and safety. At the same time, the bus is not equipped with a trash can, so passengers can easily throw garbage on the bus. For the elderly and the disabled, the steps formed by the height between the vehicle and the ground are "stumbling blocks" they must face when getting on and off the bus. Moreover, the current buses are not equipped with retractable ramps, which is inconvenient for people with limited mobility or the disabled in wheelchairs. In addition, the internal structure of the bus is compact. Although there is a special seat for the elderly and the disabled, there is not enough space for wheelchairs (i.e., Figure 4.5). The bus stations also have problems, such as no electronic information boards, a few waiting seats and uncleanliness. In particular, some bus stops cannot provide enough waiting places for wheelchair users.

There are also some problems with the bus drivers and other passengers. Some respondents thought bus drivers had a poor attitude. When older adults move slowly, the bus driver will be very aggressive in urging them, especially

for older adults who do not know how to use their smartphones and cannot show their health Quick Response code, and some rude bus drivers even do not allow older adults to ride the bus. Of the bus passengers, a significant proportion did not have the awareness or behaviour to give up their seats for the elderly or disabled. The researcher observed that during the peak hour, many young people sitting in special seats for the elderly and the disabled did not give up their seats for the elderly.

Finally, there are problems with bus routes, stops and schedules. This problem is the respondent's most frequently reported issue. Respondents felt that the current bus route was unreasonable, the location of bus stops was not convenient, and bus waiting times were too long. Some respondents reported that the waiting time was more than 30 minutes for a bus ride, and during peak commuting times, buses were extremely crowded.

Figure 4.6. *A map of the bus lines in Xinzhou*

Figure 4.6 is a map of the bus lines in Xinzhou. Using the application of transcending, the bus network indicators for Xinzhou are calculated, and the results are shown in Table 4.11：

Table 4.11. *Indicators of the bus network*

Indicators	Status of Xinzhou	National Standards
total line length	241.35km	
Line net density	0.704km/km^2	3-4km/km^2
Bus route repetition rate	1.774	1.8-2.5
Average station distance	602m	500-800m
300m coverage rate of bus stops	0.095	No less than 50%
500m coverage rate of bus stops	0.265	No less than 90%

National Standards are from Code for planning design of transport on the urban road (Ministry of Construction of the People's Republic of China, 1995).

The bus line network density, bus line repetition rate, 300m coverage rate of bus stops and 500m coverage rate in Xinzhou all have a gap with the national standard. The long waiting time and crowded bus environment mentioned by the respondents indicated that the bus schedule should be more reasonable and regular (Fu et al., 2002).

5. Discussion

In Section 4.3, this research discussed reasons for the low satisfaction travel modes, also known as the problems of these travel modes. Therefore, this chapter discusses the findings of the previous studies and proposes methods for creating an inclusive and accessible travel environment in the research area.

5.1. The discussion of findings

5.1.1. Travel mode and travel satisfaction

The result in Section 4.2 showed that respondents who used buses had the lowest travel satisfaction, while those whose travel mode was private car or taxi had the highest travel satisfaction. In contrast, some studies have found that travellers who use a car have medium satisfaction, but travellers who travel on foot or by bicycle have the highest satisfaction (De Vos et al., 2016).

This research suggests that the different findings are partly due to the different cities. According to previous studies, satisfaction with urban travel transport is negatively correlated with the urban congestion index (Cao and Liu, 2018). In large cities, the city road network is complex, and traffic congestion is frequent, which significantly affects the convenience and comfort of a car or taxi users. In contrast, Xinzhou is a medium-sized city with simple urban roads and low car ownership, where traffic congestion is almost non-existent. Therefore, the travel satisfaction level of using private cars or taxis is high. However, the walking and cycling road network is incomplete, and the relevant infrastructure is not fully equipped, so these respondents have lower

satisfaction levels. For public transport, unpleasant rides and inadequate facilities lead to deficient satisfaction levels among users.

5.1.2. The present transport problems

1. Non-motorised transport

Non-motorised transport does not receive much attention before (Rietveld, 2000). However, nowadays, non-motorised transport modes are attracting increasing attention as healthy, sustainable, and eco-friendly means of transport (Zhou et al., 2020). Current research focuses on how to release traffic congestion, achieve sustainability, and improve citizens' health by promoting it.

In some medium-sized cities, non-motorised transport is always one of the main travel ways. Therefore, in these cities, non-motorised transport aims to create a better travel environment, not for the mentioned benefits.

