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A cross sectional survey of attitudes, behaviours, barriers and motivators to cycling in University students

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ABSTRACT

High rates of active travel are essential aspects of healthy communities. Increasing cycling participation has the potential to address a range of long-term health and societal issues, and positively contribute to the health and sustainability agenda. Universities have been proposed as appropriate settings for a healthy place approach however, there is a paucity of evidence on student cycling. Therefore the aim of this paper is to explore the motivators and barriers to cycling amongst University students.

An online cross sectional survey of young adults (18–25 years) studying at an urban United Kingdom university was undertaken. Using convenience sampling participants were surveyed on levels of cycling (e.g. daily, weekly) alongside perceptions, barriers and motivators to cycling activity.

194 responses were received of which 55% were male, 54% owned a bicycle and 14% were regular cyclists. Cycling motivators were enjoyment and improving fitness; especially amongst regular cyclists. However, weather and safety concerns were the main barriers. The majority (85%) felt more should be done to encourage cycling, with 70% stating cycling was easier 'elsewhere'. Respondents felt cycling had an important environmental element (67%), although less than 8% cited congestion and pollution reduction as a reason for cycling and 64% believed there were more barriers to cycling than driving.

This study suggests that levels of cycling within a university setting may be higher than the general population and the appreciation of the merits of cycling are well recognised. In addition motivators and barriers are similar to the wider population. However more research is required, especially with occasional and non-cyclists, to understand how best to address the 'value-action' gap highlighted between cycling attitudes and behaviour amongst university students.

1. Introduction

Increasing the number of people cycling provides a means of both directly and indirectly addressing the public health impacts of an increasingly sedentary lifestyle. The benefits of cycling include increased levels of physical activity (Department of Transport, 2004), reduced congestion and pollution (Pooley et al. 2011), increased social capital and sense of community (Cavill and Buckland, 2012) along with long term financial benefits (Cavill and Davis, 2007). Increased levels of physical activity is recognised as crucial to tackling the rise in obesity in the UK (Department of Transport, 2010) which would impact on the National Health Service (NHS)

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budget spent on treating obesity related conditions (Allendar and Rayner, 2007).

The UK has some of the lowest levels of cycling in Europe with just 2% of all journeys made by bicycle (Department of Transport, 2012). This is despite numerous investments and policies, noticeably in the last 20 years, to change this trend (Butcher, 2012). Nationally 10% of adults cycle weekly although this figure has local variance ranging from 4% (Pendle) to 52% (Cambridge) (Department of Transport, 2012). Only the West Midlands has fewer people cycling either weekly or monthly than the North West and cycling rates in Merseyside and Liverpool are lower than the regional average. In the UK, efforts to improve cycling rates have manifested themselves through a preference for addressing singular determinants, such as building cycle lanes and to date this has delivered limited success (Jones, 2001).

Elsewhere in Europe ecological approaches have, over time, led to Northern Europe being regarded as the world's most cycle friendly region (Horton et al., 2007) with several countries recording high prevalence including the Netherlands where over a quarter of all journeys are made by bicycle (Pucher and Buehler, 2008). Ecological approaches to health behaviour favour the development of comprehensive interventions based on explicit recognition and consideration of multifaceted and multi-level factors (Sallis et al., 2008). Such approaches have provided a means for considering the complete environment within which behaviours are adopted rather than focusing on individual factors (Cochrane and Davey, 2008). In order to implement ecological approaches to changing behaviour it is important to understand the many factors which affect that behaviour. Research in the UK population shows that safety concerns and traffic are barriers to cycling (Transport for London, 2012) whilst health and enjoyment have been cited as motivators (Heesch et al., 2012) but it is not clear if this is representative of a university population.

Global efforts to establish active travel in the student population date back over 20 years. From the Talloires Declaration in 1990 through to the 2002 Graz Declaration universities around the world have acknowledged their unique position to act in a leadership role in terms of sustainable travel development (Balas, 2003) and some authors suggest it is their fundamental obligation to do so (Orr, 1992). However, there is a paucity of research into levels of cycling amongst young adults (Rosen, 2002). The evidence base is especially narrow relating to young adults attending university with limited international (Rissel et al., 2013) and UK (Tolley, 1996) studies identified. Tolley (1996) suggested that car use was the largest detrimental impact from universities on the environment and stressed the need for a change in mind set to reap individual and societal short and long term benefits of increasing cycling within universities.

