Challenges Faced by Rural Students Attending Urban Higher Education

A comparative analysis between Northwestern Europe and the USA

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Abstract

This paper investigates the relationship between the geographic proximity of rural communities to urban communities and the challenges faced by rural students attending urban higher level education. To do so, a comparison has been done between the USA and Northwestern Europe. The Netherlands and Germany act as samples for the larger region of Northwestern Europe.

A literature review was conducted in order to establish which challenges rural students in the USA face when attending urban higher education. Through a quantitative analysis it was found that rural students in Northwestern Europe do not face the same challenges that rural students in the USA do. This was partially explained by conducting a geospatial analysis in which the percentage of land area and population which is proximate to urban regions was compared between the USA and The Netherlands.

A discussion of the limitations of the current study and potential directions for further study are included in the penultimate section of this paper.

Table of contents

List of Tables and Figures

Tables

Figures

Introduction

The Urbanisation of Higher Level Education

As the world continues to urbanise (Ritchie and Roser, 2018), so too are its people becoming more educated. The percentage of people worldwide who are attending higher level education is steadily increasing (Marginson, 2016; Osborne, 2003) in tandem with their movement to urban areas. Although most higher level institutions are now located in urban centres, this was not always the case. Diner (2017) describes the negative view of urban systems held by many academics and college officials in the USA during the 19th Century. He further details the push from these actors to keep colleges in the rural areas or on the periphery of urban systems. On the other hand, institutions of higher level education in Europe have been located in mainly urban structures since as early as the 14th Century (Brockliss, 2000). In both cases, there has been a recent expansion of higher level education into urban settings. Be it through the eventual spatial relocation of higher education into urban systems as seen in the USA (Diner, 2017) or in the near exponential increase in the amount of institutions of higher education found in urban areas in Europe (Brockliss, 2000).

The Rural - Urban Divide

Urban life has often been presumed to be so different to rural life that the population of many countries has been divided in two, creating the rural-urban divide. Although the rural-urban divide is a concept fraught with mythos, and has received much criticism throughout the years regarding its accuracy, especially when used in a general sense (Scott et al., 2007), it has been shown to be a useful tool with which to understand the variance in cultural characteristics within a region or nation, in regards to particular phenomena (Pateman, 2011).

School Learning in Urban and Rural Communities

Paradise (1998) describes the ways in which urban schools use “activity systems” (Lave and Wenger, 1991) which are systematically different to the principles with which learning and teaching occur in rural communities. He goes on to add that these differences are not only relevant within particular geographical contexts but that the characteristics of the activity systems used in rural education transcend national differences and uniformly contrast with urban schooling structures. That is to say, that across the globe and despite cultural differences, the learning and teaching which occurs in rural communities is consistently different to the schooling which occurs in urban communities. With this in mind, proximity to urban communities and exposure to the particular educational activity systems which are found within becomes the lens with which this paper will analyse the relationship between urban higher education and the challenges faced by rural students attending it.

Research Question

This paper answers the following research question and sub-questions:

1. Do rural students in Northwestern Europe face the same challenges attending urban higher education as their American[1] counterparts, and are the presence of these challenges moderated by proximity to urban systems?

    1.1. What challenges do rural students in the USA face when attending urban higher education?
    1.2. Do rural students in The Netherlands and Germany face the same challenges attending urban higher education as their American counterparts?
    1.3. Is there a difference in the percentage of the population and land area which is spatially proximate to urban systems in the USA and in the Netherlands?

Considering that Northwestern (NW) Europe and the USA are the regions which have urbanised the fastest (Peng et al., 2011), they will be used as the setting for this research. The Netherlands and Germany in particular, have been chosen as samples representing the larger region, and population there in, of NW Europe. Many studies have already been carried out on the difficulties faced by rural students in the USA with which a comparative analysis can be completed (Guiffrida, 2008; Maples, 2000; Zucker, 2007). On the other hand, there is a considerable research gap in NW Europe as a whole, regarding the potential difficulties faced by rural students in urban European universities. Considering the trends of increasing urbanisation and participation in higher education described in the Introduction, the situation in Europe warrants an increased level of importance, lest we risk the abandonment or alienation of much of the younger generation.

[1] Throughout this paper the use of the label “American” refers to the population of the United States of America

Theoretical Framework

Cultural Proximity and Exposure

Tobler's First Law of Geography, states that "everything is related to everything else, but near things are more related than distant things." (Tobler, 1970). Tobler's First law of Geography highlights the effects that proximity may have on spatial structures and the societies which take place within them. The effects of proximity on cultural exchange and diffusion, and on individual's behaviours within those cultures, has been further studied using gravity models (Sen and Smith, 2012). Sen and Smith (2012) suggest that the degree by which two separate communities interact with each other is inversely proportional to the distance between those communities. Baruah (2022) shows the effects of these theories in a qualitative study which examines processes of cultural assimilation. He also describes that the vehicle by which an individual's assimilation of a foreign culture's components occurs, is direct exposure to that foreign culture. As such cultural proximity moderates the degree to which each culture is exposed to one another. Montgomery (2012) further elaborates on the effects that proximity can have on an individual's cultural perceptions by examining the consequences which "barriers" may have on the effective exposure which proximity should cause. Such barriers include topographical barriers such as mountain ranges which physically prevent exposure, or cultural censorship which may prevent proximate cultures from assimilating.

Having outlined the fundamental differences between the learning (and teaching) which occurs in urban and rural communities, the cultural effects of proximity and exposure which have been discussed, act as an explanatory mechanism which sheds light on why rural students might face specific challenges when attending urban higher education, which their urban peers do not.

Rural and Urban Geographies in the USA and NW Europe

Table 1 - Geographical and demographical characteristics of relevant countries

Country	**Total land** (Km^2)	**Urban Land** (% of total)	**Rural land** (% of total)	**Total Percent of Rural Pop,**
USA	9,147,420	186,573 (2.5%)	8,903,098 (97.5%)	17%
The Netherlands	33,670	8,322 (24%)	26,212 (76%)	7%
Germany	349,390	36,996 (10%)	316,383 (90%)	22%

Source: (The World Bank 2023)

We can see from table 1 that the geographical and demographical constitutions of the USA and NW Europe[2] are considerably different. We might then expect different spatial relationships within each country in regards to the proximity between rural and urban systems, and as a consequence in the degree of exposure to urban structures that rural communities experience. In particular the contrast between the USA and The Netherlands is sizable, the former consisting of a total land area several factors larger than the latter. While The Netherlands consists of a much larger portion of urban land with a nearly completely urban population. On the other hand, the situations in the USA and Germany are relatively similar, with Germany consisting of a larger percentage of rural population than the USA, despite its smaller share of rural land. It is hypothesised from these indicators that we will see a similar situation in Germany and in the USA, but not in The Netherlands.

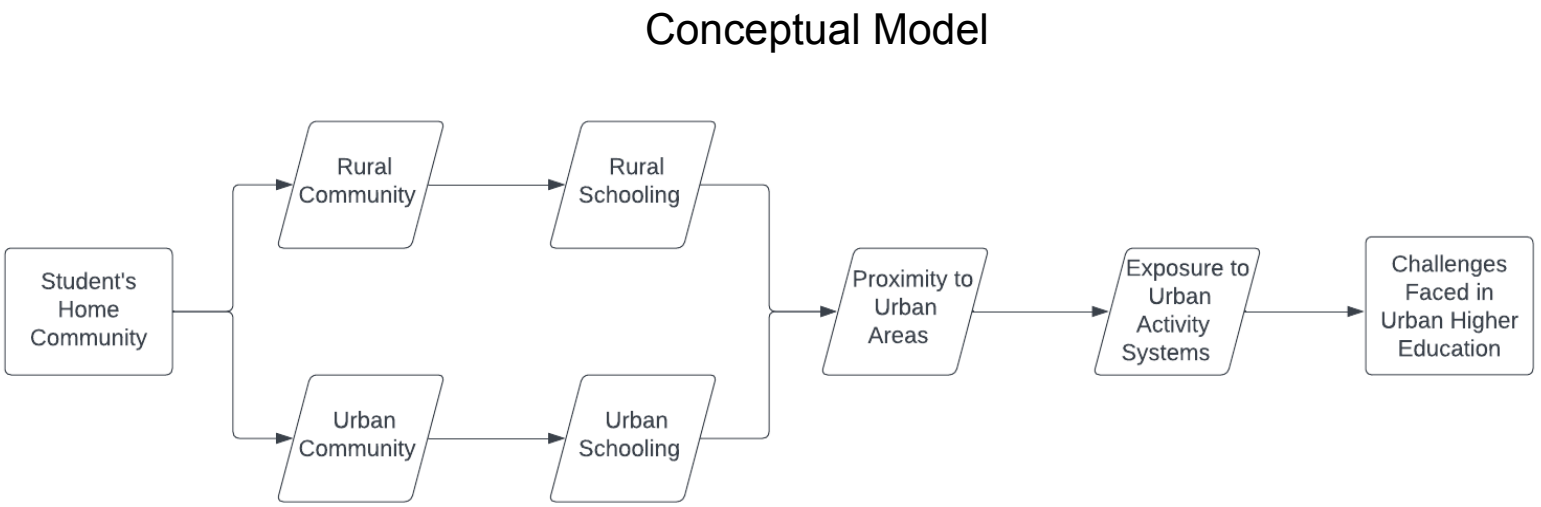

Figure 1 (author's own work) - Conceptual Model

The conceptual model in Figure 1 highlights the relationship between a students' home community and the possibility of that student will facing specific challenges when attending urban higher education. That is to say that the further a student's home community is from an urban community, the less they will be exposed to urban systems of activity, and as such have an increased chance to face specific challenges in urban higher education.