However, when developing non-motorised transport, safety concerns are also common problems. In most countries, about 20-40% of the traffic victims are non-motorised travellers (Rietveld, 2000). The leading cause of this is the lack of regulation. If completed laws and regulations are used, there will be no bikes running the wrong way and motor vehicles occupying non-motorised lanes, which can better protect non-motorised travellers.

In addition, the lack of infrastructure is a current issue. A study in India showed that non-motorised transport infrastructure is crucial for maintaining travel mode shares in the future (Tiwari et al., 2016). However, the lack of infrastructure reduces the comfort of non-motorised travellers, which leads to

low travel satisfaction. Therefore, it also requires the construction of non-motorised transport facilities and equipment.

2. Bus

When enhancing accessibility by buses, the first problem is backward technology. Compared with buses in London or Berlin, Xinzhou buses are more suitable for young people. London published “Accessible Bus Stop Design Guidance” in 2017 (TfL, 2017); Berlin has gradually replaced buses with low-floor buses since 2006 (Zhang and Li, 2022). However, Xinzhou's bus not only has a high floor, which makes it inconvenient to get on and off but also does not have a considerable seat arrangement giving space to park wheelchairs

The service attitude of bus drivers is also an important issue. Older adults move slowly. Therefore, when using a bus, they may prolong the stop time at the bus stop. Moreover, this results in some bus drivers having a bad attitude toward the elderly during peak hours, and they are impatient to answer questions, making the elderly feel unfriendly and uncomfortable.

Some seniors think buses are overcrowded and maladapted in routes and frequencies. There are few bus lines, and some buses are outsourced to private operators. Therefore, the actual departure time of the bus is not as accurate as the platform timetable. Moreover, because the urban area is small and there are not many buses in one bus line, which causes insufficient bus frequency and crowding on the bus during peak hours.

5.2. Creating an inclusive and accessible travel environment

5.2.1 Improvements for non-motorised transport

In the past, people ignored non-motorised transport. The following proposes ways to improve non-motorised transport from two aspects: strengthening supervision and completing equipment.

1. Strengthening supervision

Although many laws regulate car driver behaviour, it is still easy for them not to obey traffic regulations. For non-motorised travellers, due to lack of supervision, pedestrians and cyclists often cross the road violating traffic rules. Therefore, government departments and traffic police should strengthen the regulation of all travel modes.

The behaviour of car drivers can be regulated by increasing the number of traffic cameras to ensure them not occupy non-motorised vehicle lanes. Based on experts' suggestions, government departments should formulate traffic rules as soon as possible to regulate the behaviour of non-motorised travellers. The traffic police can patrol the city when older people travel. Because the travel purpose of the elderly who use bicycles is mainly for work or shopping, police officers should pay great attention to the speed limit of bikes/e-bikes to avoid traffic accidents caused by excessive speed.

However, due to the limited police force, strengthening supervision cannot wholly rely on the enforcement of traffic police. Thus, a reporting reward system can also be set up. All people can report violations of traffic rules, and cash rewards will be given after verification.

2. Completing equipment

The first step is to improve pedestrian facilities and the walking environment. Adequate numbers of seats, umbrellas and canopies should be provided for pedestrians to stay and rest (Zhou, 2018). Moreover, public toilets should be built along the roads. It is noted that public toilets must include accessible toilets. The design of traffic lights and footbridges should consider the elderly and disabled. The intervals between traffic lights should be designed scientifically, considering the time required for pedestrians rather than being set arbitrarily. Meanwhile, crossing audible devices can be used to help the visually impaired. For pedestrian bridges, a gently sloping staircase with slops should be designed to facilitate the use of older people with limited mobility.

Bike parks can be constructed using streets and alleys with fewer vehicles and pedestrian and open spaces (Zhou, 2018). When building the parks, some security facilities can be added to reduce the possibility of losing bicycles. At the same time, special bike parking spaces for disadvantaged people should be built to give them more space to move and more secure storage facilities. Besides, care should be taken to avoid disabled parking facilities being occupied.

Road optimisation can also be carried out but must follow humane principles. By adding separation fences, the non-motorised flow is effectively separated from the motor flow, preventing interference. More important, priority should also be given to pedestrian and bicycle traffic when allocating rights of way (Mo, 2021).

However, cost-benefits should also be considered when carrying out the

construction of non-motorised transport infrastructure. The construction should be carried out in line with the real needs, but not for the sake of building infrastructure that is not applicable but a waste of money.

