Transport Mode Choice in Recreational Football Clubs: The Influence of Spatial Accessibility on Modal Choice in Zwolle, the Netherlands.

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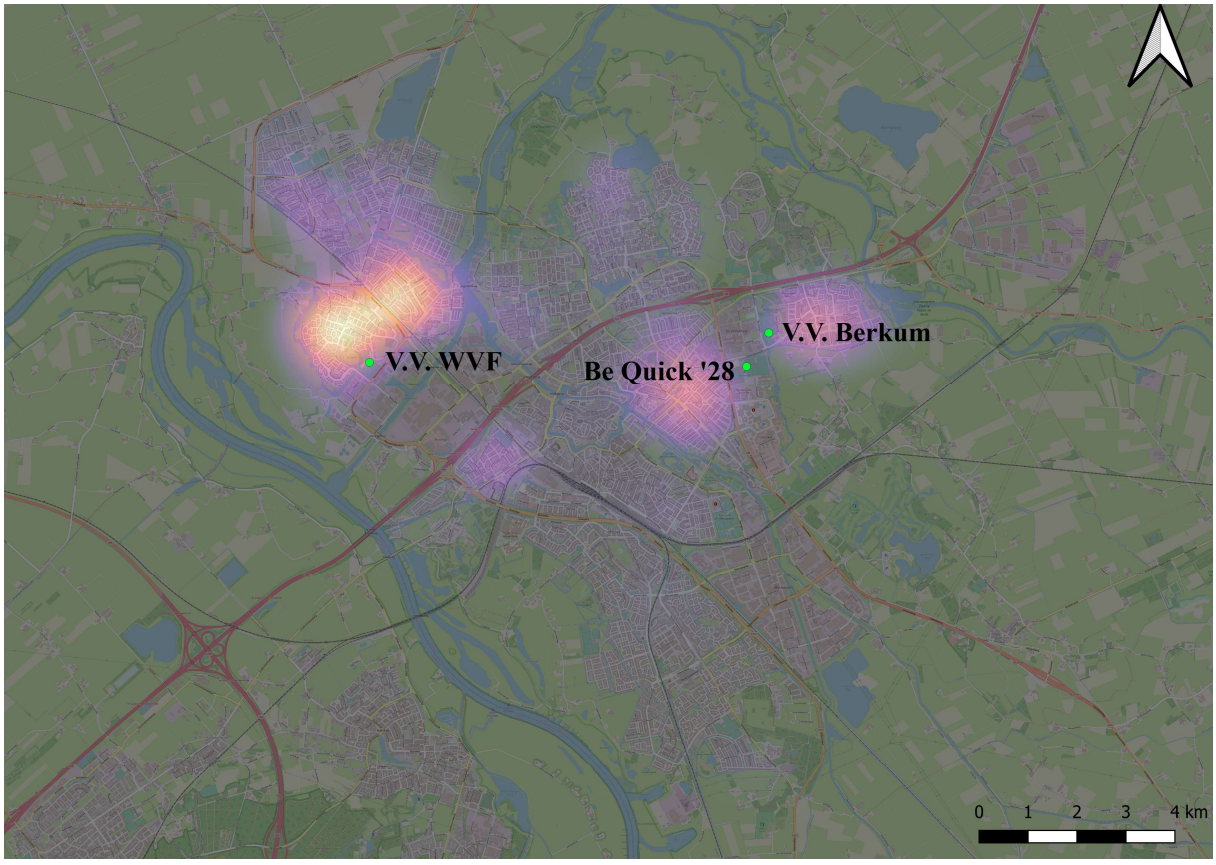

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Title	Transport Mode Choice in Recreational Football Clubs: The Influence of Spatial Accessibility on Modal Choice in Zwolle, the Netherlands.
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Abstract

Ongoing research shows that accessibility influences the likelihood of use of services. Accessibility changes with different transport modes. Currently, these different transport modes, particularly cars but also bikes, can become a nuisance to neighbours of sport clubs. The main question that is asked is "*How does spatial accessibility influence transport modal choice in recreational football clubs in Zwolle?*". With this question it is researched whether distance influences modal choice and what role perceptions play in modal choice.

By using existing literature and a comprehensive statistical analysis based on mostly primary data, an answer to the main question is attempted to be formulated. Distance influences whether to walk, bike or drive to a sports club. A 15-minute time window as earlier found for a maximum walking distance is not found for biking. Furthermore, the ease to navigate walking, biking or driving influences the use of that transport mode. It can be said that infrastructure has an influence on transport mode choice.

Key words: accessibility, transport mode, mode choice, perceived accessibility, sports

Table of contents

1. Background

It is not an unusual sight to see streets surrounding football clubs packed with parked cars. This can lead to pressure on the infrastructure and can be a nuisance to the surrounding neighbourhoods (Kuik, 2019; Koster, 2019). Association Football is the most popular sport in the Netherlands, according to sport association membership, and it is still growing in popularity (NOC*NSF, 2018). The women in the research use the car al most as men do, despite being only 34% of the respondents (Appendix A). With only 12% of the members of the KNVB being female and women's football being the fastest growing sport in the Netherlands (Romijn & Elling, 2017), it can be expected for traffic to football clubs to only increase more in the near future.

There has been interest in modal choice and sports. Accessibility is seen as a predictor for physical activity (PA) by youth (Scott et al., 2007, p.346). However, de Vos et al. (2016) note that "the built environment … can impose restrictions on travel mode choice". There is great interest in the influence of the built environment on active travel mode choice (Ferguson et al., 2013, p.1). With great interest in the influence of the built environment on modal choice and the association with transport mode use and sports, it is relevant to research the influence of spatial accessibility on transport modal choice in football clubs.