[2] The Netherlands and Germany are used as samples for the larger region of NW Europe for the purposes of this study

Literature review

Having established some of the theories by which the urbanisation of educational institutions may lead to increased challenges faced by rural students, the literature review will examine what challenges, in specific, do rural students in the USA face when attending urban higher education. The literature review will be used to answer research sub question one.

(Guiffrida, 2008) describes through an exhaustive literature review of his own, carried out using sources across the mainland of the USA excluding Alaska, that in the USA research suggests that rural students are less satisfied when attending larger institutions of higher education located in urban settings (Maples, 2000). These challenges are brought on by the transformations in rural students' socio-cultural environment when they move to urban settings (Zucker, 2007). Additionally Guiffrida (2008) provides a well documented list of the particular challenges faced by rural students.

Foremost is the change in scale rural students face when transitioning from relatively small educational environments in rural areas to much larger ones in urban areas. This manifests spatially as a difficulty adapting to larger campuses, lecture halls and classrooms (Hemmings et al.,1997; Maltzan, 2006; Parsons, 1992; Swift, 1988).

Rural students also encounter difficulty with the new social environment found in urban centres, which is typically less personal than they are used to (Maltzan, 2006), more culturally diverse at a interpersonal scale (Parsons, 1992), and less homogenous at a macro scale (McIntire et al., 1990; Pearson and Sutton, 1999) all of which result in an environment which becomes overwhelming (Parsons, 1992).

Additionally, a general sense of discomfort is often felt by rural students simply being in an urban environment (Parsons, 1992) and having to face, or predicting that they will have to face, “urban problems”, such as poverty and illegal activities (Guiffrida, 2008). Rural students come from an educational environment which prioritises providing leadership opportunities for students and modes of active participation (Downey, 1980), and so often find themselves dissatisfied with the opportunities to take leadership roles in urban higher education which does not prioritise these same opportunities (Downey, 1980).

Additionally, there is typically a lack of extracurricular activities which take place outdoors at urban universities (Swift, 1988), which may prevent rural students from following previously acquired interests (Swift, 1988), or make them home sick. Not only is the spatial environment different, as mentioned, but so too are the curriculum offered at urban universities (Maltzan 2006), typically of which there is a much larger degree of choice. This can be overwhelming for rural students who have not been adequately prepared for this (Maltzan, 2006) or have not had that experience before in their rural educational setting (Gibbs, 1998).

All of the above difficulties have been found by Swift (1988) to be exacerbated by the residential transition into an urban environment which typically follows admission to urban university, and effectively leaves students feeling like they don’t belong (Maltzan, 2006).

Methodology

Data Collection

Secondary Data

The secondary data used in this paper consists of literature included in the literature review and geospatial data which was used for the geospatial analysis. Literature was used in the development of the conceptual model and as the basis for the formation of the questions in the questionnaire. The literature review in specific was used to answer the first research sub question. In the geospatial analysis only the mainland of the USA was considered excluding Alaska as the literature used in the literature review all originated from within the mainland of the USA excluding Alaska.

Primary Data

The primary data used for this paper was collected in the form of a questionnaire, a copy of which has been fully included in Appendix A. A deductive approach was used in the formation of content of the questionnaire. It was hypothesised that since rural students in the USA face challenges when attending urban higher education which their urban peers do not, then so too will rural students in NW Europe face the same challenges.

The first section of the questionnaire seeks to establish to what degree the respondent is rural. The responses to this section of the questionnaire have then been recoded into one unique variable representing the total rurality of the respondent and is considered as the independent variable for this study.

The second section aims to capture if the respondent faces the same challenges faced by rural students attending urban higher education in the USA. Ratio scales measuring satisfaction from zero to one hundred are used for this purpose. This section will act as the dependent variable for the quantitative analysis.

The third section of the questionnaire consists of open questions in which respondents can elaborate on any of the themes mentioned above if desired.

Sampling Strategy

The target population of this study is students in NW Europe. The questionnaire was distributed amongst students in the author's student network in the University of Groningen, The Netherlands and Ludwig Maximilians-Universiteit, Germany. WhatsApp was used to inform and invite students to complete the questionnaire. The sampling strategy used was a convenience strategy (Stratton, 2021). This imposes some limitations onto the representativeness of the sample and may have consequences on the significance of any findings in the following section. Regardless, the results obtained from the questionnaire will be used to make inferences about the larger population of NW Europe as a whole. Further limitations caused by the sampling strategy will be discussed in the Discussion section.

Ethical Considerations

Regarding ethical considerations of the data collection process and storage, care was taken to ensure that no information which could be used to identify respondents was requested. The data set acquired will be used exclusively to conduct this research and will at no time be publicly available. As such, its use and collection is deemed to be in accord with the ethical guidelines set out in The Netherland's code of conduct for research integrity (Algra et al., 2018) and as outlined in the GDPR (Voigt & Von dem Bussche, 2017).

Methods of Analysis

Quantitative Analysis

SPSS will be used to conduct the statistical analysis needed to answer the second research sub question, the complete syntax of which can be found in Appendix B. Statistical tests carried out include Kendall Tau-b and Spearman rank correlation, both of which serve as a means to establish if there is a relationship between the independent and dependent variables and what the direction of that relationship is, if any. These tests have been chosen in particular, instead of a Pearson correlation, because the sample is not normally distributed and the sample size is small (Kaur & Kumar, 2015). Two tests were used as means to ensure greater accountability of any significant result. All collected responses were used in the analysis, unless the respondents did not fully complete section one of the questionnaire.

Geospatial Analysis

The final layer of analysis acts as a geospatial comparison between the country of The Netherlands and the USA in order to answer the third research sub question. Germany was excluded from the geospatial analysis due to the correlations discovered in the quantitative analysis in the following section.

ArcGIS Pro has been used to conduct the analysis. The need for a geospatial analysis arises initially as a means to better understand the spatial distribution of institutions of higher level education in each country and how this relates to each country's geographic and demographic environment. Furthermore, spatial analysis acts as a method by which we might explain differences found (or similarities discovered) in the quantitative analysis carried out in the following section.

For the purposes of this research urban density is defined and calculated as the total number of housing units per area. Educational density is defined and calculated in the same fashion.

Results

Quantitative Analysis

Descriptive Statistics

Table 2 illustrates the descriptive statistics for the entire sample. Values for N vary for some of the dependent variables. All of the independent variables which were used to code variable 1 “Total rurality” had a N size of 43. The minimum and maximum values for each variable have been provided as well as the mean response and the standard deviation from the mean. The mean was used rather than the mode, or the median as the data set is considered to be robust because the ratio scale used (0 - 100) does not allow for outliers (Box, 1979).

Table 2 - Descriptive statistics (ratio variables)

Variable	N	Minimum	Maximum	Mean	Std. Deviation
1. Total rurality (Independent variable)	43	0	87	34.81	23.88
2. How satisfied are you with the size of your campus?	43	15	100	69.53	26.18
3. How satisfied are you with the size of your lecture halls?	43	10	100	73.45	24.03
4. How satisfied are you with the size of your class rooms?	43	15	100	72.38	21.6
5. How satisfied are you with teacher - student interactions?	43	20	100	63.14	24.83
6. How satisfied are you with student - student interactions?	43	5	100	61.16	24.95
7. How similar are the people you meet in university to the people in your home community?	43	5	95	44.84	26.62
8. How similarly do people in your university interact with each other compared with people in your home community?	43	0	80	41.98	23.48

Variable	N	Minimum	Maximum	Mean	Std. Deviation
9. How comfortable do you feel at university?	43	10	100	78.12	18.24
10. How safe do you feel in and around your university environment?	43	50	100	91.63	10.79
11. How safe do you feel going to your university campus?	43	50	100	92.51	9.53
12. How satisfied are you with the extra-curricular activities available at your university?	33	0	100	67.27	29.58
13. To what degree do you feel that you have the opportunity to take a leadership role in extra-curricular activities in your university?	31	0	100	70.65	26.7
14. In your opinion are there sufficient outdoor activities available at your university?	41	5	100	60.61	25.6
15. How satisfied are you with the style of teaching?	43	20	95	66.4	19.03
16. How satisfied are you with the style of assessment/examination?	43	15	100	62.91	22.55
17. Are you satisfied with the quantity of practically oriented courses/content in your study?	43	15	100	52.95	21.94

Examining Variable 1 “Total rurality” we can see from the mean that the sample is more urban than rural on average, however there is a high standard deviation from the mean indicating that there is a large variation. This can be further seen in figure 2 below.