5.2.2. Improvements in public transport

Based on 4.1, respondents who were 60-69 years old, did not own a car, did not have a job, and had a personal monthly income of 0-2,000 yuan were more likely to use the bus. Borges (2007) summarised the public transport travel needs of the elderly into the categories of accessibility, acceptability, affordability, and availability. Thus, this part gives suggestions from four categories.

1. Accessibility

Low-floor buses can replace existing models (Zhang and Li, 2022). Because low-floor buses improve accessibility for all passengers by lowering the height difference between the kerb and bus floor. (TfL, 2017). Inside the bus, special wheelchair parking areas should be set up. Meanwhile, consideration should be given to the elderly on the bus, with extra “stop” buttons to remind drivers. As for the hygiene problem, it needs to regulate the storage of cleaning supplies and supervise the passengers.

An ideal bus stop should have seating areas, be well-lit and visible, provide information, be clean and weather-protected, and have help points available (Shrestha et al., 2017). It is also stated that proximity to bus stops is a strong indicator of public transport use (Giuliano et al., 2003; Su et al., 2008; Hess, 2009). Poor road and footway conditions can be a substantial obstacle to

walking for elderly individuals to access bus stops. Therefore, the roads to bus stops should be kept in excellent condition, have a flat or low grade, have a decent crossing facility, and have a reduced traffic speed (Shrestha et al., 2017).

However, because Xinzhou is an economically underdeveloped area, the government may not have enough money to replace all the buses with low-floor buses at one time and rebuild the bus stops. Therefore, combined with a more comprehensive bus travel survey, it is possible to start with the bus routes most frequently used by the elderly and the disabled, and then gradually transform them, eventually replacing the existing ones with barrier-free buses and bus stops.

2. Acceptability

Safety is a serious concern for older people as they are likely to be more severely injured, take longer to recover and suffer a more significant psychological impact (Shrestha et al., 2017). Older individuals frequently avoid using public transport out of concern for crime or falling and being hurt. Therefore, the bus should improve its safety. For example, drivers should only drive after the elderly are appropriately seated. At the same time, the vehicle's speed should be gentle, and try to avoid rapid acceleration and emergency braking. Moreover, high-definition cameras can be added to the bus, reducing the illegal and criminal behaviour of passengers, especially the elderly.

Driver attitude and driving behaviour are other factors. An Australian study showed that senior bus passengers like helpful and friendly drivers, convenient access and departure, and valuable information (Levin,2019).

Rickert (2009) pointed out that unsafe driving practices are a barrier for many individuals from utilising public transport. Therefore, drivers should be given special training before they start work to understand the importance of safety and a good attitude. As for passengers, society and the government should encourage them to give up their seats for the elderly and the disabled when needed.

3. Affordability

Affordability is an essential issue for many older people as they probably have less disposable income in retirement. This means they are less likely to own their vehicle and have an increased reliance on public transport (Smith et al. 2006). Regarding bus affordability, older people's demands include the availability of reduced rates, convenience, transferable/flexible tickets, and a simple fee structure. A common governmental strategy to encourage elderly persons to use public transport is fare subsidies (Shrestha et al., 2017). Public transport operators and national/local governments frequently provide senior citizens fare reductions at the national and municipal levels. In England and Germany, for example, the government has responded with subsidised bus transport for the elderly. Thus, in Xinzhou, exclusive welfare cards could be issued for disabled and older adults, with different discount levels depending on age and disability. This would put as little strain on government finances as possible while still giving full benefits to the elderly.

Additionally, when subsidizing, it should also combine personal income, family status and other factors to give corresponding subsidies to those living in poverty. However, the distribution of the subsidy amount may also cause some people to use the bus when it is not necessary, occupying the urban

bus seats and bringing a bad experience to other travellers who must use the bus.

4. Availability

Availability of public transport between homes and destinations, with service times and frequencies meeting their requirements, is essential where older people depend on buses.

Therefore, in Xinzhou, better bus route planning and station design should be implemented. Before designing bus stops, much research is necessary to ensure that the stops are set in locations where people can easily travel. A survey of people aged 75 and over travelling on public transport showed that only about 5% of older people use smartphones and other intelligent ways to get timely information about public transport, with the majority relying on experience, print or other people to get timely information (EGALITEplus, 2011). Therefore, by installing electronic information screens at bus stops, the possibility of independent access to timely public transport information for older people is guaranteed, and the physical exertion of older people due to unknown waiting is reduced.

In addition, the bus scheduling system should also be more scientific, using modern measurements to adjust the same line of multiple bus scheduling unstable situations to ensure all passengers' travel needs.