The province of Overijssel has relatively many active participants in sports and members of sport associations (NOC*NSF, 2018). Zwolle has relatively fewer members of sports clubs (25,8%) than the rest of the province (Volksgezondheidenzorg.info, 2019), but more than the largest city of the province, Enschede. The city of Zwolle sees itself as a 'sportstad', implying that they are invested in a good climate for participation in sports (Gemeente Zwolle, 2019). With 13 football clubs on 10 complexes in its city limits (SportService Zwolle, 2019), it has has a variety of clubs to do research at. With room for improvement, but with ample facilities, Zwolle appears to be a good research area for this study.

Therefore, this study will investigate the influence of spatial accessibility on modal choice in amateur football clubs in Zwolle. From this research, clubs and municipalities can find ways to maximize sustainable traffic to football clubs.

2. Research problem

Ferguson et al. (2013) has described the interest between the built environment and modal choice in recreational sports. However, there has not been research into the influence of spatial accessibility on transport modal choice in sport clubs. Therefore, the main research question will be as follows;

How does spatial accessibility influence transport modal choice in recreational football clubs in Zwolle?

This main question can be divided into three sub-questions;

- *How does the proximity to football clubs affect the transport modal behaviour of residents living nearby?*
- *How does perceived accessibility influence transport modal choice?*
- *How does infrastructure influence transport modal choice?*

In the theoretical framework, there will be more attention into the connection of proximity and accessibility features and modal choice.

2.1 Hypotheses

The hypothesis to be researched is as follows; *Spatial accessibility measures influences transport modal choice in football clubs.* To answer this hypotheses, other hypotheses need to be formulated. *Travel distance influences transport modal choice*., *Perceived accessibility influences transport modal choice.* & *Infrastructure influences transport modal choice.*

2.2 Structure

The structure of this dissertation paper is as follows. Firstly, a theoretical framework will be laid out, containing relevant theories and concepts, based on literature. This will support the academic relevance and give a framework for data analysis. At the close of this framework, a conceptual model will be laid out. Following this, the methodology will be summarised, wherein the choice of research methods, the manner of data collection and ethical considerations will be discussed. After this, results will be presented in theoretical context. This will be finished with a discussion about the results. Conclusions of the research and recommendations for further research will close this paper. This will also contain strong points and restrictions of this research. This will be followed by a list of used references and appendices with statistical tables and maps.

3. Theoretical framework

“There is no single theory on what affects travel mode choice most...” (Schwanen and Lucas in De Vos et al., 2016, p.773). Travel mode choice can be influenced by a plethora of factors, this research aims to find correlations between factors. Accessibility of recreational sport facilities has been researched before. The research of Ferguson et al. (2013) is interesting, but it does not link specific transport modes directly to the built environment, but rather to the affluence of certain neighbourhoods.

Wendel-Vos et al. (In Titze et al., 2008, p.253) state that there is a positive relationship between sport grounds and park area and bicycle use. Therefore, proximity to sports clubs could determine bicycle use to an extent. Carver et al. (In Titze et al., 2008, p.253) notes a positive relationship between children's use of bicycles and perception of good sport facilities. Titze et al. (2008, p.257) also state that bike lane connectivity is positively associated with bike use.

Karusisi et al. (2013, p.8) found that the probability of use of a swimming pool within 1000 meters, or approximately 15 minutes walking distance, was significantly higher than outside of that area. It is interesting to see whether proximity as a determinant to use applies to formalised recreational sports as well, because there can be a ‘pull-effect’ of sports clubs. Kim & Lee (2000) note that recreational activities can be considered a pull-factor.

Scott et al. (2007) notes that for 8 out of 9 sports in the survey, easy access was reported highest when the facility was within a 0.5 mile radius of their homes. Association football may not be in their survey as it is not as popular in the United States as it is in the Netherlands. Also, Pucher & Buehler (2012) write that in the Netherlands, policy is made to encourage walking and cycling, while discouraging car use. Therefore, a direct correlation to the survey of Scott et al. can possibly not be found. According to Titze et al. (2008), in the EU around half of all car trips are shorter than 5km. There could be a possibility that some of these trips can be done by walking or biking as well.

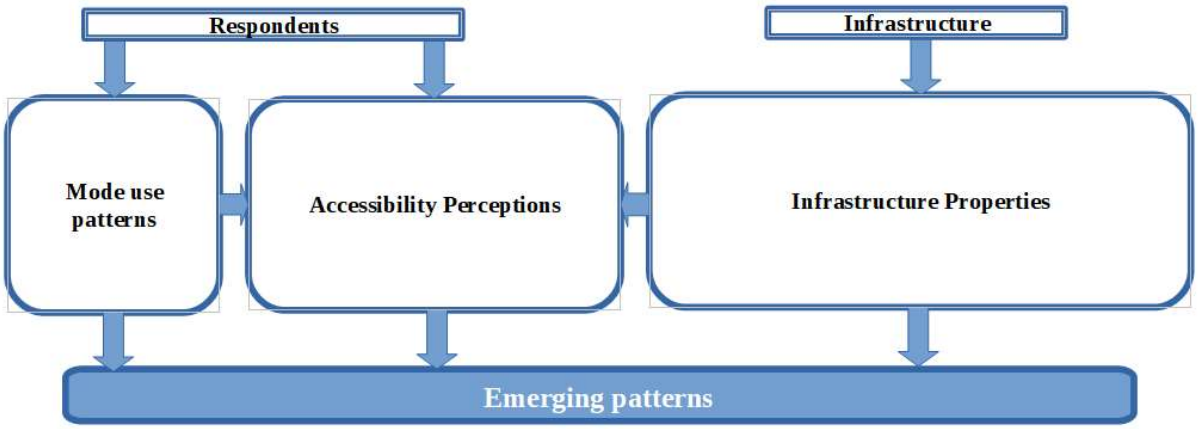
The ease to move through a given environment can be influenced by certain factors in the built environment. Aziz et al. (2017) states that improving walk and bike infrastructure increases the likelihood of active travel mode choice. Pedestrian pathways and crossings can influence the ease with which to walk. The proximity of dedicated bicycle lanes or bicycle friendly streets may influence ease of biking. The presence of street lighting may influence slow transport mode choice as well. The proximity of a bus stop can influence bus use. Therefore, permeability is one of the concepts that will be tested. Permeability is “the property that denotes the ability to sense or move through a given environment” (Silavi et al., 2017, p.1).