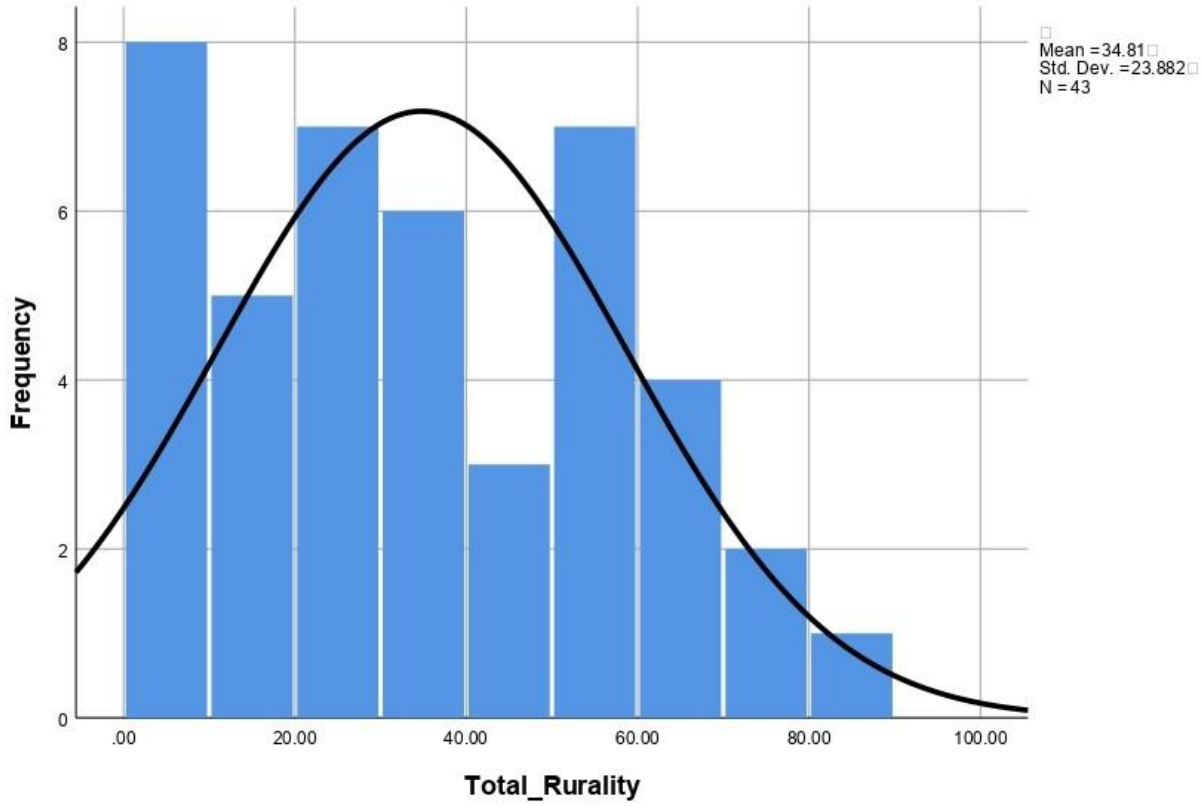

Figure 2 (author's own work) - Distribution of responses for variable 1 “Total rurality” against a normal distribution

In the histogram depicted in Figure 2 we can see that variable 1 “Total rurality” roughly follows a normal distribution. Further analysis on the skewness and kurtosis of the data confirms that it is within the bounds of a normal distribution. The values for skewness and kurtosis being 0.282 and -0.976 respectively, which indicate a slightly larger skew and thicker peak than one would expect in a normal distribution (Bai & Ng, 2005).

All dependent variables, from 2 to 17, have mean values higher than 60, except for variables 7, 8 and 17. This is what we would expect from a predominantly urban sample, from the research hypothesis. Many of the variables have a standard deviation of 20 or more, indicating that even within a predominantly urban sample there still may be some significant variation along the rural - urban spectrum.

The mean values of variables 7, 8 and 17 suggest that we would expect to find an inverse relationship between rurality and satisfaction, considering that their values are approximating or lower than 50. Their standard deviation follows the trend found with the rest of the variables. The standard deviations of variables 10 and 11, which both measure feelings of safety, is relatively small. The high mean, 90<, of these variables suggests that there is not a strong relationship, if any at all, between rurality and feelings of safety.

Analysis on the Whole Sample

In the following tables, which show the dependent variables which were found to have a significant relationship with the independent variable “Total rurality”, a P-value of 0.05 or lower is considered to indicate a significant correlation.

Table 3 - Significant results from Kendall’s Tau-b and Spearman’s Rho correlations

Dependent variable	N	Kendall’s Tau-b correlation coefficient	P value	Spearman’s Rho correlation coefficient	P value
To what degree do you feel that you have the opportunity to take a leadership role in extra-curricular activities in your university?	31	0.328	0.012	0.452	0.011
In your opinion are there sufficient outdoor activities available at your university?	41	0.242	0.030	0.349	0.025

Table 3 contains details on the only two dependent variables, 13 and 14, which showed significant correlation with the independent variable “Total rurality”. The correlation found between the dependent and the independent variables shows a positive linear relationship. This can be seen in both the Kendall’s Tau-b correlation coefficient and Spearman’s Rho correlation coefficient which are 0.328 and 0.452 respectively for variable 13 and 0.242 and .0349 respectively for variable 14. This suggests that in the sample as respondent’s rurality increases so does the degree to which respondents feel that they have the opportunity to take leadership roles (variable 13) and the opinion that there are sufficient outdoor activities available (variable 14). This is the opposite of what was found to be the case in the USA and of what was expected to be the case in NW Europe from the literature which has been reviewed.

Explanatory Variables

Possible explanations for this will be discussed after the geospatial analysis in the Discussion section. Further statistical analysis will first be carried out by splitting the sample into subgroups based on the current country of residence of the responder, Variable (i). This is done in order to reveal any potential moderating effects that the Variable (i) might have on the relationship between Variable 1 “Total rurality” and the dependent variables; 2 through 17.

Descriptive Statistics for Variable (i)

Table 4 shows the values for Variable (i) for the whole sample. As can be seen in Table 4 the sample predominantly consists of respondents who indicated that they currently live in The Netherlands, which was expected when conducting the questionnaire.

Table 4 - Variable (i)

(i) Current Country of Residence	Frequency	Percent
The Netherlands	28	65.1
Germany	14	32.6
Iceland	1	2.3

Analysis using Explanatory Variable (i)

Table 5 shows the results of the correlation analysis carried out on the cases where respondents indicated they lived in The Netherlands.

Table 5 - Significant results per country (The Netherlands)

Variable	N	Kendall's Tau-b correlation coefficient	P value	Spearman's Rho correlation coefficient	P value
How similar are the people you meet in university to the people in your home community?	28	-0.266	0.05	- 0.402	0.034
How similarly do people in your university interact with each other compared with people in your home community?	28	-0.347	0.012	- 0.473	0.011

From this table we can see that Variable 7 and 8 were found to have significant correlations with Variable 1 "Total rurality". The correlation coefficient from Kendall's Tau-b indicates that each variable has a weak negative correlation, while Spearman's Rho's correlation coefficient indicates a moderate negative correlation. This signals that as rurality increases similarity in person and interaction type found in the respondents home community decreases, when compared with person and interaction type found in the respondents university environment. This is the direction of correlation that was expected based on the literature.

Table 6 indicates that in the sub-group of the sample in which respondents indicated that they currently lived in Germany, the same correlations were not found. Instead, the inverse correlation was found in respects to Variable 8, while Variable 7 was found to not have a significant correlation. The P-value upon which this significance is based, less than 0.01, suggesting that there is a considerable difference between the German and Dutch samples.