5.3. Research limitations

5.3.1 Incomplete sample of the survey

This research may have unconsciously excluded many elderly individuals who always stay home. At the same time, the disabled people participating in this survey all had visible disabilities, such as loss of limbs, blindness, etc. Nevertheless, many less visible disabilities, such as autism, dementia, or anxiety, can make travelling equally as tricky as a more visible disability. (DfT, 2018).

5.3.2. Deficiencies in the survey methodology

Although a random sampling survey was adopted in this study, the actual selection of respondents cannot be regarded as entirely random. Because this study distributed questionnaires in 6 selected areas, it cannot be ruled out that the sample was drawn from people who happened to have appeared at the survey area on the day of the survey. It is possible that some respondents did not go into the survey area before.

5.3.3. The single research approaches

This research only used descriptive analysis and nonparametric tests to analyse the travel characteristics of the respondents and the difference between the travel satisfaction of different travel modes. It did not analyse which factors would affect the travel satisfaction of the respondents. Therefore, analysing the influencing factors of travel satisfaction was not comprehensive.

6. Conclusion and recommendation

6.1. Conclusion

Against the backdrop of a rapidly increasing elderly population, the question of how to improve the mobility of older people has become crucial. However, there is a lack of theoretical research on enhancing the mobility of older people in mainland China. In reducing transport carbon emissions, this research explores the problems of low-satisfaction transport modes for older people and the responsive solutions to facilitate a better inclusive and accessible travel environment in the research regions.

The research finds that different travel modes have different levels of satisfaction. The lowest level of satisfaction is found among those who use public transport, but the highest is among those who use private cars/taxis, with the remaining two modes of transport in the middle. The research then examines the problems for the three modes of transport with lower satisfaction- bus, walking and bike/e-bike - to find the reasons. With the current problems of the transport system in Xinzhou, the research analyses that the problems of walking and biking/e-biking are the lack of government regulation and defective supporting equipment. For buses, the main problems are the technical shortcomings of the vehicles, the uncomfortable stations, the poor service attitude of the bus drivers and the unreasonable design of bus routes and stops.

The research also proposes solutions to these problems. The solution for walking and bikes/e bikes is to improve regulation and equipment. While for public transport, the research gives suggestions from four areas of

accessibility, acceptability, affordability, and availability, such as improving vehicle technology, enhancing driver training and providing fare concessions to help improve the satisfaction of older people with public transport. In addition to making recommendations for different modes of transport, the research also makes reasonable suggestions to increase accessibility for disabled people, making the travel environment more inclusive and accessible.

There are many studies on the mobility of older people in large cities, but few on small and medium-sized cities in China. Xinzhou is a relatively underdeveloped city with low-income levels and even fewer older adults owning cars. Therefore, some improvements should be made to the low satisfaction modes of older people to build a more inclusive and accessible travel environment.

However, this research still has some limitations: the survey sample was not comprehensive, the survey methodology had shortcomings, and the research method was relatively homogeneous. These should be avoided in any follow-up studies.

6.2. Recommendation for further research

Follow-up research could use a more complete satisfaction questionnaire. This survey's travel satisfaction question mainly examines the respondents' perception of the travel environment but does not consider the traveller's attitude. De Vos and Witlox (2016) and Ye and Titheridge (2017) found that positive attitudes towards travel in general (i.e., travel-liking attitudes) are positively correlated with travel satisfaction. Therefore, future studies on travel satisfaction in older adults should also consider which travel mode the

respondents themselves have a positive attitude tendency. So, Satisfaction with Travel Scale (STS) can be used in future research (De Vos et al., 2015; Ettema et al., 2011; Friman et al., 2013). This scale asks respondents to indicate which emotions they experienced during the trip and how they evaluated this trip (De Vos, 2018).

In addition, the influence factor of travel distance can be added in future research. Because most people choose different travel modes for travel of different distances, even if they use the same travel mode, people with different travel distances can have different satisfaction. Longer trip durations often result in low satisfaction levels (Morris and Guerra, 2015; De Vos, 2019).

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Appendices

Appendix 1. The questionnaire on transport for the elderly

Hello! I am a student at UCL, and I need some of your time to complete this questionnaire in order to find out about the travel situation for older people. The data of this questionnaire will only be used for academic research, and I will keep it confidential following relevant laws. Thank you for your support, and I hope you have a good day!