Furthermore, use of public transport is not only limited to travel time. Ferguson et al. (2013, p.4) averages bus stop waiting times to half of the interval of bus stops up to 5 minutes. However, in association sports, which have a set start and semi-set finish time, knowledge of bus rosters do not dictate waiting times. Therefore, the 5 minute mark should be disregarded.

Therefore, the current research highlights that proximity can be a determinant to transport mode choice. A 15-minute mark can determine the likelihood of walking to a sport related activity. And, an environment supportive of a travel mode increases the likelihood of using that transport mode. This research tries to test the influence of distance on mode choice and aims to get more insight in how perceptions determine mode choice.

4. Conceptual Model

The conceptual model uses relationships between accessibility and mode choice, as well as personal factors and mode choice. This will be tested through GIS and statistics.



5. Methodology

A quantitative research method is used for this dissertation. The data used in the research is primary data. This data was collected by a survey distributed to the members of three football clubs in Zwolle. Namely; Be Quick '28, Voetbalvereniging Berkum & Voetbalvereniging W.V.F.. These clubs are three of the largest clubs in Zwolle. Zwolle was chosen as a research area because there are relatively many members of sports clubs for a larger city. Two other football clubs were contacted as well, but were not willing to cooperate. The choice for these football clubs was motivated to get as many respondents as possible, without complicating the research by adding football clubs where it would be difficult to get enough respondents to perform substantiated statistical tests.

Travel times were calculated using address data supplied by respondents. Using Google Maps and setting the desired departure time at 2:00 AM. At this time, delays are usually low so travel times are a best case scenario. Accessibility perceptions are measured both by asking for perceptions on the ease of navigation and asking for perceptions on travel time. People are asked for ease of navigation instead of ease of completing the distance because ease of navigation complies better with the concept of permeability. Perceptions on navigation are measured by using a semantic differential scale, using a scale to measure the connotations respondents have with certain statements. Perceptions on travel time are measured using a 'yes' and 'no' option. The questionnaire can be found in Appendix C.

Variable	**Type**	**Values**
Gender	Nominal	Binary: Male/female
Age	Ratio	
Postal Code	Nominal	Geographical value
Housenumber	Nominal	
Household Composition	Ratio	
Household in Football Club	Ratio	
Football club	Nominal	
Transport mode daily commute	Nominal	Categories: Bike, Car, Public transport, walking
Transport mode match days	Nominal	Categories: Bike, Car, Public transport, walking
Transport mode practice days	Nominal	Categories: Bike, Car, Public transport, walking
Ease of navigating the neighbourhood on foot	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating the neighbourhood by bike	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating the neighbourhood by car	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating the neighbourhood by public transport	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating to the football club on foot	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating to the football club by bike	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating to the football club by car	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating to the football club by public transport	Ordinal	7-point semantic scale; Very easy-very hard
Ease of navigating to the football club overall	Ordinal	7-point semantic scale; Very easy-very hard
Perception of football club within 15 minutes walking	Nominal	Binary: Yes/No
Perception of football club within 15 minutes biking	Nominal	Binary: Yes/No

5.1 Methodological tools

To test the null hypotheses, SPSS Statistics 26 by IBM is used. The aim for the questionnaire was to get at least 30 respondents per participating football club in order for the results to be distributed normally according to the central limit theorem, which works well with samples greater than 30. The questionnaire had 411 respondents who filled in the questionnaire to a greater or lesser extent. This is why *N* changes in tests from 353 to 411.

To test the first sub-question "*How does the proximity to football clubs affect the transport modal behaviour of residents living nearby?*" a series of logistic regression analyses are used. Transport mode choice on match days is recoded into 3 different dummy variables.

For the second sub-question "*How does perceived accessibility influence transport modal choice?"* a series of Chi-square tests and Fisher's Exact tests are used. Recoding needs to be done to fulfil the requirements of the Chi-Square tests.

To answer the third sub-question "*How does infrastructure influence transport modal choice?*", a regression analysis needs to be made.

The respondents are from a big part of Zwolle. To give insight in where the respondents are located primarily a heat map is made. Some respondents live in other parts of the country, but for legibility, these are not included in Figure 5.1.