Table 6 - Significant results per country (Germany)

Variable	**N**	**Kendall's Tau-b correlation coefficient**	**P value**	**Spearman's Rho correlation coefficient**	**P value**
How similarly do people in your university interact with each other compared with people in your home community?	14	0.587	0.005	0.719	0.004
How satisfied are you with the extra-curricular activities available at your university?	14	0.553	0.01	0.739	0.004

A sub-group was not created for respondents who indicated they currently lived in Iceland because the sample size was considered to be too small to do so, and their geographical relevance was dubious for the purposes of this study.

Geospatial analysis

A geospatial analysis has been carried out comparing the USA and The Netherlands. The degree of urbanity, and spatial distribution or rural areas, will be examined, and potentially used as an explanatory variable for the correlations discovered in the quantitative analysis. Germany has not been included in the geospatial analysis. Despite its larger percentage of rural land and rural population, compared with The Netherlands (see Table 1), the correlations found in the quantitative analysis deviate further from the expected outcome than The Netherlands. As such this geospatial analysis was not considered to have a strong explanatory power for the German sample.

Educational and Urban Density

In Figure 3 and 4 the relationship between the density of institutions of higher education (educational density for short) and urban density is examined per county and municipality in the USA and The Netherlands respectively. An increase in educational density is represented as a darkening in the shade of colour per county/municipality, while an increase in urban density is represented by a change in colour from green, through blue, to pink.

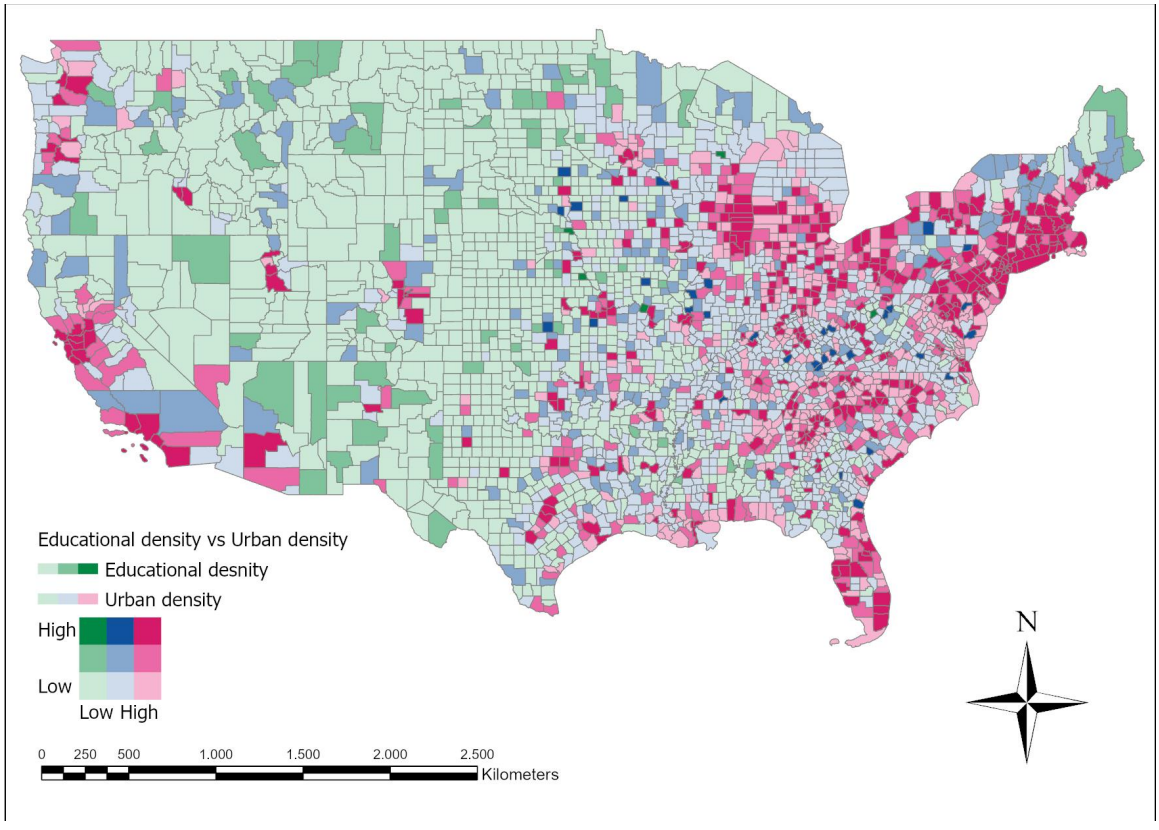

Figure 3 (author's own work) - Visualisation of the relationship between higher level education density and urban density in the USA

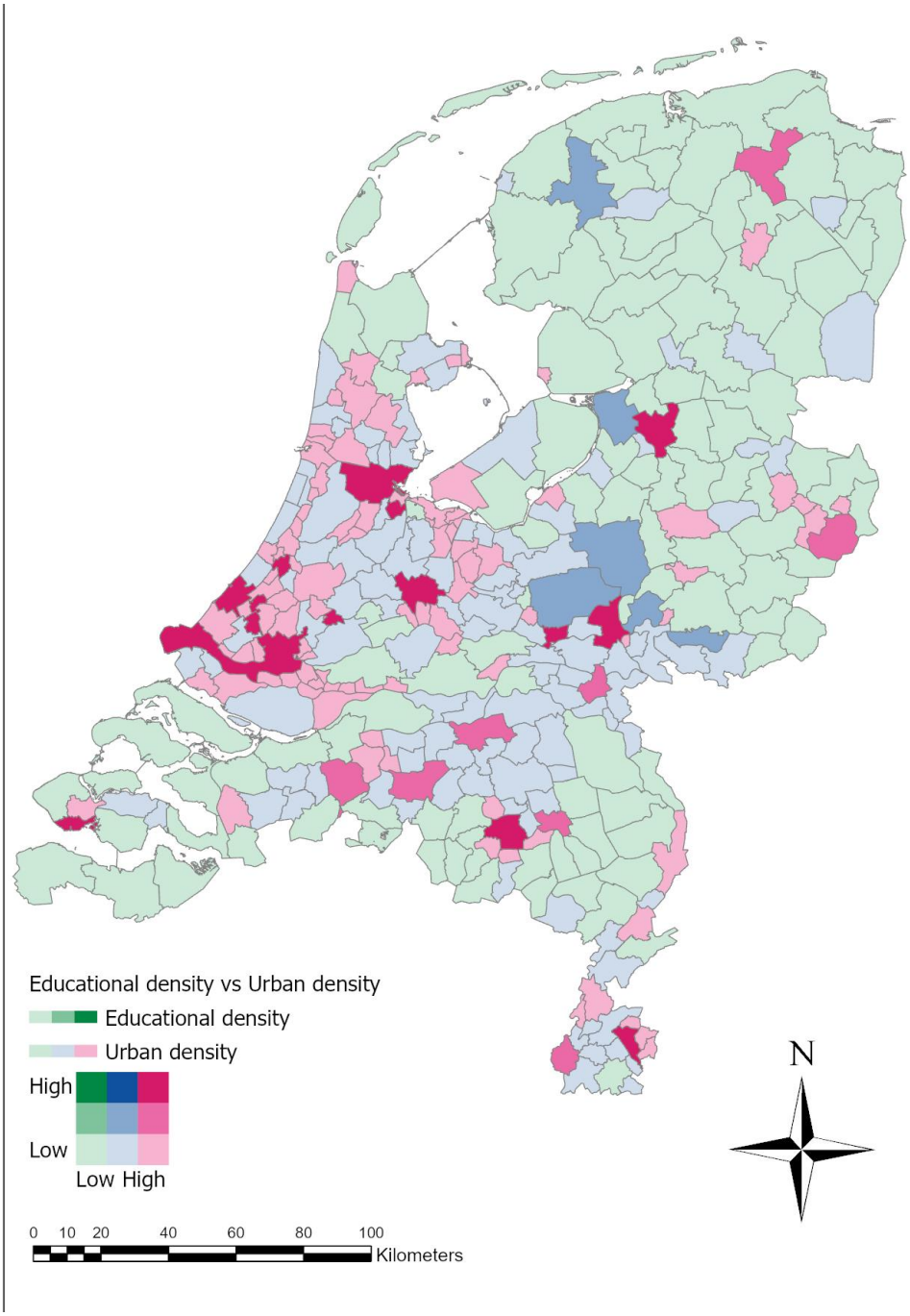

Figure 4 (author's own work) - Visualisation of the relationship between higher level education density and urban density in The Netherlands

There are no dark green counties/municipalities and near to no dark blue ones in either country. This confirms what we discovered in the literature; that higher education has become an urban phenomenon. The fact that there are faded pink counties/municipalities does not refute this as it is not contradictory to have regions that are high in urban density but not high in educational density. As such we can eliminate the possibility that a difference in the relationship between educational location and urban density is the factor which led to a divergence from the expected results in the Quantitative Analysis.