1. Your gender: ☐Male ☐Female

2. Your age: ☐50-59 years old ☐60-69 years old ☐70-79 years old ☐80 years old or over

3. Do you permanently live in Xinfu District: ☐No ☐Yes

4. Do you still work: ☐No ☐Yes

5. Do you have a driver's license: ☐No ☐Yes

6. Do you own a car: ☐No ☐Yes

7. How many people in your family: ☐1-2 ☐3 ☐4 ☐5 or more

8. Your personal average monthly income:
☐0-2000 yuan ☐2000-4000 yuan ☐4000-6000 yuan ☐6000yuan or more

9. Do you have children in your family who need to be transported to school: ☐No ☐Yes

10. Are you a person with a disability: ☐No ☐Yes
(If you answer No for Question 10, you do not need to answer questions 11-13)

11. Are you satisfied with the step-free accessibilities of Xinzhou City:
☐Strongly dissatisfied ☐Dissatisfied ☐ Neutral ☐ Satisfied ☐Strongly satisfied

12. What difficulties have you encountered when using public facilities in your daily travels: (multiple choice)
☐Inconvenience in getting on and off public transport.
☐Inconvenience in using public toilets.
☐Inability to use street bridges or underpasses.
☐Facilities for disabled people are damaged, occupied or not available at all.
☐There are very few wheelchairs access ramps in buildings or public facilities.
☐No voice guidance at crossings.

Please recall your yesterday's travel for the day and answer the following questions:

13. The type of start point of your travel:
☐Residential areas ☐Supermarkets, or shopping areas ☐Hospitals ☐Parks, scenic spots ☐Restaurants, or leisure places ☐Train stations, coach stations, etc. ☐Offices ☐Banks ☐Schools ☐Outside surveyed area

14. The type of endpoint of your travel:
☐Residential areas ☐Supermarkets, or shopping areas ☐Hospitals ☐Parks, scenic spots ☐Restaurants, or leisure places ☐Train stations, coach stations, etc. ☐Offices ☐Banks ☐Schools ☐Outside surveyed area

15. Is there someone accompanying you? ☐No ☐Yes

16. What is your main travel mode? ☐Walking ☐Bicycle/e-bike ☐Bus ☐Private car/taxi

17. What is your main travel purpose?
☐Work/education ☐Shopping or personal business ☐ Leisure, sports, and recreation ☐ Visiting relatives or friends ☐ Accompanying others ☐ Other

Do you agree with the following statement about the current urban transport situation? (Please check √ under the option you agree with)

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
18. I can reach the bus stop easily and quickly (within 10 minutes).	○	○	○	○	○
19. Traveling by bus, my waiting time at the stop is within 12 minutes.	○	○	○	○	○
20. When travelling in the city, I always get to my destination quickly.	○	○	○	○	○
21. I have enough waited space at the bus stop, and I find the waiting area comfortable and clean.	○	○	○	○	○
22. When I take the bus, I always have a seat.					

23. I think the current cost of the trip is reasonable.	○	○	○	○	○
24. When I am walking, the pavement is always flat and continuous.	○	○	○	○	○
25. I always have enough time when using the traffic lights to cross the road.	○	○	○	○	○

Finally, I would like to ask you to make suggestions for the development of urban transport for this city:

_____

Appendix 2. Statistical tests undertaken

Table 1. *The Likert scale test*

Cronbach's Alpha	N of Items	Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	Bartlett's Test of Sphericity		
			Approx. Chi-Square	df	Sig.
0.97	8	0.941	4382.073	28	0.000

From Table 1, Cronbach's Alpha value of the Likert scale is 0.97, indicating that the scale is highly reliable. The KMO value is 0.941, and the p-value of Bartlett's Test of Sphericity is 0.000, indicating that the results are very valid. So, the scale is reliable and can be used for further analysis.

Table 2. *Tests of Normality and Homogeneity of Variances*

	Main travel mode	Kolmogorov-Smirnov[a]			Levene Statistic	Sig.
		Statistic	Sig.			
Mean travel satisfaction	Walking	0.143	0.000	Based on Mean	5.143	0.002
	Bike/ e-bike	0.196	0.000			
	Bus	0.218	0.000			
	Private car/ taxi	0.187	0.000			

The normality and variance homogeneity tests are carried out on the collected travel modes and the calculated travel satisfaction means.

According to Table 2, the sig values of the four travel modes are all 0.00, less than 0.05, so the data distribution is not normal. At the same time, the p-value (Levene Statistic) based on the mean is 5.143, and the p-value is less than 0.05, indicating that the variance of the data is uneven. So the data neither satisfy the normality of the data nor the homogeneity of variance.