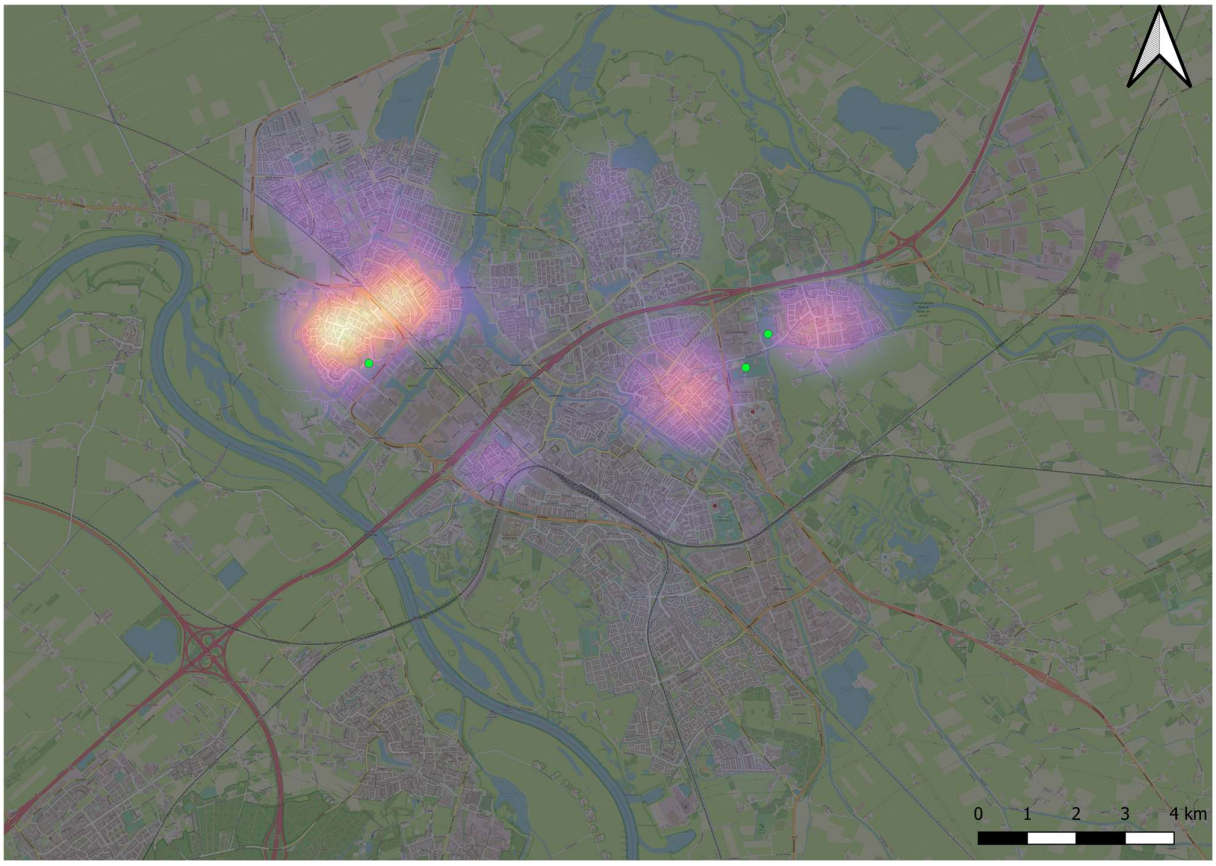


Figure 5.1 Response heat map

5.2 Ethical considerations

The researcher has no interests in the field of amateur football and other related businesses. To survey, the use of club networks would be preferable. As an outsider, the research will not be compromised by motivations other than to gain insights. As a former inhabitant of Zwolle, I can relate somewhat to the experiences of respondents, but it is important to leave opinions as they are. As an outsider, there can be a barrier to approach people, but as most people will be contacted through email, any personal considerations or hesitations will not be shared.

In order to obscure personal data as much as possible, the dataset would be kept in a controlled environment and addresses will be recoded into variables in order to anonymize them. These addresses will be used to make variables as to whether or not they are in certain distances of their football clubs and will be made into heat maps based on postal codes in order for answers not to be traced back to individual respondents.

6. Results

In this chapter, results of statistical analyses will be discussed. In each paragraph, one of the main questions will be discussed, together with the corresponding null hypothesis. The results will give an answer to the question *to what extent accessibility measures influence transport modal choice in football club members in Zwolle*.

For reference, two histograms are given. It appears that a large amount of respondents are between 40 and 50 years old, as can be seen in Figure 6a: Age distribution. This can be explained by the fact that a lot of the people responsible for travel choice in a football club can be parents of players.

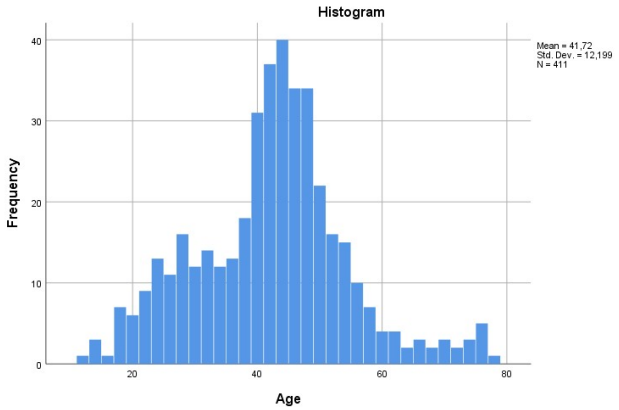


Figure 6a: Age distribution

It also appears that most respondents are within 14 minutes driving distance of their football club, as can be seen in Figure 6b: Driving distance distribution. Most people tend to live fairly close to the place they like to play football.

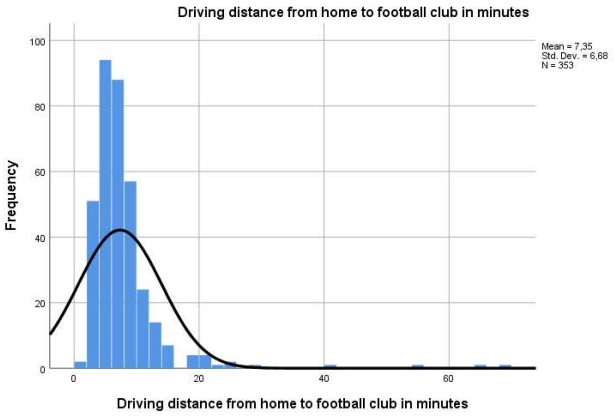


Figure 6b: Driving distance distribution

6.1 Travel distance and modal choice

In this section the question "*How does the proximity to football clubs affect the transport modal behaviour of residents living nearby?*" is discussed. In the analyses it is explored whether the time it takes to travel to the club using a certain transport mode influence the choice whether or not to use that transport mode.