Urban Density

Figure 5 and 6 visualise the urban density per region of each country. For the purposes of the study, regions indicated in yellow (low urban density) are considered to be rural, as opposed to urban (orange and red). We can see from the two figures below that The Netherlands appears to have a higher ratio of highly urbanised regions and a lower ratio of rural regions than the USA.

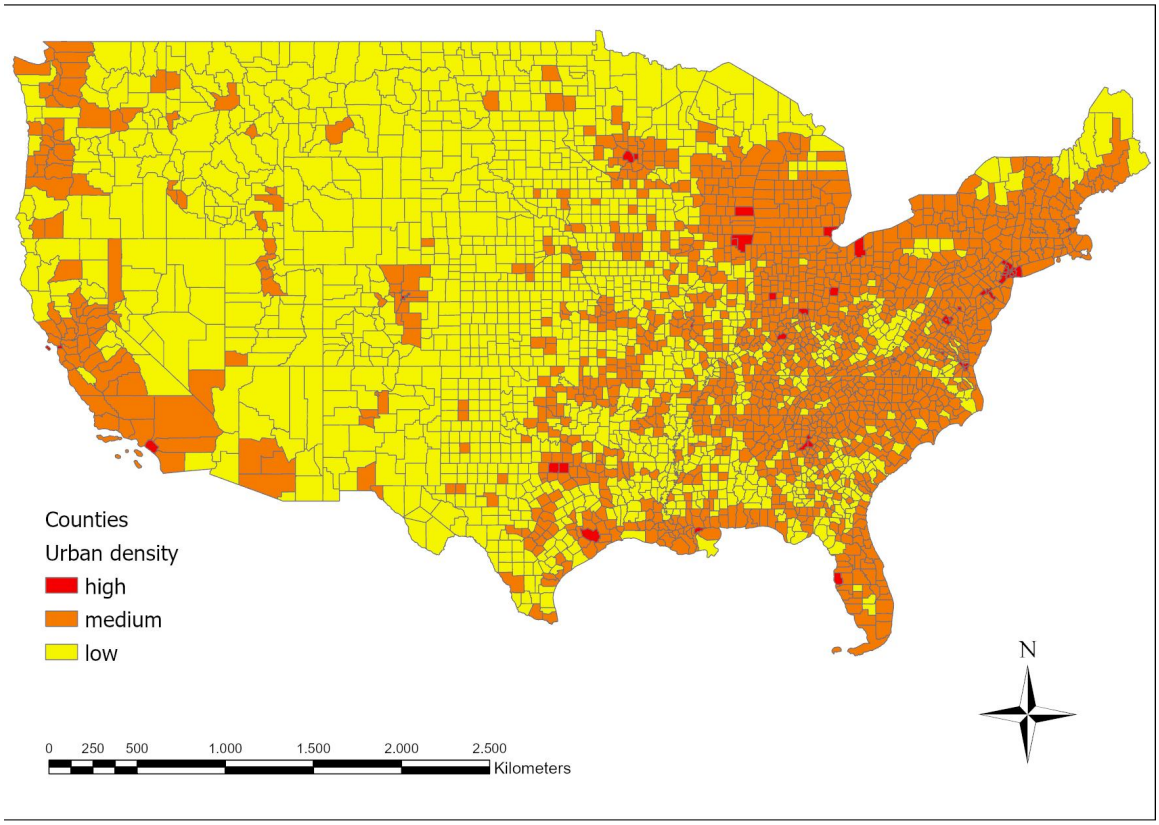

Figure 5 (author's own work) - Visualisation of urban density per County of the USA

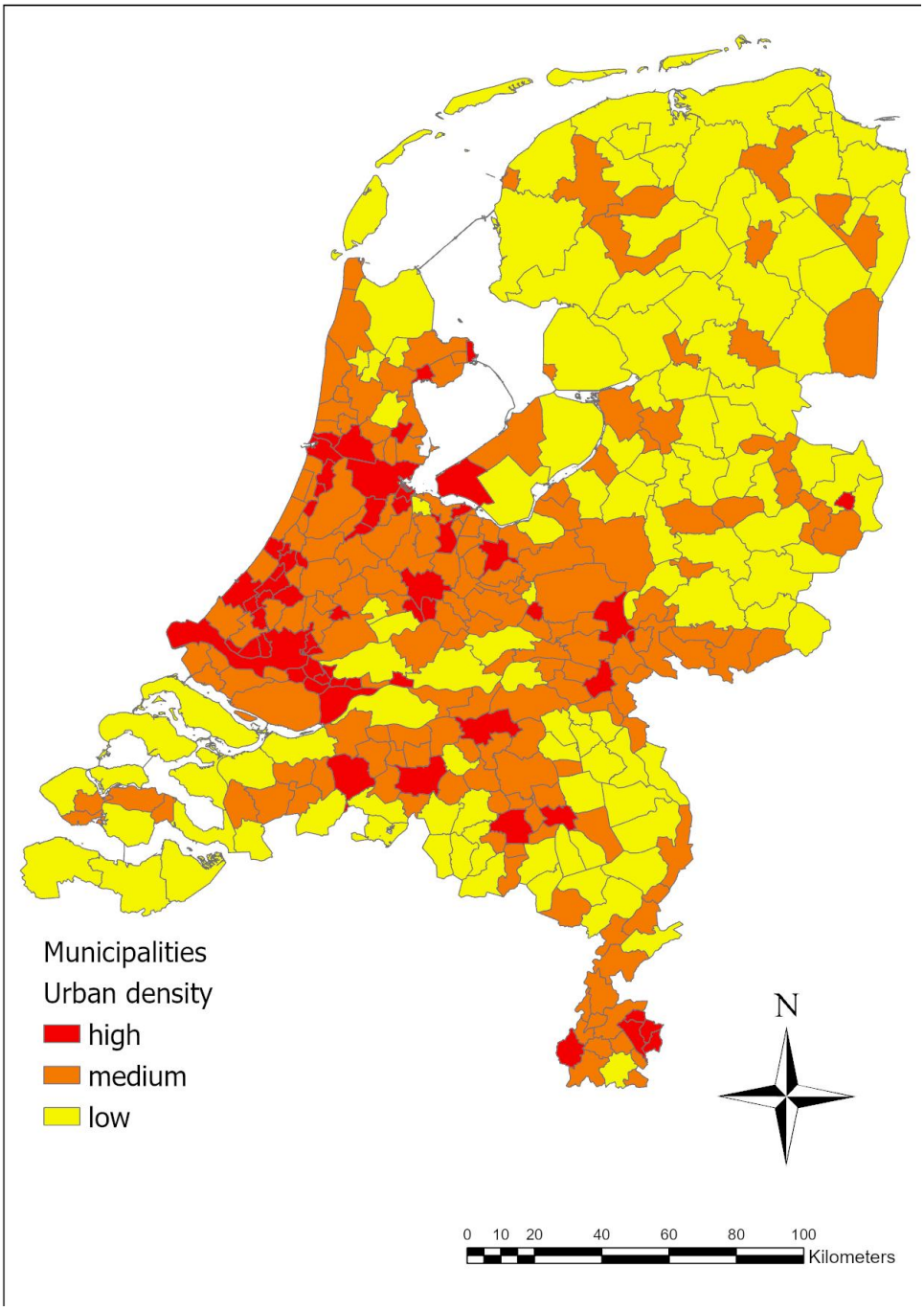

Figure 6 (author's own work) - Visualisation of urban density per Municipality of The Netherlands

Rural Regions

In Figures 7 and 8 the rural regions (previously coloured yellow) have been recategorised into rural regions which share a border with urban regions (blue) and rural regions which are completely surrounded by other rural regions (green). For the purposes of this research the rural regions which are completely surrounded by other rural regions will be referred to as insulated rural regions.