Appendix 3. Risk assessment form

RISK ASSESSMENT FORM
FIELD / LOCATION WORK

DEPARTMENT/SECTION: BARTLETT SCHOOL OF PLANNING
LOCATION(S): XINZHOU, CHINA
PERSONS COVERED BY THE RISK ASSESSMENT: YUJUN TAO

BRIEF DESCRIPTION OF FIELDWORK (including geographic location): The fieldwork of this study mainly consisted of distributing questionnaires and supervising participants to participate in answering. The questionnaire distribution site of this study was selected in Xinzhou, Shanxi, China.

COVID-19 RELATED GENERIC RISK ASSESSMENT STATEMENT:

Coronavirus disease (COVID-19) is an infectious disease caused by coronavirus SARS-CoV-2. The virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes. Droplets fall on people in the vicinity and can be directly inhaled or picked up on the hands and transferred when someone touches their face. This risk assessment documents key risks associated fieldwork during a pandemic, but it is not exhaustive and will not be able to cover all known risks, globally. This assessment outlines principles adopted by UCL at an institutional level and it is necessarily general. Please use the open text box 'Other' to indicate any contingent risk factors and control measures you might encounter during the course of your dissertation research and writing.

Please refer to the Dissertation in Planning Guidance Document (available on Moodle) to help you complete this form.

Hazard 1: Risk of Covid -19 infection during research related travel and research related interactions with others (when face-to-face is possible and/or unavoidable)

Risk Level - Medium /Moderate

Existing Advisable Control Measures: Do not travel if you are unwell, particularly if you have COVID-19 symptoms. Self-isolate in line with NHS (or country-specific) guidance.

Avoid travelling and face-to-face interactions; if you need to travel and meet with others:

- If possible, avoid using public transport and cycle or walk instead.
- If you need to use public transport travel in off-peak times and follow transport provider's and governmental guidelines.
- Maintain (2 metre) social distancing where possible and where 2 metre social distancing is not achievable, wear face covering.
- Wear face covering at all times in enclosed or indoor spaces.

- Use hand sanitiser prior to and after journey.
- Avoid consuming food or drinks, if possible, during journey.
- Avoid, if possible, interchanges when travelling - choose direct route.
- Face away from other persons. If you have to face a person ensure that the duration is as short as possible.
- Do not share any items i.e. stationary, tablets, laptops etc. If items need to be shared use disinfectant wipes to disinfect items prior to and after sharing.
- If meeting in a group for research purposes ensure you are following current country specific guidance on face-to-face meetings (i.e rule of 6 etc.)
- If and when possible meet outside and when not possible meet in venues with good ventilation (e.g. open a window)
- If you feel unwell during or after a meeting with others, inform others you have interacted with, self-isolate and get tested for Covid-19
- Avoid high noise areas as this mean the need to shout which increases risk of aerosol transmission of the virus.
- Follow one way circulation systems, if in place. Make sure to check before you visit a building.
- Always read and follow the visitors policy for the organisation you will be visiting.
- Flush toilets with toilet lid closed.
-'Other' Control Measures you will take (specify):

NOTE: The hazards and existing control measures above pertain to Covid-19 infection risks only. More generalised health and safety risk may exist due to remote field work activities and these are outlined in your Dissertation in Planning Guidance document. Please consider these as possible 'risk' factors in completing the remainder of this standard form. For more information also see: Guidance Framework for Fieldwork in Taught and MRes Programmes, 2021-22

Consider, in turn, each hazard (white on black). If **NO** hazard exists select **NO** and move to next hazard section.
If a hazard does exist select **YES** and assess the risks that could arise from that hazard in the risk assessment box.
Where risks are identified that are not adequately controlled they must be brought to the attention of your Departmental Management who should put temporary control measures in place or stop the work. Detail such risks in the final section.

ENVIRONMENT	**The environment always represents a safety hazard. Use space below to identify and assess any risks associated with this hazard**
e.g. location, climate, terrain, neighbourhood, in outside organizations, pollution, animals.	Examples of risk: adverse weather. The risk is low.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
	work abroad incorporates Foreign Office advice
	only accredited centres are used for rural field work
√	participants will wear appropriate clothing and footwear for the specified environment
√	refuge is available
	work in outside organisations is subject to their having satisfactory H&S procedures in place
	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