To do this, three binary logistic regression analyses are executed for walking, biking and driving. Public transport was also an option in the questionnaire. However, it appears that none of the respondents use public transport to gain access to their football club. More results are found in the appendices (Appendix B; Analyses 6.1.1 through 6.1.3).

In the first analysis, a logistic regression was executed in order to see if walking distance influences the choice to walk to the football club. According to this test, there is a correlation between walking distance and the choice to walk to the football club, as the test shows a probability value ($\chi 2(1) = 2{,}561$ $p = .046$). However, the model explained 3,7% (Nagelkerke R^2) and correctly classified 97,7%

The second regression analysis was executed in order to see if biking distance influences the choice to bike to the football club. The results appear to be significant ($\chi 2(1) = 18{,}232$ $p < .004$). The model explained 7,5% (Nagelkerke R^2) and correctly classified 77,6%.

The third regression analysis also shows to be significant. Therefore, a correlation between driving distance and the choice whether or not to use a car is shown ($\chi 2(1) = 16{,}105$ $p < .000$). The model explained 6,9% (Nagelkerke R^2) and correctly classified 77,9%.

In all 3 measured transport modes, there is a correlation between the travel time and the use of a certain mode. The hypothesis "*Travel distance influences transport modal choice*." appears to be correct.

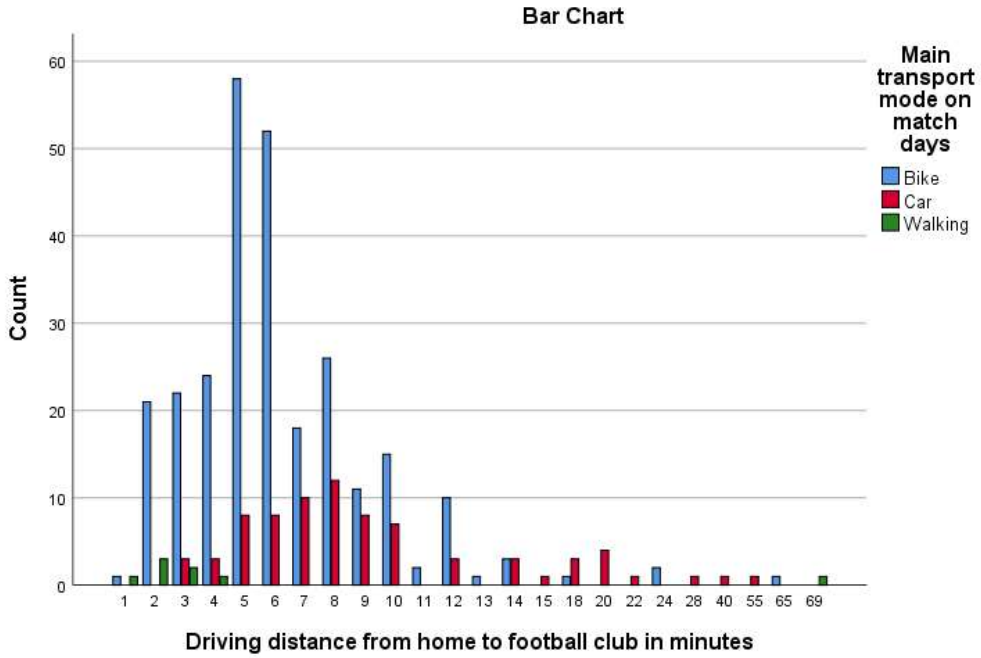


Figure 6.1a Bar chart distance-modal choice

6.2 Perceived accessibility and modal choice

Next to actual distance, perception of respondents can also influence their modal choice patterns. In this paragraph the question "*How does perceived accessibility influence transport modal choice?"* is being discussed. It is explored what the influence of ease of navigation and the perception of travel time is on modal choice. To do this, Chi-square tests are used. In Chi-Square tests the conditions for most tests were not being met. Therefore, the variables were recoded to also suit an alternative test, Fisher's Exact test. The results of these analyses are in Appendix B; Analyses 6.2.1 through 6.2.5.

Because the conditions for a Chi-square test are not being met, Fisher's exact test can give an answer to the question whether or not there is a correlation between the ease of navigating to the club whilst walking and actual walking. Because the test is not significant ($p = .172$), there appears to be no correlation between walking to the football club and the ease of navigating to the football club. It appears that ease of navigating to the football club using a bike is a significant predictor for actual bike use ($p < .000$). It appears that ease of navigating to the football club using a car is also a significant predictor for actual car use ($p = .023$).

There appears to be no correlation between the club being within a perceived distance of 15 minutes of biking and the actual use of a bike ($\chi2(1) =1,831$ $p = .176$). Apparently, the 15 minute time window used by Karusisi et a.l (2013), does not translate into biking.

For walking, the 15 minute time window does appear to apply. Because conditions for the Chi-square test are not being met, Fisher's exact test is significant ($p = .027$)

Ease of navigating is not significant as a predictor for walking, but it is significant for biking and driving. This can be explained by the few people who are walking even short distances. When walking distances are up to 6 minutes on a bike that same distance is under one minute. Because bike ownership is common in the Netherlands, people appear to be inclined to use the faster transport mode.

However, respondents generally appear to find it easy to navigate to their football club, regardless of transport mode. Whilst the statement 'Ease of navigating by a certain transport mode is a predictor for use of said transport mode' can be true, the statement 'unease of navigating by a certain transport mode is a predictor for not using said transport mode' may hold more value.

The perceived 15 minute time window of walking distance is significant. It appears to be that within a 15 minute time frame, people are more inclined to walk. However, this does not apply to biking. This can be explained by several factors. Some respondents might not be able to go by car, even when they would like to because they have no driving license, or the cars in the family might be prioritized for other uses.