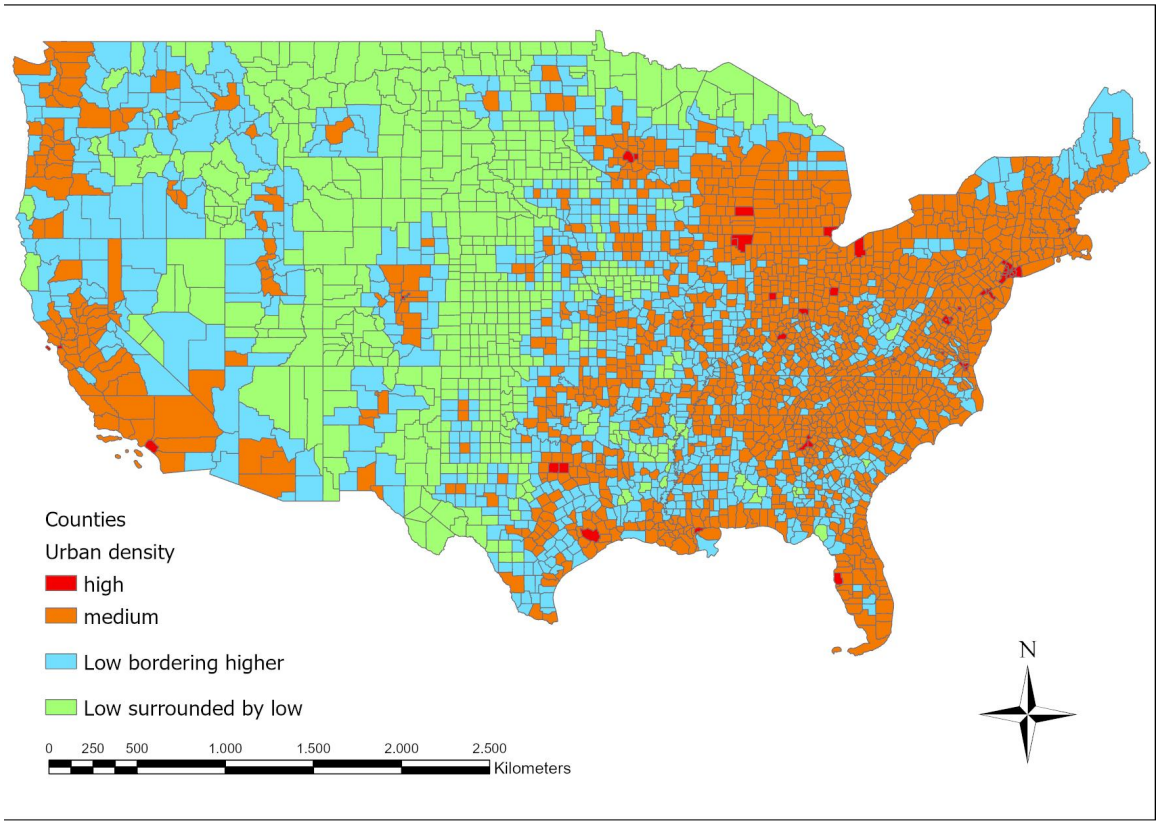

Figure 7 (author's own work) - Visualisation of rural counties which share a border with urban counties (blue) or which are surrounded by other rural counties (green)

We can see from the two figures that the ratio of rural regions which share a border with urban regions is much higher in The Netherlands than in the USA. Additionally, comparing Figure 7 with Figure 3 we can see that the insulated rural regions are also the regions with low educational density, while in The Netherlands there are very few insulated rural regions at all.

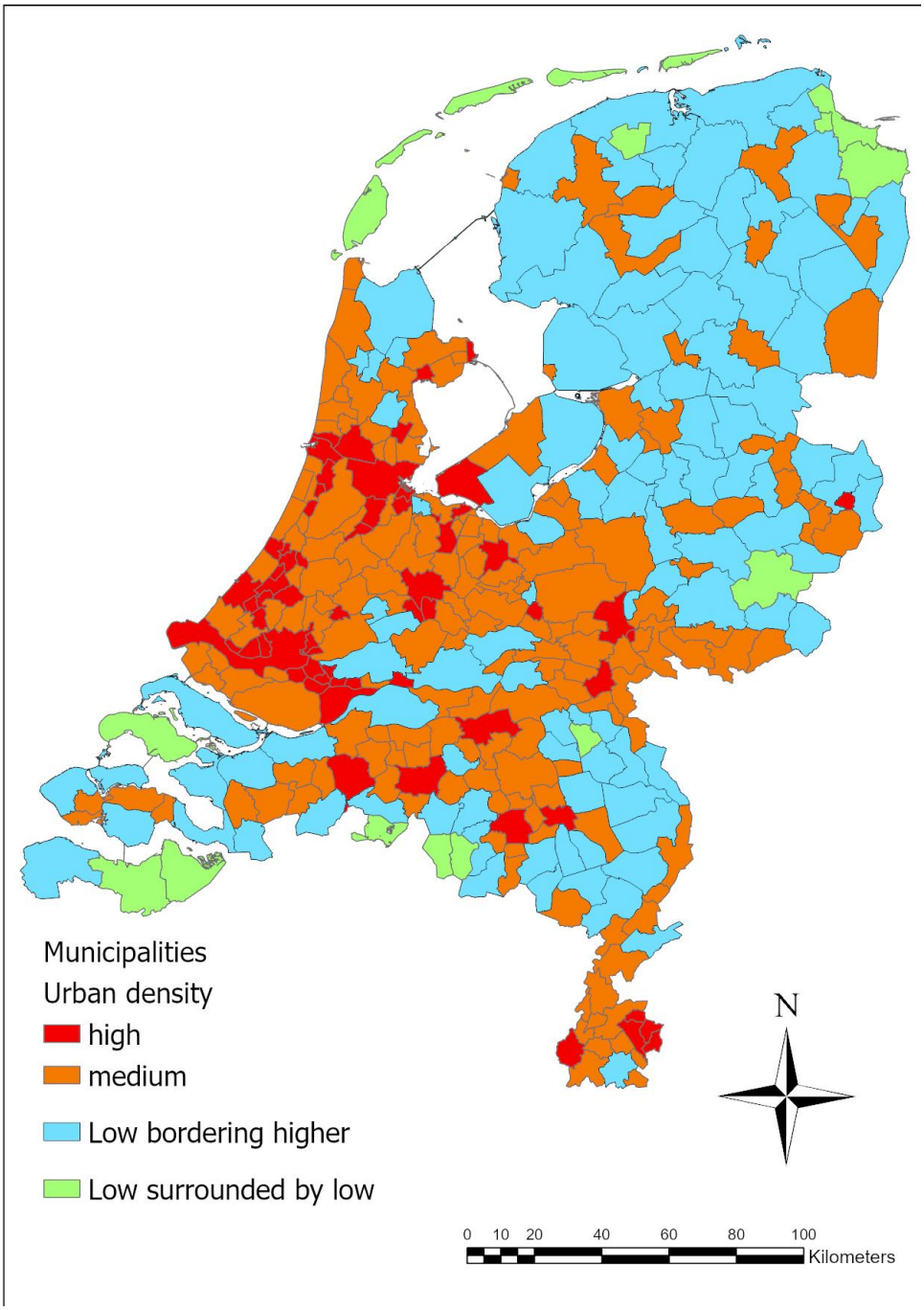

Figure 8 (author's own work) - Visualisation of rural municipalities which share a border with urban municipalities (blue) or which are surrounded by other rural municipalities (green)

Tables 7, 8 and 9 describe the geographic and demographic characteristics of the rural regions in each country.

Table 7 - Distribution of regions per country

Country	**Total Regions**	**Total Rural Regions** (% of total regions)	**Insulated Rural Regions** (% of rural regions)
The Netherlands	355	120 (34%)	17 (14%)
USA	3108	1530 (49%)	527 (34%)

We can see in Table 7 that not only does the USA have a higher percentage of rural regions than The Netherlands, but also, that of those regions a larger percentage are insulated rural regions.

Table 8 - Demographic distributions or rural regions per country

Population per Country Region	**Rural Regions**	**Rural Regions Bordering Urban** (% of rural regions)	**Insulated Rural Regions** (% of rural regions)
The Netherlands	3,251,482	2,922,882 (90%)	328,600 (10%)
USA	24,824,269	17,876,987 (72%)	6,947,282 (28%)

As might be expected, following the increase in rural regions and percentage of those regions which are insulated rural regions between the USA and The Netherlands there is also a larger population which lives in insulated rural regions within the USA. However, the percentage of the population which lives in insulated rural regions is less than the percentage of rural regions which are insulated.

Table 9 - Geographic characteristics of rural regions per country

Land Area per Country (Km^2)	**Rural Regions**	**Rural Regions Bordering Urban** (% of rural regions)	**Insulated Rural Regions** (% of rural regions)
The Netherlands	18,720	16,644 (89%)	2,076 (11%)
USA	5,011,182	2,731,726 (55%)	2,279,456 (45%)

What is the most striking difference between the two countries is the percentage of total rural land which is insulated rural land. From the previous tables it may be expected that the percentage of insulated rural land would be larger in the USA, however, the magnitude of its increase is unproportional to the total insulated regions as seen in Table 7.