EMERGENCIES	Where emergencies may arise use space below to identify and assess any risks
e.g. fire, accidents	Examples of risk: Traffic accidents and stolen. The risk is low.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
	participants have registered with LOCATE at http://www.fco.gov.uk/en/travel-and-living-abroad/
√	contact numbers for emergency services are known to all participants
√	participants have means of contacting emergency services
	a plan for rescue has been formulated, all parties understand the procedure
	the plan for rescue /emergency has a reciprocal element
	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

EQUIPMENT	Is equipment used?	NO	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. clothing, outboard motors.	Examples of risk: inappropriate, failure, insufficient training to use or repair, injury. Is the risk high / medium / low ?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
	the departmental written Arrangement for equipment is followed
	participants have been provided with any necessary equipment appropriate for the work
	all equipment has been inspected, before issue, by a competent person
	all users have been advised of correct use
	special equipment is only issued to persons trained in its use by a competent person
	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

LONE WORKING	Is lone working a possibility?	YES	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. alone or in isolation *lone interviews.*	Examples of risk: Multiple surveys cannot be run at the same time. The risk is low.		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
√	the departmental written Arrangement for lone/out of hours working for field work is followed
	lone or isolated working is not allowed
√	location, route and expected time of return of lone workers is logged daily before work commences
√	all workers have the means of raising an alarm in the event of an emergency, e.g. phone, flare, whistle
	all workers are fully familiar with emergency procedures

☐	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:		
FIELDWORK	**2**		May 2010

ILL HEALTH	The possibility of ill health always represents a safety hazard. Use space below to identify and assess any risks associated with this Hazard.
e.g. accident, illness, personal attack, special personal considerations or vulnerabilities.	Examples of risk: injury, allergies. The risk is low.

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
	all participants have had the necessary inoculations/ carry appropriate prophylactics
√	participants have been advised of the physical demands of the research and are deemed to be physically suited
	participants have been adequate advice on harmful plants, animals and substances they may encounter
√	participants who require medication should carry sufficient medication for their needs
	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

TRANSPORT	Will transport be required	NO	√	Move to next hazard
		YES		Use space below to identify and assess any risks
e.g. hired vehicles	Examples of risk: accidents arising from lack of maintenance, suitability or training Is the risk high / medium / low?			

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
	only public transport will be used
	the vehicle will be hired from a reputable supplier
	transport must be properly maintained in compliance with relevant national regulations
	drivers comply with UCL Policy on Drivers http://www.ucl.ac.uk/hr/docs/college_drivers.php
	drivers have been trained and hold the appropriate licence
	there will be more than one driver to prevent driver/operator fatigue, and there will be adequate rest periods
	sufficient spare parts carried to meet foreseeable emergencies
	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

DEALING WITH THE PUBLIC	Will people be dealing with public	YES	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. interviews, observing	Examples of risk: Causing offence, being misinterpreted. The risk is low.		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
	all participants are trained in interviewing techniques
√	advice and support from local groups has been sought
	participants do not wear clothes that might cause offence or attract unwanted attention
√	interviews are conducted at neutral locations or where neither party could be at risk
	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

WORKING ON OR NEAR WATER	Will people work on or near water?	NO	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. rivers, marshland, sea.	Examples of risk: drowning, malaria, hepatitis A, parasites. Is the risk high / medium / low?		

CONTROL MEASURES	Indicate which procedures are in place to control the identified risk
	lone working on or near water will not be allowed
	coastguard information is understood; all work takes place outside those times when tides could prove a threat
	all participants are competent swimmers
	participants always wear adequate protective equipment, e.g. buoyancy aids, wellingtons
	boat is operated by a competent person
	all boats are equipped with an alternative means of propulsion e.g. oars
	participants have received any appropriate inoculations
	OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

MANUAL HANDLING (MH)	Do MH activities take place?	NO	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. lifting, carrying, moving large or heavy equipment, physical unsuitability for the task.	Examples of risk: strain, cuts, broken bones. Is the risk high / medium / low?		

CONTROL	Indicate which procedures are in place to control the identified risk

MEASURES

- [ ] the departmental written Arrangement for MH is followed
- [ ] the supervisor has attended a MH risk assessment course
- [ ] all tasks are within reasonable limits, persons physically unsuited to the MH task are prohibited from such activities
- [ ] all persons performing MH tasks are adequately trained
- [ ] equipment components will be assembled on site
- [ ] any MH task outside the competence of staff will be done by contractors
- [ ] OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

SUBSTANCES	Will participants work with substances	NO	If 'No' move to next hazard If 'Yes' use space below to identify and assess any risks
e.g. plants, chemical, biohazard, waste	Examples of risk: ill health - poisoning, infection, illness, burns, cuts. Is the risk high / medium / low?		