The answer to "*How does perceived accessibility influence transport modal choice?"* is complicated. Perceived accessibility in the form of ease of navigation is somewhat of a predictor. However, the perception of distance in time is only a predictor in walking, which only 9 out of all respondents do. The use of a perceived 15-minute travel distance is not a predictor for bike use, which is the transport mode of the majority of all respondents.

6.3 Infrastructure and modal choice

The most plain way to measure whether infrastructure is more supportive of slow modes is to calculate whether it is faster to go by car or by bike. Pucher & Buehler (2012) stated that car driving is discouraged in Dutch policy, whilst biking is encouraged. As these transport modes are by far the most common reported transport modes in this study, it is fair to assume that the choice is between these two transport modes most of the time. Therefore, a new variable is calculated. Subtracting the driving distance in minutes by car from the biking distance in minutes.

The analysis uses a binary logistic regression to see whether the shorter a distance is on bike compared to by car, the more likely it is not to use a car. The results of this analysis is in Appendix B; Analysis 6.3.1. The results of this test are significant ($\chi2(1) = 8{,}236$ $p = .022$). The model explained 3,5% of results (Nagelkerke R^2) and correctly classified 78,2%.

Therefore, it can be assumed that the shorter a distance is by bike compared to by car, the less likely it is that a car will be used. However, when distances are relatively shorter by bike compared to by car, distance to the football club is generally smaller as well. However, a model using both metrics (Appendix B; Analysis 6.3.2) is not much better ($\chi2(2) = 19{,}663$ $p < .000$). The model explained 8,3% of results (Nagelkerke R^2) and correctly classified 78,8%.

Using linear regression analysis (Appendix B; Analysis 6.3.3), ($F(1, 351) = 1794{,}927$, $p < .000$, $R^2 = .836$), it is found that distance and “bike distance-car distance” are correlated.

6.4 Data discussion

With a the amount of respondents on each variable ranging from 353 to 411, it is expected that strong tests can be used. However, non-parametric tests were necessary in order to perform tests on certain variables. Fisher’s exact test was used to calculate the influence of perceived accessibility. However, it is preferred to use stronger tests whenever this is possible.

There were four cases with a travel time that can be considered an outlier. Respectively 40, 55, 65 and 69 minutes. It is plausible that these respondents do not have an active role in their club any more or they might be students living elsewhere in the country.

There are 9 respondents who are not old enough to drive by themselves and 12 respondents over 70. This can influence what transport modes they can use. One of the respondents who reported to go walking lives 1038 minutes from his or her football club. Considering that the age of the respondent is the age a student could be, this respondent could stay at his parents in the weekends.

The respondents are not distributed equally among the football clubs. As seen in Appendix A, 53,5% of all respondents come from one football club. The amount of women in the research is also different compared to the average of the KNVB. It is 34,1& compared to 12% in the research of Romijn & Elling (2017).

7. Conclusions

The goal of this research is to give answer to the question how spatial accessibility influences modal choice in recreational football clubs in Zwolle. This was researched by using a questionnaire distributed to members of 3 football clubs. In this research, travel distance, perceived accessibility and infrastructure are used as factors to attempt to predict modal choice in recreational football clubs.

The research of Karusisi et al. (2013) and Scott et al. (2007) suggest that travel distance influences use of certain facilities. This dissertation adds to that, noting that there is a correlation between distance and the use of certain transport modes. A 15-minute time window, as per Karusisi et al. (2013) is not found for biking, but is is found for walking. The likelihood of walking within a perceived time frame of 15 minutes is higher than outside of that time frame. For biking, the same cannot be said.

There also appears to be a relation by ease of navigation to the football club and the use of a transport mode. However, because it can be expected of members of a football club to be familiar with the way to their football club, the obverse may be more valid. When members find it uneasy or hard to navigate to their football club using a certain transport mode, they will most likely not use that transport mode. Therefore, the research of Silavi et al. (2017), does appear to be applicable to specific transport modes.

The influence of infrastructure is also present. When it takes less long to bike then to drive, it is less likely a car is used. Dutch policy to discourage car use does appear to work. The correlation between distance and "bike distance-car distance" is very interesting. It can be said that infrastructure can be planned in such a way that car use is less attractive (Pucher & Buehler, 2012), but this effect is seemingly most present in short distances.

The hypotheses were as follows; *Travel distance influences transport modal choice*., *Perceived accessibility influences transport modal choice.* & *Infrastructure influences transport modal choice.* According to the tests, all hypotheses are correct.

To answer the question "*How does spatial accessibility influence transport modal choice in recreational football clubs in Zwolle?"*, one should say that distance transport motivates transport mode choice. Building infrastructure in a way to suit slow traffic modes also appears to work and if someone finds him or herself uneasy to use a certain transport mode, it is unlikely that he or she will use that transport mode. If clubs have reached their peak capacity in car parking, they can restrict new membership to only come from within a certain proximity, where bike use is much more likely than car use. Municipalities on the other hand can go on with discouraging car traffic in policy and infrastructure.

7.1 Reflection

In this research, it is suggested that only travel distance and accessibility perceptions motivate the mode choice used for travel to a sports club. There can be many different factors that motivate travel mode choice, like ingrained habits, infrastructure or the lack of choice in travel modes (De Vos et al., 2016). Also, this research is Dutch in its context. The same results may not be found

elsewhere, because Dutch planning is more motivated towards increasing bike use (Buehler & Pucher, 2012). This research is limited in its scope to keep it manageable.

In this research, only 3 football clubs were included in the research. The respondents from these clubs mainly live in the city of Zwolle, transport mode choice may be influenced differently by factors in a more rural environment. The research is limited because tennis and field hockey, the second and third sports of the Netherlands (NOC*NSF, 2018), were not included. Motivations can be different in these clubs. Footballers have a fairly limited amount of gear for their sport compared to sports where rackets or hockeysticks need to be used.