This paper seeks to explore levels of cycling; barriers and motivators amongst young adults (18–25) within a UK university population. This will allow informed consideration of key determinants of cycling behaviour to be applied to ecological approaches aimed at increasing cycling within this population.

2. Methodology

2.1. Study design

A postpositivist approach was adopted to this cross sectional online self-completed survey. This approach was chosen to identify and assess variables affecting outcomes and consolidate earlier work of others on accepted truths regarding cycling uptake within a university setting. A quantitative design allowed for information collection from a large number and enabled comparison between groups, behaviours and outcomes. In addition some qualitative analysis was possible as a result of two free text boxes within the questionnaire.

2.2. Population and sample

Liverpool has a population of 466,415 of which 13.2% are aged 19–24; higher than the national average of 8.1% (Liverpool City Council, 2011). The proportion of the population classified as White British is 86.2% which is higher than the national average of 81.4% (Liverpool City Council, 2011). It is estimated that 7% of the Liverpool population cycle weekly with 3% cycling 3 or more times a week (Department of Transport, 2013).

The population of interest were university students aged 18–25 studying at Liverpool John Moores University (LJMU) during the academic period 2012-13. The total population of students within LJMU aged 18–25 was 15383 (information provided by LJMU administrative office in response to researcher email; 11th October 2016).

2.3. Recruitment

Convenience sampling was employed to determine which schools and courses to target and the relevant link was provided to students via the student intranet page. Within those schools identified the relevant staff members emailed students with a standard text which included a web link providing access to the online questionnaire. The researcher approached key gatekeepers such as lecturers and the university sustainable transport officer to gain consent for this approach and delivered five presentations to large classes, one within each of the identified schools in an effort to avoid ‘cold calling’ on students via email in line with evidence around increasing response rates (Dillman, 2007). Students were incentivised to participate by the option to be entered into a prize draw to receive £20 worth of supermarket vouchers upon completion of the survey.

2.4. Ethics

Ethical approval for this study was granted by the ethics committee of Liverpool John Moores University (reference number 12/HEA/091). Personal information submitted by students was limited to the email addresses of those wishing to be entered into the prize draw and this information could not be connected to survey responses. These details were accessed upon completion of the study by the researcher and all details erased following the random selection of a winner. All respondents were required to indicate via a tick box that they gave consent for their feedback to be included within a research paper and an additional consent box was employed for those wishing to be entered in the prize draw. The software used for data collection and subsequent analysis featured safeguarding measures built in and access was limited to the researcher alone through a secure password.

2.5. Data collection

No validated tool was found to satisfy the objectives of the study and as such a bespoke survey instrument was developed using the Bristol Online Surveys (BOS) software. The online survey method was selected because university students are at least as likely if not more so to complete an electronic survey than a traditional mail survey (Pealer et al., 2001). LJMU students generally submit work electronically and have access to free use of computers at various sites across the city. The online survey method was felt to be efficient in terms of time, costs and capacity along with minimising errors and providing data in a format easily analysed (Denscombe, 2006).

Initial demographic questions were followed by Likert scale questions based on themes emanating from the literature. Respondents were asked to select a measure of their agreement along a five point scale from strongly agree to strongly disagree. Data was collected on cycling frequency and ranking scales explored perceptions, barriers and motivators to cycling.

In addition to the quantitative design there were two free text questions included to generate a small amount of qualitative data relating to both cycling in general and the survey instrument used. The survey was piloted on 10 LJMU staff and amendments were made based on verbal feedback following this pilot prior to the study commencing. Amendments made included increasing font size and providing a more detailed introductory statement to the survey.

2.6. Data analysis

Data was extracted from the online survey into Statistical Product and Service Solutions (SPSS version 20) for analysis. Descriptive analysis were undertaken including distribution, central tendency and dispersion to generate insight into cycling activity along with potential synergies and differences between groups such as regular and non-regular cyclists. Analysis of major barriers and motivators allowed for comparison with existing evidence and policies implemented.

Cohort characteristics were generated by initial questions relating to factors such as age, gender and school of study. In addition perceptions, barriers and motivators relating to cycling were generated in the form of ordinal data collected through the range of ranking questions. Combining such data allowed the researcher to explore the possibility of relationships between factors such as age and gender with views on cycling and barriers and motivators to establish similarities and differences.