CONTROL MEASURES — **Indicate which procedures are in place to control the identified risk**

- ☐ the departmental written Arrangements for dealing with hazardous substances and waste are followed
- ☐ all participants are given information, training and protective equipment for hazardous substances they may encounter
- ☐ participants who have allergies have advised the leader of this and carry sufficient medication for their needs
- ☐ waste is disposed of in a responsible manner
- ☐ suitable containers are provided for hazardous waste
- ☐ OTHER CONTROL MEASURES: please specify any other control measures you have implemented:

OTHER HAZARDS	Have you identified any other hazards?	NO	If 'No' move to next section If 'Yes' use space below to identify and assess any risks
i.e. any other hazards must be noted and assessed here.	Hazard: Risk: is the risk		

CONTROL MEASURES — **Give details of control measures in place to control the identified risks**

Have you identified any risks that are not adequately controlled?	NO	√	Move to Declaration
	YES		Use space below to identify the risk and what action was taken

DECLARATION	The work will be reassessed whenever there is a significant change and at least annually. Those participating in the work have read the assessment.

Select the appropriate statement:

√	I the undersigned have assessed the activity and associated risks and declare that there is no significant residual risk
√	I the undersigned have assessed the activity and associated risks and declare that the risk will be controlled by the method(s) listed above

NAME OF SUPERVISOR

Tim Pharoah

Appendix 4. Ethical clearance pro forma

It is important for you to include all relevant information about your research in this form, so that your supervisor can give you the best advice on how to proceed with your research.

You are advised to read though the relevant sections of UCL's Research Integrity guidance to learn more about your ethical obligations.

Submission Details

1. **Name of programme of study:**
   Msc Transport and City Planning

2. **Please indicate the type of research work you are doing (Delete that which do not apply):**

- Dissertation in Planning (MSc)
- Dissertation in City Planning (MPlan)
- Major Research Project

3. **Please provide the current working title of your research:**
   Creating a inclusive travelling environment: A case study in Xinzhuo, China

4. **Please indicate your supervisor's name:**
   Tim Pharoah

Research Details

5. **Please indicate here which data collection methods you expect to use. (Tick all that apply/or delete those which do not apply.)**

- Interviews
- Focus Groups
- Questionnaires (including oral questions)
- Action research
- Observation / participant observation
- Documentary analysis (including use of personal records)
- Audio-visual recordings (including photographs)
- Collection/use of sensor or locational data
- Controlled trial
- Intervention study (including changing environments)
- Systematic review
- Secondary data analysis

- Advisory/consultation groups

6. **Please indicate where your research will take place (delete that which does not apply):**
    - UK only
    - Overseas only
    - UK and overseas

7. **Does your project involve the recruitment of participants?**
   'Participants' means human participants and their data (including sensor/locational data and observational notes/images.)

   Yes

Appropriate Safeguard, Data Storage and Security

8. **Will your research involve the collection and/or use of personal data?**

Personal data is data which relates to a living individual who can be identified from that data or from the data and other information that is either currently held, or will be held by the data controller (you, as the researcher).

This includes:

- Any expression of opinion about the individual and any intentions of the data controller or any other person toward the individual.
- Sensor, location or visual data which may reveal information that enables the identification of a face, address etc. (some post codes cover only one property).
- Combinations of data which may reveal identifiable data, such as names, email/postal addresses, date of birth, ethnicity, descriptions of health diagnosis or conditions, computer IP address (of relating to a device with a single user).

Yes

9. **Is your research using or collecting:**

- special category data as defined by the General Data Protection Regulation*, and/or
- data which might be considered sensitive in some countries, cultures or contexts?

*Examples of special category data are data:

- which reveals racial or ethnic origin, political opinions, religious or philosophical beliefs, trade union membership;
- concerning health (the physical or mental health of a person, including the provision of health care services);
- concerning sex life or sexual orientation;
- genetic or biometric data processed to uniquely identify a natural person.

No

10. Do you confirm that all personal data will be stored and processed in compliance with the General Data Protection Regulation (GDPR 2018)? (Choose one only, delete that which does not apply)

- Yes
- No
- I will not be working with any personal data

11. I confirm that:

- The information in this form is accurate to the best of my knowledge.
- I will continue to reflect on and update these ethical considerations in consultation with my supervisor.

Yes

BPLN0039_VKLC5

GRADEMARK REPORT

FINAL GRADE

/100

GENERAL COMMENTS

Instructor

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