There were also fairly little respondents who use to walk to get to their football club. Therein lies one of the biggest limitations of this research. Only 8 respondents note that they walk to their football club. For further research it can be of value to expand the research even further, aiming for even more respondents, because stronger tests can be used.

The research is also limited, being quantitative research. Motivations are still not entirely clear. Further research could benefit greatly from qualitative research methods. A heterogeneous group of respondents from different backgrounds in both sports and location can give much more insight in how mobility choices are motivated regarding sports.

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9. Appendices

Appendix A: Descriptive Statistics

Male * Main transport mode on match days Crosstabulation

Count

		Main transport mode on match days			Total
		Bike	Car	Walking	
Male	Female	91	46	2	139
	Male	216	48	7	271
Total		307	94	9	410

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	140	34,1	34,1	34,1
	Male	271	65,9	65,9	100,0
	Total	411	100,0	100,0	

Member of Football Club

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		2	,5	,5	,5
	(V.V.) W.V.F.	220	53,5	53,5	54,0
	Be Quick '28	41	10,0	10,0	64,0
	V.V. Berkum	148	36,0	36,0	100,0
	Total	411	100,0	100,0	

Appendix B: SPSS Outputs

Analysis 6.1.1

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	2,561	1	,110
	Block	2,561	1	,110
	Model	2,561	1	,110

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	73,848[a]	,007	,037

a. Estimation terminated at iteration number 7 because parameter estimates changed by less than ,001.

Classification Table[a]

			Predicted		
			MatchDay=Walking		Percentage Correct
	Observed		0	1	
Step 1	MatchDay=Walking	0	345	0	100,0
		1	8	0	,0
	Overall Percentage				97,7

a. The cut value is ,500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Walking distance from home to football club in minutes	,003	,001	3,992	1	,046	1,003
	Constant	-3,954	,392	101,489	1	,000	,019

a. Variable(s) entered on step 1: Walking distance from home to football club in minutes.

Analysis 6.1.2

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	18,232	1	,000
	Block	18,232	1	,000
	Model	18,232	1	,000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	371,475[a]	,050	,075

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than ,001.

Classification Table[a]

			Predicted		
			MatchDay=Bike		Percentage Correct
	Observed		,00	1,00	
Step 1	MatchDay=Bike	,00	8	77	9,4
		1,00	2	266	99,3
	Overall Percentage				77,6

a. The cut value is ,500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Biking distance from home to football club in minutes	-,027	,009	8,507	1	,004	,973
	Constant	1,467	,161	82,716	1	,000	4,335

a. Variable(s) entered on step 1: Biking distance from home to football club in minutes.

Analysis 6.1.3

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	16,105	1	,000
	Block	16,105	1	,000
	Model	16,105	1	,000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	354,214[a]	,045	,069

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than ,001.

Classification Table[a]

			Predicted		
			MatchDay=Car		Percentage Correct
	Observed		0	1	
Step 1	MatchDay=Car	0	272	4	98,6
		1	74	3	3,9
	Overall Percentage				77,9

a. The cut value is ,500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Driving distance from home to football club in minutes	,082	,026	10,220	1	,001	1,085
	Constant	-1,904	,235	65,865	1	,000	,149

a. Variable(s) entered on step 1: Driving distance from home to football club in minutes.

Analysis 6.2.1

Crosstab

Count

		MatchDay=Walking		Total
		,00	1,00	
Ease of navigating to the football club walking	Easy	310	9	319
	Not easy	68	0	68
Total		378	9	387

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,964[a]	1	,161		
Continuity Correction[b]	,918	1	,338		
Likelihood Ratio	3,524	1	,061		
Fisher's Exact Test				,370	,172
N of Valid Cases	387				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 1,58.

b. Computed only for a 2x2 table

Analysis 6.2.2

Crosstab

Count

		MatchDay=Bike		Total
		,00	1,00	
Ease of navigating to the football club biking	Easy	86	287	373
	Not easy	11	2	13
Total		97	289	386

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	25,302[a]	1	,000		
Continuity Correction[b]	22,136	1	,000		
Likelihood Ratio	21,249	1	,000		
Fisher's Exact Test				,000	,000
N of Valid Cases	386				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 3,27.

b. Computed only for a 2x2 table

Analysis 6.2.3

Crosstab

Count

		MatchDay=Car		Total
		,00	1,00	
Ease of navigating to the football club driving	Easy	263	84	347
	Not easy	37	4	41
Total		300	88	388

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4,367[a]	1	,037		
Continuity Correction[b]	3,582	1	,058		
Likelihood Ratio	5,144	1	,023		
Fisher's Exact Test				,047	,023
N of Valid Cases	388				

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,30.

b. Computed only for a 2x2 table

Analysis 6.2.4

Crosstab

Count

		Club within 15 minutes biking of home perceived		Total
		No	Yes	
MatchDay=Bike	0	41	57	98
	1	100	192	292
Total		141	249	390

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1,831[a]	1	,176		
Continuity Correction[b]	1,517	1	,218		
Likelihood Ratio	1,808	1	,179		
Fisher's Exact Test				,183	,109
Linear-by-Linear Association	1,827	1	,177		
N of Valid Cases	390				

a. 0 cells (,0%) have expected count less than 5. The minimum expected count is 35,43.

b. Computed only for a 2x2 table

Analysis 6.2.5

Crosstab

Count

		Club within 15 minutes walking distance of home perceived		
		No	Yes	Total
MatchDay=Walking	0	226	150	376
	1	2	7	9
Total		228	157	385

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5,224[a]	1	,022		
Continuity Correction[b]	3,773	1	,052		
Likelihood Ratio	5,241	1	,022		
Fisher's Exact Test				,035	,027
Linear-by-Linear Association	5,210	1	,022		
N of Valid Cases	385				

a. 1 cells (25,0%) have expected count less than 5. The minimum expected count is 3,67.

b. Computed only for a 2x2 table

Analysis 6.3.1

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	8,236	1	,004
	Block	8,236	1	,004
	Model	8,236	1	,004

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	362,083[a]	,023	,035

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than ,001.