Discussion of Results and their Limitations

Results

Quantitative Analysis

The quantitative analysis in the Results section was used to answer the second research sub question: Do rural students in The Netherlands and Germany face the same challenges attending urban higher education as their American counterparts? The results from the quantitative analysis of this study indicate that rural students in The Netherlands and Germany do not face the same challenges as their American counterparts. From these results this study infers that the same is the case for the entirety of the NW of Europe. Further research should be carried out in Scandinavia and other relevant regions to confirm or deny this inference.

There were found to be very few significant results between the rurality of European respondents and the list of challenges faced by rural students in the USA. In the analysis of the sample taken as a whole (Table 3) and in the German sample (Table 6) any significant correlations which were found demonstrated the opposite relationship; that as rurality increased so did satisfaction. However, the significant results in the Dutch subgroup (Table 5) were found to follow the same trend as was discovered in the USA, if only to a minor degree. This is not what was expected based on the literature discussed in the Introduction nor in the Theoretical Framework. It was expected that if the results from either country were to deviate further from the situation in the USA; it would be those resulting from the analysis carried out on the Dutch population, not the German.

Geospatial Analysis

The geospatial analysis in the Results section answers research sub question three, by confirming that there is a difference in the percentage of the population and land area which is spatially proximate to urban systems in the USA and The Netherlands? The population which is not spatially proximate to urban regions is considered to be that which lives in the insulated rural regions. Of which there is a much larger amount within the USA as compared to The Netherlands. Additionally, the ratio of rural land area consisting of insulated rural regions is much larger in the USA than The Netherlands. This implies that when comparing the insulated rural regions of the USA and The Netherlands, the populations found within are even more removed from urban regions in the USA than in The Netherlands, due to the greater distances at play in the USA.

In conjunction with the literature discussed in the Theoretical Framework the geospatial analysis acts as a possible explanation for why the results expected based on the literature review were not found in The Netherlands. That is to say, that since most rural regions in The Netherlands are spatially proximate (Sen and Smith, 2012; Tobler, 1970) - share a border with an urban region - then these regions are exposed (Baruah, 2022) to urban systems of activity (Lave and Wenger, 1991) and as such the populations within do not face the same challenges as their American counterparts when attending urban higher education.

In addition, physical barriers such as topographical features (mountain ranges, water systems, etc.) and larger distances brought on by larger land areas are present in the USA which are not in The Netherlands. This may further prevent the exposure of rural regions and their populations to urban activity systems in the USA, while this would occur to a much lesser degree, if at all, in The Netherlands (Montgomery, 2012). A similar phenomena may be occurring in Germany, leading to a reduced degree of significant correlations discovered, however, in either case this would not explain the positive linear relationship discovered in the German sample.

Further research will have to be carried out to establish why the correlations found in the German subgroup of the sample deviated more than the Dutch subgroup and if the results discovered in the study are representative of the larger NW European population as a whole.

Limitations

Quantitative Analysis

It may be the case that rural students in NW Europe do face increased challenges compared to their urban peers but that these challenges are different to the ones faced by their American counterparts, and as such were not captured by the questionnaire. This constitutes the first notable limitation of this study and warrants further research.

The small sample size used for the quantitative analysis poses another considerable limitation to the study. It may be the case that with a larger sample more significant results would have been found, or different results all together. Additionally, the geographic isolation of the regions which were sampled calls to question the representativeness of the study as a whole.

Geospatial Analysis

The geospatial analysis examines a possible explanatory variable which may reveal why the results found in the quantitative analysis deviated from those which were expected. However it does not fully explain why the results for the whole sample (Table 3) deviated from the expected results nor why the opposite relationship was found in the German sample specifically (Table 6).

Additionally, the age group of the population found in rural regions which are insulated from urban regions was not considered. It could be the case that the population within those regions consists mainly of younger members of the population, in which case this would add to the explanatory power of the geospatial analysis. On the other hand, the opposite could be true, or the mean age of the population living in insulated rural regions might be different in the USA and NW Europe.

Conclusion

Results

The quantitative analysis indicates that rural students in NW Europe do not face the same challenges attending urban higher education as their American counterparts. In the case of the USA and The Netherlands this is explained by the difference in percentage of the population and land area which is proximate to urban regions. The literature discussed in the Introduction and Theoretical Framework is found to be consistent with the findings in the geospatial analysis, despite the deviation from expected results in the quantitative analysis.

Future Research

This paper treats itself as one of the first steps in a process of identifying possible challenges faced by rural students in NW Europe attending urban higher education. However, it should not be the last. Further research could be carried out using a larger and more extensive sampling strategy, In order to verify the results found in this study. Additionally, a country specific approach in examining the challenges faced by rural students in NW Europe could be taken. As it was found that there were different results in the analysis of the subgroup that indicated they lived in The Netherlands when compared to the German subgroup. Finally, other potential explanatory variables could be examined, for example the degree of internal migration within each country or the effects of immigration as a whole.

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Appendix A - Questionnaire

The survey pages which begin on the following page have been imported and converted for ease of inclusion, as such aspects of their layout have been altered. Regardless, the contents of the questions remain the same and serve as an accurate depiction of the questionnaire carried.

university of groningen

Participant information

Thank you for choosing to take part in this survey, it's really appreciated.

The study for which this survey will be used for is examining the effects that residential area could have on a students satisfaction with their university environment (a brief explanation will follow).
Your data will remain anonymous, and only be stored on university servers for the duration of the analysis period.
If you have any questions feel free to contact me at g.degano@student.rug.nl

The survey consists of 3 parts:
- Participant information
- Student satisfaction
- Open questions (optional)

It typically takes 10 minutes to complete this survey.

In the first part of this survey I am trying to measure residence type using a scale from urban to rural, the exact number you choose is not so important, rather what I am trying to capture is how rural as opposed to urban (or vice versa) you feel your residence is. In this way, if you feel that your residence is fully rural "100" on the slider would be what you would choose. If instead you think that its more urban than rural, but not by much, than 30-40 might be the most appropriate position. If you feel that your residence is neither rural nor urban or the same amount of each, then keep the slider at 50.

Current country of residence.

Have you ever moved country?

- ○ Yes
- ○ No

How rural would you describe your current residence?

Local population of area surrounding current residence (estimated).
For example: Population of the city or village you live in

Have you ever moved residence?

- Yes
- No

Indicate how rural the setting in which you lived in for most of your childhood was.
If you lived in multiple locations describe the one you felt most at home in/spent the longest time in.

Indicate how rural the setting in which you lived in for most of your adolescence was.
If you lived in multiple locations describe the one you felt most at home in/spent the longest time in.

Urban Rural

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

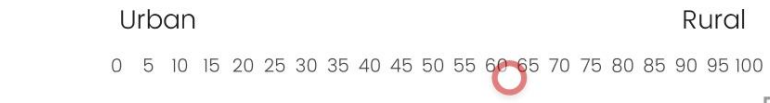
Rurality

Where are you currently attending higher education (Name of university or institution) and which degree program are you following (include if studying as an undergraduate or graduate)?

Did you move residence in order to study in your current university?

- Yes
- No

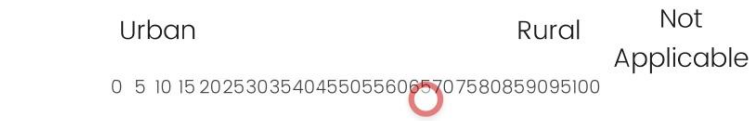
How rural was your former residence prior to moving for studies?



Rurality

Local population of area surrounding former residence (estimated).
For example: Population of the city or village you used to live in

Would you describe yourself as an urban or a rural person (where do you feel more at home)?



Rurality

Would your friends or family describe you as an urban or rural person (where would they see you living)?

	Urban	Rural	Not Applicable
	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100		
Rurality		☐	☐

How long does it take you to get to university and with which transport type do you use to get there? (You only need to choose one)

	1-30 minutes	31-60 minutes	61+ minutes
Walking/cycling	○	○	○
Train/bus	○	○	○
Car/other private vehicle	○	○	○

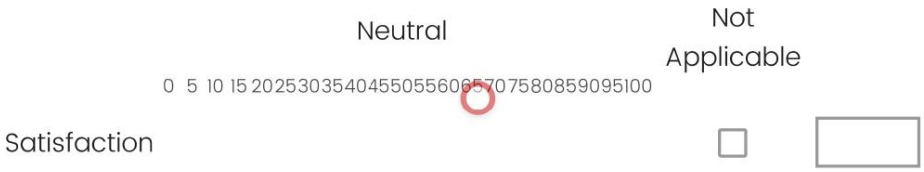
Student satisfaction

Next will follow a series of questions mostly regarding your satisfaction with different elements of your university environment.