Qualitative data was coded by hand using a colour coding scheme (Cresswell, 2009) and key themes were identified using a grounded theory approach which was checked for bias through use of peer scrutiny whereby the analysis of the primary researcher was appraised by colleagues. The analysis of qualitative data identified themes which were confirmed by colleagues to ensure they were reflective of the study findings.

3. Results and discussion

The survey was completed by 194 respondents of which just over half were male (55%), over three quarters were aged 21 or under (76%) and over half were enrolled at the School of Science (61%). Uptake rate were not assessed as potential numbers who could have engaged with the study were not available.

Table 1 provides an overview of the demographics of the respondents.

Table 1
Profile of survey respondents.

Gender		Age		School	
Male	106 (55%)	18	40 (21%)	Arts, Professional and Social Studies	10 (5%)
Female	88 (45%)	19	48 (25%)	Education, Community and Leisure	26 (13%)
		20	35 (18%)	Health and Applied Social Sciences	33 (17%)
		21	23 (12%)	Technology and Environment	6 (3%)
		22	16 (8%)	Science (including sports science)	119 (61%)
		23	10 (5%)		
		24	6 (3%)		
		25	16 (8%)		

Table 2
Summary findings relating to levels of cycling.

Question	Yes	No	Unsure
Can you ride a bike?	192 (99%)	2 (1%)	
Do you own a bike?	104 (54%)	90 (46%)	
Should more be done to encourage cycling?	164 (85%)	4 (2%)	26 (13%)
Are there more barriers to cycling than driving?	120 (64%)	44 (23%)	30 (15%)

3.1. Levels of cycling

Table 2 presents summary findings regarding levels of cycling. Almost all of the respondents were able to ride a bike (99%) and over half (54%) currently owned one. There was a strong feeling that more should be done to encourage cycling and that there were more barriers in place to cycling than to driving.

Sixty four percent of students stated that they cycled once a year or less. This is unsurprising given the low levels of UK cycling suggesting that less than 10% of adults nationally cycle weekly. The combined percentage of participants cycling on a daily (n = 11) or weekly basis (n = 17) was 15% which is higher than the national average of 10%.

More men (n = 20) were regular (daily/weekly) cyclists than women (n = 8). A chi squared test was performed although the relationship between gender and frequency of cycling was not significant, X^2 (2, N = 194) = 3.71, p= 0.53. Of the 47% (n = 90) who did not own a bicycle only 6% (n = 7) cycled monthly and nobody cycled weekly or daily. Whilst unsurprising that those who do not own a bike, cycle much less frequently than those who do this highlights the importance of increased ownership as a means of increasing overall cycling rates. It is also worth noting that 65% said that they would use a cycle hire scheme if introduced in Liverpool. This positive response suggests that such a scheme may provide an alternative means of accessing a bike without owning one.

3.2. Attitudes and perceptions of cycling

The majority of participants (85%) agreed that more should be done to encourage cycling and 67% agreed that cycling made a big difference in reducing levels of pollution and congestion. Other responses were less consistent, 32% agreed that cyclists tended to be sporty or geeky types whilst 50% felt this was not the case. Similarly 38% said that a person needed to be fit to cycle yet 41% felt that it was not necessary to be fit. Such heterogeneity presents a challenge in using such factors in universal health promoting interventions and campaigns.

One question generated a relatively high level of agreement with 70% of the population saying that they believed it was easier to cycle 'elsewhere'. The term 'elsewhere' is vague and relates to a number of variables including geography, infrastructure and culture. Weather can also be associated with 'elsewhere' and this variable was identified as a major barrier later in the survey and 'elsewhere' may be less of an issue where different weather conditions exist. However weather in itself is not a guarantee of high rates of cycling in young adults attending university as studies in warmer, drier climates have shown (Shannon et al. 2006). Weather is beyond the control of interventions and policies but other aspects of 'elsewhere' can be influenced.

The notion of cycling being easier 'elsewhere' is reinforced by qualitative comments within the survey. One comment supports this point especially well *'The environment should also be more facilitative of bikes, such as increased space for cycle lanes. Taking a more biopsychosocial approach to improving cycling would be in the best interests of the public, and would help to mirror the benefits of such a system adopted in the Netherlands'.*

This comment resonates with the ecological approach endorsed to address public health issues by some commentators (Richard et al., 2011) and emphasises the idea that 'elsewhere' is multi-faceted and as such strategies should be similarly multi-faceted in order to create an environment that supports cycling, as utilised in countries with the highest rates. This is also echoed by another participant who said *'I would love Liverpool to become a cycling city like Amsterdam!'* Certainly understanding the complexity of 'elsewhere' in this context appears valuable in understanding the potential for intervention, for example relating to the built environment and cultural norms.