Classification Table[a]

			Predicted		
			MatchDay=Car		Percentage Correct
	Observed		0	1	
Step 1	MatchDay=Car	0	274	2	99,3
		1	75	2	2,6
	Overall Percentage				78,2

a. The cut value is ,500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Distance in minutes by bike minus minutes by car	,016	,007	5,215	1	,022	1,016
	Constant	-1,362	,135	102,440	1	,000	,256

a. Variable(s) entered on step 1: Distance in minutes by bike minus minutes by car.

Analysis 6.3.2

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	19,663	2	,000
	Block	19,663	2	,000

	Model	19,663	2	,000

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	350,656[a]	,054	,083

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than ,001.

Classification Table[a]

			Predicted		
			MatchDay=Car		Percentage Correct
	Observed		0	1	
Step 1	MatchDay=Car	0	273	3	98,9
		1	72	5	6,5
	Overall Percentage				78,8

a. The cut value is ,500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Distance in minutes by bike minus minutes by car	-,027	,014	3,754	1	,053	,974
	Driving distance from home to football club in minutes	,158	,048	10,732	1	,001	1,171
	Constant	-2,368	,347	46,677	1	,000	,094

a. Variable(s) entered on step 1: Distance in minutes by bike minus minutes by car, Driving distance from home to football club in minutes.

Correlation Matrix

		Constant	Distance in minutes by bike minus minutes by car	Driving distance from home to football club in minutes
Step 1	Constant	1,000	,796	-,918
	Distance in minutes by bike minus minutes by car	,796	1,000	-,909
	Driving distance from home to football club in minutes	-,918	-,909	1,000

Analysis 6.3.3

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,915[a]	,836	,836	9,314

a. Predictors: (Constant), Driving distance from home to football club in minutes

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	155706,903	1	155706,903	1794,927	,000[b]
	Residual	30448,655	351	86,748		
	Total	186155,558	352			

a. Dependent Variable: Distance in minutes by bike minus minutes by car

b. Predictors: (Constant), Driving distance from home to football club in minutes

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-18,375	,737		-24,919	,000
	Driving distance from home to football club in minutes	3,149	,074	,915	42,367	,000

a. Dependent Variable: Distance in minutes by bike minus minutes by car

Appendix C: Questionnaire

Ethics form

Dear respondent,

This research for the University of Groningen tries to gain more insight in transport choice in amateur football clubs. In order to provide better information in future policy decisions for municipalities and football clubs it is important to gather information about several personal factors of you, the respondent. This personal data will be anonymized during processing, but needs to be collected first.

Your home address, gender, age and family composition are necessary to collect in order to determine what factors can influence your travel choices, but will become anonymous during processing. Your answers will be kept by only the researcher and after processing can be shared with staff of the University of Groningen. This data will be deleted after february 2020. Your data will be processed only by the researcher and only on the computers of either the researcher or the University of Groningen.

You have the right to access, view and edit your personal information collected by the researcher. You also have the right to be deleted from survey results.

You can contact the researcher through:
d.boeree@student.rug.nl

Personal details:

What is your gender?

- ⊄ Male
- ⊄ Female

What is your age?

_____

What is your postal code? (i.e. 1234 AB)

_____ ____

What is your house number? (Optional)

_____

How many people are in your household?

____

How many people in your household are in your football club?

____

What is your football club?

- ⊄ Be Quick ‘28
- ⊄ (V.V.) SVI
- ⊄ V.V. Berkum
- ⊄ (V.V.) W.V.F.
- ⊄ Zwolse Athletische Club (ZAC)

What transport mode do you use in your daily commute?

- ⊄ Bike
- ⊄ Car
- ⊄ Public transportation
- ⊄ Walking

What transport mode do you use most often on match days to the football club?

- ⊄ Bike
- ⊄ Car
- ⊄ Public transportation
- ⊄ Walking

What transport mode do you use most often for practice days to the football club?

- ⊄ Bike

- ⊄ Car
- ⊄ Public Transportation
- ⊄ Walking

Opinions:

In this section it is important to give your own thoughts and a view into your own perceptions.

Neighbourhood Accessibility

I find navigating in my neighbourhood on foot;

Very easy						Very hard
○	○	○	○	○	○	○

I find navigating in my neighbourhood by bike;

Very easy						Very hard
○	○	○	○	○	○	○

I find navigating in my neighbourhood by car;

Very easy						Very hard
○	○	○	○	○	○	○

I find navigating in my neighbourhood by public transport;

Very easy						Very hard
○	○	○	○	○	○	○

Football Club Accessibility

I find navigating to my football club on foot;

Very easy						Very hard
○	○	○	○	○	○	○

I find navigating to my football club by bike;

Very easy						Very hard
○	○	○	○	○	○	○

I find navigating to my football club by car;

Very easy						Very hard
○	○	○	○	○	○	○

I find navigating to my football club by public transport;

Very easy						Very hard

○ ○ ○ ○ ○ ○ ○

Overall, travelling to my football club is;

Very easy Very hard

○ ○ ○ ○ ○ ○ ○

I think my football club is within 15 minutes walking from my home

- ⊄ Yes
- ⊄ No

I think my football club is within 15 minutes biking from my home

- ⊄ Yes
- ⊄ No

What can your club do for you to start walking or cycling to your club?

What could be done in general for you to start walking or cycling to your club?

Do you have any other remarks?