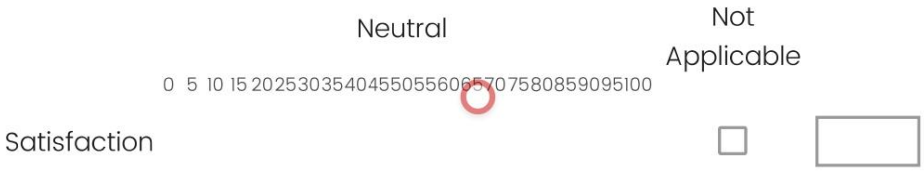
In each question the slider will start at "50", this indicates a neutral position of neither satisfied nor dissatisfied,

please lower the slider to indicate degrees of dissatisfaction or increase the slider to indicate your degree of satisfaction.
In questions not measuring satisfaction, additional guidance is provided.

How satisfied are you with the size of your campus?

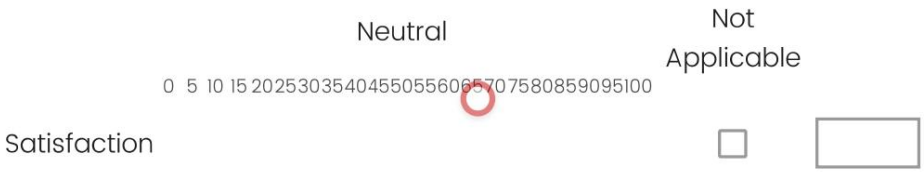


How satisfied are you with the size of your lecture halls?

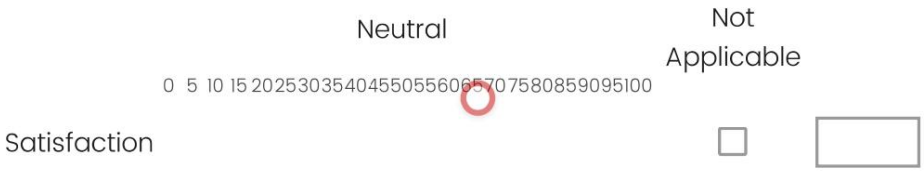


How satisfied are you with the size of your class rooms?

How satisfied are you with teacher - student interactions?



How satisfied are you with student - student interactions?

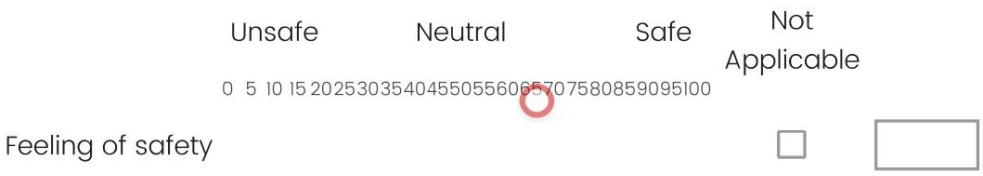


How similar are the people you meet in university to the people in your home community?
(Home being where ever you feel most at home)

How similarly do people in your university interact with each other compared with people in you home community?

How comfortable do you feel at university?

How safe do you feel in and around your university environment?



How safe do you feel going to your university campus?

Unsafe Neutral Safe Not Applicable

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Feeling of safety ☐

Do you take part in any extra-curricular activities at your university?
For example: Being part of a committee, sporting club or cultural association in part hosted by the university.

- ○ Yes
- ○ No

How satisfied are you with the extra-curricular activities available at your university?

neutral Not Applicable

0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100

Satisfaction ☐

To what degree do you feel that you have the opportunity to take a leadership role in extra-curricular activities in your university?

	Lack of opportunity	Neutral	Many opportunities	Not Applicable
Opportunity	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100			☐

Is having a leadership role important to you?

- ○ Yes
- ○ Indifferent
- ○ No

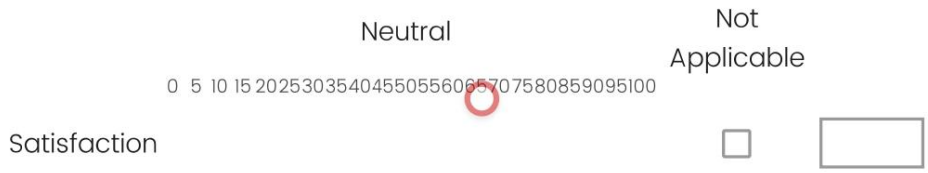
In your opinion are there sufficient outdoor activities available at your university?

	Lack of availability	Neutral	Lots of availability	Not Applicable
Availability	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100			☐

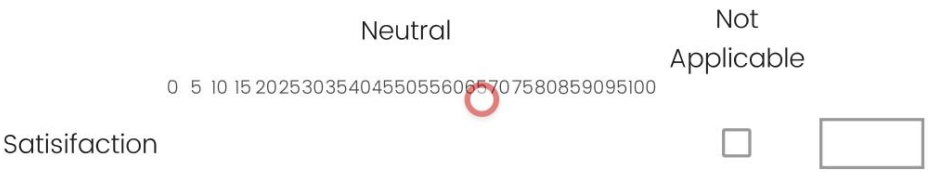
How satisfied are you with the style of teaching?

	Neutral	Not Applicable
Satisfaction	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	☐

How satisfied are you with the style of assessment/examination?



Are you satisfied with the quantity of practically orientated courses/content in your study?



Open Questions

If you've made it this far, let me say thank you :)

Next follows a series of open questions about the general themes discussed in the last section.
This section is optional, and mainly here so that you have

the chance to elaborate on any topics you feel passionate about, and so that I can get a better understanding of what it is in particular you find satisfying or dissatisfying.

If you do take the time to answer the upcoming questions, know that it is greatly appreciated.

What would be your ideal campus, lecture hall, and classroom size?

How would you describe the way students and staff in your university interact with each other? How does it make you feel?

What would make you feel more comfortable in your university environment?

Do you feel that there are extra-curricular activities which are meaningful to you available at your university? What would make the extra-curricular activities currently available more meaningful to you?

To what degree do you feel that university culture inspires you? Does attending university make you feel empowered to take on the larger world?

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Appendix B - SPSS Syntax

```
DATASET ACTIVATE DataSet1.
COMPUTE Total_Rurality=(Q1.5_1 + Q1.8_1 + Q1.9_1 + Q1.12_1 + Q1.14_1 + Q1.15_1) / 6.
EXECUTE.

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SKEWNESS.

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GRAPH
```

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EXECUTE.

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GRAPH
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GRAPH
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```

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  /VARIABLES=Total_Rurality Q2.9_1 Q2.10_1 Q2.11_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.

NONPAR CORR
  /VARIABLES=Total_Rurality Q2.13_1 Q2.14_1 Q2.16_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.

NONPAR CORR
  /VARIABLES=Total_Rurality Q2.17_1 Q2.18_1 Q2.19_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.

GRAPH
  /SCATTERPLOT(BIVAR)=Total_Rurality WITH Q2.16_1
  /MISSING=LISTWISE.

GRAPH
  /SCATTERPLOT(BIVAR)=Total_Rurality WITH Q2.14_1
  /MISSING=LISTWISE.

USE ALL.
COMPUTE filter_$=(Q1.11 = 2).
VARIABLE LABELS filter_$ 'Q1.11 = 2 (FILTER)'.
VALUE LABELS filter_$ 0 'Not Selected' 1 'Selected'.
FORMATS filter_$ (f1.0).
FILTER BY filter_$.
EXECUTE.

NONPAR CORR
  /VARIABLES=Total_Rurality Q2.2_1 Q2.3_1 Q2.4_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.
```

```
NONPAR CORR
  /VARIABLES=Total_Rurality Q2.5_1 Q2.6_1 Q2.7_1 Q2.8_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.

NONPAR CORR
  /VARIABLES=Total_Rurality Q2.9_1 Q2.10_1 Q2.11_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.

NONPAR CORR
  /VARIABLES=Total_Rurality Q2.13_1 Q2.14_1 Q2.16_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.

NONPAR CORR
  /VARIABLES=Total_Rurality Q2.17_1 Q2.18_1 Q2.19_1
  /PRINT=BOTH TWOTAIL NOSIG
  /MISSING=PAIRWISE.

FREQUENCIES VARIABLES=Q2.2_1 Q2.3_1 Q2.4_1 Q2.5_1 Q2.6_1 Q2.7_1 Q2.8_1 Q2.9_1
Q2.10_1 Q2.11_1
    Q2.13_1 Q2.14_1 Q2.16_1 Q2.17_1 Q2.18_1 Q2.19_1
  /STATISTICS=STDDEV VARIANCE RANGE MINIMUM MAXIMUM SEMEAN MEAN MEDIAN
MODE SKEWNESS SESKEW
    KURTOSIS SEKURT
  /HISTOGRAM NORMAL
  /ORDER=ANALYSIS.
```