3.3. Barriers

Whilst a range of barriers were identified weather and safety returned as the two primary barriers with weather cited by 62% of participants and safety by 39%. Given that only 22% of the sample cycle more than once a year this can be seen as a reflection of the views of many occasional or non-cyclists and as such could be identified as a combination of safety and perceived safety. This is consistent with previous work where perceived danger has been recognised as a major barrier to the uptake of cycling especially amongst occasional or non-cyclists (Transport for London, 2012). Previous studies have suggested that this view is challenged by regular cyclists and as such is largely an expression of perceived danger due to a lack of confidence amongst other factors. There were no significant differences by gender in any of the barriers included in the survey (e.g. weather and safety).

Lack of shower facilities was the third most frequently cited barrier (24%). Again this was consistent for male and female responses. Lack of showers and changing facilities also emerged as a theme for qualitative responses. It is beyond the scope of this

study to suggest whether this barrier is more significant to different types of cycling (recreational, sport, utility, commuting) although the qualitative data suggests that it is more applicable to utility and commuting cycling. This is evidenced by comments such as *'my biggest barrier would be turning up to lectures smelling after I exercise'*. Typically settings away from the home where exercise is promoted have shower and changing facilities and as such the promotion of exercise through commuting appears at odds with alternative modes of exercise.

A further barrier emerging from the qualitative data was the cost of purchasing a bike. This is illustrated by the following quote *'Money to buy a bike. I am particularly looking to buy a road bike, which are very expensive'* and supported by others such as *'My biggest barrier is the cost of a bike'*. As such it is possible that the desire to own a bike is not lacking but the associated costs are a practical barrier which impedes greater ownership and subsequently higher cycling rates. The proposed Liverpool cycle hire scheme, which has been highlighted as well supported by participants, may provide something of a solution to this issue. Subsidised and recycled bikes are other options which have been explored in England to overcome this barrier.

Only 15% of the population disagreed with the statement that there were more barriers in place to cycling than to driving and so clearly more work is needed to remove actual or perceived barriers. Barriers identified in the study resonate with those identified by the LJMU travel plan (LJMU, 2015) which identifies the two main barriers for staff and students to cycling more as safety and facilities, including showers. In terms of addressing these barriers the university travel plan states that safety is '*external to LJMUs control'* and has approached this issue by working collaboratively with the local authority. The local authority approach to this barrier has been consistent with policies across the UK focusing on increasing and improving numbers of cycle lanes which has mixed levels of support as the best approach to address issues around safety.

Death and accident rates are lowest, relatively speaking, in countries and areas with high levels of cycling (Jacobsen, 2003) and it is widely accepted that a paradox exists wherein levels of cycling increase when feelings of safety are experienced. Recognising that a highly effective way of improving safety and the perception of safety is by increasing numbers cycling continues to present a significant challenge for policy makers. With regards shower and changing facilities improvements to both facilities and student awareness of those facilities was recommended by the LJMU travel plan although the extent to which this has happened and the impact it has made remains unclear.

3.4. Motivators

Improving fitness was reported as either the primary or secondary motivation to cycle by 62% of respondents followed by 'maintaining or losing weight' which 50% of respondents said was one of their two main motivators. There is considerable crossover between these two motivators and messages combining these complimentary motivators might be beneficial in cycling promotion. Caution must be used in an effort not to market cycling as solely about fitness and weight management as this is likely to only act as motivator to some individuals and may have a negative impact on increasing levels of cycling, especially in those currently not cycling regularly. This is supported by Table 3 showing the cross tabulation of students cycling frequency and health benefits as a motivator. Chi squared testing showed significant differences between cycling frequency and health benefits as a motivator. Regular cyclists (daily/weekly) were significantly more likely to see health benefits as a motivator than both occasional cyclists (monthly/annually) X^2 (2, N = 179) = 8.77, p = 0.03 and those cycling annually; X^2 (2, N = 138) = 10.31, p = 0.01. Whilst such differences exist there remains considerable heterogeneity around primary motivators which presents a challenge for effective policy and intervention planning.

Almost half of respondents (46%) cited 'saving money' as one of their main two motivators. However costs of cycling and especially buying a bike were mentioned as barriers. Cost then can be seen as an important consideration when seeking to increase levels of cycling as it can act as both barrier and motivator. Subsidised gym membership is offered to all students but subsidised cycling is not. Student discount can be attained in the usual way in many places selling bicycles and equipment but LJMU do not offer a bicycle hire scheme, discounted bikes or any incentives for students cycling to university despite recognising the low levels of students who do so (LJMU travel plan, 2015). The initial cost of buying a bike must be addressed as subsequent long term costs are low and current policy of removing barriers to cycling is likely to have a greater impact on bike owners rather than encouraging non owners to buy a bike and begin cycling.

In terms of environmental factors having a motivational impact there is little evidence to support this with both 'reducing pollution' and 'reducing congestion' being seen as a primary motivator by only 12% of respondents. This is despite the 67% who acknowledged that cycling had an impact on pollution and congestion reduction. Clearly at present an awareness of the

Table 3
Cycling frequency and health benefits as a motivator.

		Health benefits as a motivator		Total
		No	*Yes*	
Cycling frequency	*daily*	2 (18%)	9 (82%)	11
	weekly	11 (65%)	6 (35%)	17
	monthly	27 (66%)	14 (34%)	41
	annually	85 (77%)	25 (23%)	110
	other	13 (87%)	2 (13%)	15
Total		138 (71%)	56 (29%)	194

environmental benefits of cycling is insufficient to significantly increase rates and this hints at the value-action gap (Homer and Kahle, 1998; Shove, 2010) which has been found to exist in many areas of sustainability and environmentalism (Barr, 2004; Young et al., 2010).

3.5. Strengths and limitations

A major strength of this study is the real world setting in which it took place along with the need for additional research within this population. In addition the study could be easily replicated allowing for more powerful inferences to be made. Other suitable research opportunities are also identified through this study. Significant investment is made by universities to increase levels of cycling and the findings of this study may provide a focus for future investment and policy development.

Limitations of the research include the limited use of inferential statistics, largely due to small numbers, and the role of convenience sampling in recruitment. Students outside of the age range desired (18–25) could also have completed the survey although older students represent low numbers with 30% of the student population regarded as 'mature students' which is defined as over 21 (email communication between primary researcher and LJMU administration office, April 2013). In addition whilst the survey instrument was piloted this was only done with staff and not students.

4. Conclusion

The overwhelming majority of respondents had the ability to cycle (99%) and over half of them owned a bike (54%) and yet only 15% of the respondents regularly cycled. Understanding the reasons for this failure to align ability and means to produce action should underpin any policy or intervention aimed at increasing cycling rates. There was heterogeneity in some aspects of attitudes to cycling, barriers and motivators based although there was a great deal of homogeneity within the study and also in relation to evidence relating to the general population. This suggests policies and interventions can be similar within universities to those adopted more widely and as such more practical to implement. Whilst some barriers and motivators emerged as more common than others a significant strength of cycling is its ability to appeal to a diverse range of individuals who have various reasons for riding a bike and this potentially broad appeal and subsequent impact should be embraced. This study has confirmed the findings of previous studies and highlights that universities, whilst in some respects are sub cultures can be approached in the same way as the general population as they have similar perceptions, barriers and motivators.

Current approaches to increase levels of cycling have focused primarily upon singular aspects and largely on barrier reduction (safety) with little consideration for the motivators present within this group. As such it is suggested that future initiatives to increase cycling adopt an ecological approach which considers primary barriers (safety, facilities) alongside primary motivators (fitness, weight management) in order to maximise effectiveness whilst remaining cognisant of variation in barriers and motivators between regular and non-regular cyclists. The multi-faceted approach endorsed by this paper should be underpinned by consideration of how to reduce barriers and maximise motivators to enable comprehensive strategies for increasing cycling levels.

Future research recommendations would include in-depth qualitative work using a 'positive deviance approach focusing solely on the small number of individual who manage to adopt a healthy lifestyle behaviour (cycling) despite the barriers. Such research could help inform policy and planning targeting helping other to adopt similarly healthy behaviours. A larger study looking the university population, perhaps over multiple sites with the same tool, would also allow for greater generalisability and use of inferential statistics. Also additional research into the divisive issue of cost is recommended along with work to evaluate schemes linked to support for buying bikes (cycle to university), bike sharing programmes and the impact of cycle hire schemes such as the Liverpool CityBike scheme.

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